Office of

Energy Projects

May 2019

Columbia Gas Transmission, LLC **Docket No. CP18-137-000**

Buckeye XPress Project

Environmental Assessment

Cooperating Agencies:

U.S. Forest Service

U.S. Army Corps of Engineers

Washington, DC 20426

FEDERAL ENERGY REGULATORY
COMMISSION

WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:

OEP/DG2E/Gas 1
Columbia Gas Transmission, LLC
Buckeye XPress Project
Docket No. CP18-137-000

TO THE INTERESTED PARTY:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the Buckeye XPress Project, proposed by Columbia Gas Transmission, LLC (Columbia) in the above-referenced docket. Columbia requests authorization to construct and operate facilities in Vinton, Jackson, Gallia, and Lawrence Counties, Ohio and Wayne County, West Virginia. The Buckeye XPress Project would increase the firm natural gas transportation capacity on Columbia's system by 275 million cubic feet per day.

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

The U.S. Army Corps of Engineers and the U.S. Forest Service participated as cooperating agencies in the preparation of the EA. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis. The U.S. Forest Service and the U.S. Army Corps of Engineers will adopt the EA to fulfill their agency's NEPA obligations. The USFS will use the EA, as well as other supporting documentation, to consider the issuance of a special use permit authorization for the portion of the project on National Forest System lands. The U.S. Army Corps of Engineers will use the EA and supporting documentation to consider the issuance of Clean Water Act Section 404 and Rivers and Harbors Act Section 10 permits. Although the cooperating agencies provided input to the conclusions and recommendations presented in the EA, the agencies will present their own conclusions and recommendations in their respective Records of Decision for the project.

The proposed Buckeye XPress Project includes the following facilities:

- 66.1 miles of new, 36-inch-diameter natural gas pipeline and various associated facilities, including four new tie-ins, four new mainline valves,

various other appurtenant facilities, and installation of over-pressure protection at three locations (together resulting in a new R-801 system);

- 0.2 mile of new 4-inch-diameter pipeline for the Wellston Lateral;
- a new regulation run at the existing Ceredo Compressor Station;
- abandonment of 58.7 miles of existing 20-inch-diameter pipeline and associated facilities on Columbia's R-501 system;
- abandonment of 1.1 miles of 2- to 3-inch-diameter distribution pipeline on Columbia's R-530 system; and
- abandonment of 2.1 miles of existing 20- and 24-inch-diameter pipeline and associated facilities on Columbia's R-500 system.

The Commission mailed a copy of the *Notice of Availability* to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries in the project area. The EA is only available in electronic format. It may be viewed and downloaded from the FERC's website (www.ferc.gov), on the Environmental Documents page (https://www.ferc.gov/industries/gas/enviro/eis.asp). In addition, the EA may be accessed by using the eLibrary link on the FERC's website. Click on the eLibrary link (https://www.ferc.gov/docs-filing/elibrary.asp), click on General Search, and enter the docket number in the "Docket Number" field, excluding the last three digits (i.e., CP18-137-000). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at (866) 208-3676, or for TTY, contact (202) 502-8659.

Any person wishing to comment on the EA may do so. Your comments should focus on the EA's disclosure and discussion of potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that the Commission has the opportunity to consider your comments prior to making its decision on this project, it is important that we receive your comments in Washington, DC on or before 5:00 pm Eastern Time on **June 19, 2019.**

For your convenience, there are three methods you can use to file your comments to the Commission. The Commission encourages electronic filing of comments and has staff available to assist you at (866) 208-3676 or FercOnlineSupport@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 also file your comments electronically using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." You must select the type of filing you are making. If you are filing a comment on a particular project, please select "Comment on a Filing"; or

(3) You can file a paper copy of your comments by mailing them to the following address. Be sure to reference the project docket number (CP18-137-000) with your submission: Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street NE, Room 1A, Washington, DC 20426

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (Title 18 of the Code of Federal Regulations, Part 385.214). Motions to intervene are more fully described at http://www.ferc.gov/resources/guides/how-to/intervene.asp. Only intervenors have the right to seek rehearing or judicial review of the Commission's decision. The Commission may grant affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Additional information about the project is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the eLibrary link. The eLibrary link also provides access to the texts of all 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.

TABLE OF CONTENTS

Buckeye XPress Project
Environmental Assessment

TABLE OF CONTENTS i

LIST OF APPENDICES iv

LIST OF TABLES vi

LIST OF FIGURES viii

ACRONYMS AND ABBREVIATIONS ix

A. PROPOSED ACTION A-1
1. Introduction A-1
1.1 Federal Energy Regulatory Commission A-2
1.2 U.S. Department of Agriculture – Forest Service A-3
1.3 U.S. Army Corps of Engineers A-4
2. Purpose and Need A-5
3. Public Review and Comment A-6
4. Proposed Facilities A-8
4.1 Mainline Pipeline Facilities A-11
4.2 Aboveground and Appurtenant Facilities A-12
5. Land Requirements A-13
5.1 Pipeline Facilities A-13
5.2 Aboveground Facilities A-17
5.3 Staging Areas and Contractor Yards A-17
5.1 Access Roads A-18
5.2 Cathodic Protection A-19
5.3 Oak Hill Pond A-19
6. Construction Schedule and Workforce A-21
7. Construction, Operations, and Maintenance Procedures A-21
7.1 General Pipeline Construction Procedures A-22
7.2 Special Pipeline Construction Procedures A-28
7.3 Aboveground Facility Construction Procedures A-37
7.4 BXP Abandonment Procedures A-38
7.5 Environmental Compliance Inspection and Monitoring A-39
7.6 Operations and Maintenance A-40
8. Non-Jurisdictional Facilities A-41
9. Summary of the Proposed Action within the Wayne National Forest A-42
10. Permits and Approvals A-43

B. ENVIRONMENTAL ANALYSIS B-1
1. Geology and Soils B-1
1.1 Geology B-1
1.2 Soils B-28
2. Water Resources and Wetlands B-40
2.1 Groundwater Resources B-40
2.2 Surface Water Resources B-51
2.3 Wetlands B-65
3. Vegetation, Fisheries, and Wildlife B-75
3.1 Vegetation B-75
3.2 Aquatic Resources B-90
3.3 Wildlife Resources B-93
3.4 Conclusions Regarding Impacts on Wildlife Resources B-103

4. Threatened, Endangered, and Other Special Status Species B-104
4.1 Federally Listed Species B-104
4.2 State-Listed Species B-112
4.3 Wayne National Forest B-122
5. Land Use and Visual Resources B-125
5.1 Land Use B-125
5.2 Residential Land and Planned Developments B-128
5.3 Mining Lands and Hazardous Waste Sites B-131
5.4 Public Land, Recreation, and Special Interest Areas B-131
5.5 Visual Resources B-149
6. Socioeconomics B-154
6.1 Employment B-154
6.2 Transportation B-155
6.3 Housing B-157
6.4 Property Values B-157
6.5 Environmental Justice B-158
7. Cultural Resources B-161
7.1 Survey Results B-161
7.2 Native American Consultation B-165
7.3 Wayne National Forest B-167
7.4 Unanticipated Discovery Plan B-169
7.5 Compliance with the National Historic Preservation Act B-169
8. Air and Noise B-171
8.1 Air Quality B-171
8.2 Noise and Vibration B-178
9. Reliability and Safety B-192
9.1 Safety Standards B-192
9.2 Pipeline Accident Data B-199
9.3 Impact on Public Safety B-202
10. Cumulative Impacts B-204
10.1 Other Projects within the Geographic Scope of Analysis B-207
10.2 Cumulative Impacts on Specific Environmental Resources B-219
10.3 Conclusion B-236

C. ALTERNATIVES C-1
1. No-Action Alternative C-3
2. System Alternatives C-4
2.1 Existing Columbia Systems C-5
2.2 Proposed Columbia Systems C-6
2.3 Other Pipeline Systems C-8
3. Route Alternatives and Variations C-8
3.1 Route Alternatives C-9
3.2 Route Variations and Landowner Routing Concerns C-42
4. Abandonment By Removal Alternatives C-50
4.1 Wayne National Forest Removal Alternative 1 ..... C-52
4.2 Wayne National Forest Removal Alternative 2 ..... C-54
4.3 Conclusion for the WNF Removal Alternatives C-57
5. Alternatives Conclusion C-57

D. STAFF CONCLUSIONS AND RECOMMENDATIONS D-1

TABLE OF CONTENTS (CONTINUED)

E. REFERENCES E-1

F. LIST OF PREPARERS F-1

1. FERC F-1
2. Cardno F-1

LIST OF APPENDICES

A-1 **Project Overview Maps**

A-2 **Aboveground Facilities**

A-3 **Additional Temporary Workspaces**

A-4 **Collocations with and Deviations from Existing Rights-of-Way along the R-801 Pipeline**

A-4a *Collocation with Existing Rights-of-Way along the R-801 Pipeline*

A-4b *Collocation with Existing Rights-of-Way along the R-801 Pipeline on Wayne National Forest-Lands*

A-4c *Deviations from Existing Rights-of-Way along the R-801 Pipeline*

A-5 **Staging Areas**

A-6 **Access Roads along the R-801 Pipeline**

A-7 **Pipeline Right-of-Way Width Greater than 75 feet in Wetlands**

A-8 **Public Roads and Railroads Crossed by the R-801 Pipeline**

A-9 **Site-specific Construction Plans for Residences**

A-10 **Steep Slopes**

A-10a *Vertical Slopes Greater than 15 percent Crossed by the R-801 Pipeline*

A-10b *Side Slopes Greater than 15 percent Crossed by the R-801 Pipeline*

A-11 **Wayne National Forest Maps**

A-12 **Draft Construction, Operation, and Maintenance Plan Wayne National Forest**

B.1-1 **Mines within 0.25 mile of Construction Work Areas**

B.1-2 **Oil and Natural Gas Wells within 0.25 mile of Construction Work Areas**

B.1-3 **Areas with Greater Potential for Landslides along the R-801 Pipeline**

B.2-1 **Water Wells and Springs within 150 feet of Construction Work Areas**

B.2-2 **Surface Water Resources Crossed or Within the Project Footprint**

B.2-3 **303(d) Impaired Waterbodies Crossed by the Project**

B.2-4 **Hydrostatic Test Water Requirements, Water Sources, and Discharge Locations**

B.2-5 **Wetland Resources Crossed or within the Project Footprint**

B.3-1 **Common Invasive and Ohio State-Prohibited Noxious Weed Species Observed in the Buckeye XPress Project Area**

B.4-1 **Federally Listed Species with Potential to Occur in the Project Area**

B.4-2 **State Listed and Regional Forester Sensitive Species with Potential to Occur in the Project Area**

B.4-3 **Biological Evaluation Wayne National Forest**

B.5-1 **Structures within 50 feet of Construction Work Areas**

B.5-2 **Elkins Creek Horse Camp and Tack Shop Vicinity**

B.5-3 **Scenic Integrity Objectives**

B.6-1 **Ethnic and Poverty Statistics in the Counties and Census Blocks Affected by the Buckeye XPress Project**

B.8-1 **Noise Impacts from Nighttime Construction**

B.9-1 **Class Locations Crossed by R-801**

B.10-1 **Cumulative Impacts - Other Projects Table**

C-1 **System Alternatives for the Buckeye XPress Project**

LIST OF APPENDICES (CONTINUED)

C-1a *Columbia R-System Alternative (Option 1)*
C-1b *Columbia R-System Alternative (Option 2)*
C-1c *Columbia T-System and SM-80 System Expansion Alternative*
C-1d *Columbia Mountaineer XPress System Alternative*
C-1e *TETCO System Alternative*
C-1f *TGP System Alternative*
C-1g *REX System Alternative*
C-1h *Rover System Alternative*
C-2 **Wayne National Forest Avoidance Alternatives**
C-2a *Wayne National Forest Avoidance Alternative - West*
C-2b *Wayne National Forest Avoidance Alternative - East*
C-3 **Minor Route Modifications Adopted by Columbia**
C-3a *Minor Route Modifications Adopted by Columbia before Submittal of Its Application*
C-3b *Minor Route Modifications Adopted by Columbia after Submittal of Its Application*

LIST OF TABLES

Table	Title	Page
A-1	Issues Identified During the Public Scoping Process	A-8
A-2	Summary of Land Requirements	A-14
A-3	Pipeline Facilities	A-15
A-4	Contractor Yards	A-18
A-5	Cathodic Protection Areas	A-20
A-6	Minimum Depth of Cover Over the Pipeline	A-26
A-7	Proposed Horizontal Directional Drill Locations	A-30
A-8	Public Roads and Railroads Crossed by the Proposed R-801 Pipeline	A-33
A-9	Utility Lines Crossed by the Proposed R-801 Pipeline	A-34
A-10	Non-Jurisdictional Facilities for the Buckeye XPress Project	A-42
A-11	Environmental Permits, Approvals, and Consultations	A-43
B.1-1	Summary of Underground Coal Mines within 0.25 mile of Construction Work Areas	B-3
B.1-2	Summary of Surface Coal Mines within 0.25 mile of Construction Work Areas	B-3
B.1-3	Summary of Surface Industrial Mines within 0.25 mile of Construction Work Areas	B-5
B.1-4	Features Consistent with Landslide Morphology Within 500 Feet of the R-801 Pipeline	B-7
B.1-5	Subsidence Features within 1 mile of Construction Work Areas	B-10
B.1-6	Preliminary Identified Underground Mine Subsidence Risk Areas	B-12
B.1-7	Preliminary Identified Surface Mine Subsidence Risk Areas	B-14
B.1-8	Crossing of FEMA 100-year Floodplains for the Buckeye XPress Pipeline	B-18
B.1-9	Soil Characteristics Affected by Project Construction (acres)	B-29
B.2-1	Wellston Public Water System (ID# OH40019192) Groundwater Protection Areas That Would Be Crossed by the Project	B-44
B.2-2	Summary of Groundwater Wells and Springs within 150 feet of the Proposed Buckeye XPress Project	B-46
B.2-3	Summary of Waterbodies Crossed by Construction of Project Facilities (FERC Classification)	B-52
B.2-4	Summary of Waterbodies Crossed by Construction of Project Facilities (Flow Regime)	B-53
B.2-5	State Resource Waters Crossed or within the Project Footprint a/	B-54
B.2-6	Summary of Waterbodies Crossed by Construction of Project Facilities on WNF Lands (FERC Classification)	B-56
B.2-7	Summary of Waterbodies Crossed by Construction of Project Facilities on WNF Lands (Flow Regime)	B-57
B.2-8	Proposed Water Appropriation and Amounts for the Buckeye XPress Project	B-63
B.2-9	Summary of Wetland Resources Crossed by Construction of Project Facilities	B-67
B.2-10	Summary of Wetland Resources to be Matted	B-68
B.2-11	Summary of Category 3 Wetland Crossings	B-70
B.3-1	Vegetation Resources of Special Concern Crossed by the Buckeye XPress Project Within the Wayne National Forest	B-77
B.3-2	Vegetation Communities Affected by the Buckeye XPress Project (in acres)	B-80
B.3-3	Estimated Effects of the Buckeye XPress Project on Interior Forest and Edge Habitat in the Vicinity of the R-801 Pipeline	B-85
B.3-4	Estimated Effects of the Buckeye XPress Project on Interior Forest and Edge Habitat in the Vicinity of the R-801 Pipeline in the Wayne National Forest	B-88

LIST OF TABLES (CONTINUED)

B.3-5	Birds of Conservation Concern with Potential to Occur in the Buckeye XPress Project Area	B-100
B.4-1	Proposed Project Work Areas Located Outside of MSHCP-Covered Lands	B-106
B.4-2	Streams Crossed by the Project that Meet Ohio Mussel Survey Protocol Criteria	B-119
B.4-3	Non-Target State-Listed Plant Species Document During 2018 Surveys	B-121
B.5-1	Recreation, Public Interest, and Conservation Areas Crossed by the Project	B-132
B.5-2	Summary of Land Use Impacts on Wayne National Forest Lands	B-142
B.5-3	Public Roads Crossed by the R-801 Pipeline on Wayne National Forest Lands	B-144
B.5-4	Access Roads on Wayne National Forest Lands	B-145
B.5-5	Scenic Byways Crossed by the R-801 Pipeline	B-152
B.6-1	Demographics and Low-Income Populations in the Buckeye XPress Project Area	B-159
B.7-1	National Register of Historic Places-Listed or Eligible Architectural Resources	B-164
B.8-1	Estimated Construction Emissions	B-177
B.8-2	Estimated Operational Emissions	B-178
B.8-3	Noise Impacts from Horizontal Directional Drilling	B-187
B.8-4	Noise Impacts from Blowdowns	B-189
B.8-5	Noise Impacts from Regulation Run at the Ceredo Compressor Station	B-191
B.9-1	Emergency Response Resources and Personnel along the Pipeline Route	B-197
B.9-2	Natural Gas Transmission Pipeline Significant Onshore Incidents by Cause (1999-2018)	B-200
B.9-3	Natural Gas Transmission Pipeline Outside Forces Onshore Incidents by Cause (1999-2018)	B-201
B.9-4	Injuries and Fatalities – Natural Gas Transmission Pipelines	B-202
B.9-5	Accidental Deaths by Cause	B-203
B.10-1	Resource-Specific Geographic Regions for Determining Cumulative Impacts for the Project	B-206
B.10-2	Affected HUC-12 Watersheds Affected by the Buckeye XPress Project (During Construction)	B-210
C-1	Route Alternative 1 Comparison	C-13
C-2	Route Alternative 2 Comparison	C-16
C-3	Route Alternative 3 Comparison	C-19
C-4	Route Alternative 4 Comparison	C-22
C-5	Route Alternative 5 Comparison	C-25
C-6	Route Alternative 6 Comparison	C-28
C-7	Route Alternative 7 Comparison	C-31
C-8	Route Alternative 8 Comparison	C-34
C-9	Route Alternative 9 Comparison	C-38
C-10	Route Alternative 10 Comparison	C-41
C-11	Private Landowner Routing Concerns	C-43
C-12	Wayne National Forest Removal Alternative 1	C-52
C-13	Wayne National Forest Removal Alternative 2	C-55

LIST OF FIGURES

Number	Title	Page
A-1	Project Location Map	A-10
A-2	Typical Pipeline Construction Sequence	A-24
B.2-1a	Groundwater and Surface Water Protection Areas for the Wellston Public Water System	B-42
B.2-1b	Groundwater and Surface Water Protection Areas for the Ironton and Portsmouth Public Water Systems	B-43
B.8-1	NSAs Near the Highway 32 HDD Crossing	B-182
B.8-2	NSAs Near the Highway 35 HDD Crossing	B-183
B.8-3	NSAs Near the Wetland W-545B HDD Crossing	B-184
B.8-4	NSAs Near the Wetland W-558B HDD Crossing	B-185
B.8-5	NSAs near the Ceredo Compressor Station	B-190
B.10-1	Buckeye XPress – Projects Contributing to Cumulative Impacts	B-208
C-1	Route Alternative 1	C-11
C-2	Route Alternative 2	C-15
C-3	Route Alternative 3	C-18
C-4	Route Alternative 4	C-21
C-5	Route Alternative 5	C-24
C-6	Route Alternative 6	C-27
C-7	Route Alternative 7	C-30
C-8	Route Alternative 8	C-33
C-9	Route Alternative 9	C-37
C-10	Route Alternative 10	C-40
C-11	Landowner Routing Concern Parcel OH-JA-054.540	C-46
C-12	Landowner Routing Concern – OVCC Parcels OH-JA-185.00 & OH-JA-185.210	C-49

ACRONYMS AND ABBREVIATIONS

Abbreviation	Definition
ACRP	Abandonment and Capacity Restoration Project
AEP	American Electric Power
AMMs	avoidance and minimization measures
APE	Area of Potential Effects
AQCR	Air Quality Control Region
ASME	American Society of Mechanical Engineers
ATWS	additional temporary work space
BCC	Birds of Conservation Concern
bcf/day	billion cubic feet per day
BMP	Best Management Practice
BXP	Buckeye XPress Project
CAA	*Clean Air Act*
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalents
COE	U.S. Army Corps of Engineers
Columbia	Columbia Gas Transmission, LLC
COM Plan	*Construction, Operation, and Maintenance Plan*
Commission	Federal Energy Regulatory Commission
Crescent	Crescent Brick Company
CRP	Conservation Reserve Program
CS	Compressor Station
CSR	Code of State Rules
CWA	*Clean Water Act*
dB	decibel
dBA	A-weighted sound level
DMR	Division of Mineral Resources
DOW	Division of Wildlife
EA	Environmental Assessment
ECS	Environmental Construction Standards
EI	Environmental Inspector
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	*Endangered Species Act of 1973*
FAA	Federal Aviation Administration
fbs	feet below the ground surface
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FERC Plan	*FERC Upland Erosion Control, Revegetation, and Maintenance Plan*

FERC Procedures	*FERC Wetland and Waterbody Construction and Mitigation Procedures*
FSM	Forest Service Manual
FWS	U.S. Fish and Wildlife Service
g	gravity
GHG	greenhouse gas
GWP	global warming potential
HAP	hazardous air pollutants
HCA	high consequence area
HDD	horizontal directional drill
hp	horsepower
HUC	hydrologic unit code
IBA	Important Bird Area
IMP	integrity management program
IR	inadvertent release
L_{dn}	day-night sound level
$L_{eq(24)}$	24-hour equivalent sound level
LiDAR	Light Detection and Ranging
LXP	Leach XPress Project
MA	management area
MAOP	maximum allowable operating pressure
Mcf	thousand cubic feet
MLV	mainline valve
MMcf	million cubic feet
MP	milepost
MSHCP	Multi-Species Habitat Conservation Plan
MXP	Mountaineer XPress Project
NAAQS	National Ambient Air Quality Standards
NAGPRA	*Native American Graves Protection and Repatriation Act of 1990*
NEPA	*National Environmental Policy Act of 1969*
NFS	National Forest System
NGA	*Natural Gas Act of 1938*
NNIS	Non-native Invasive Species
NO_2	nitrogen dioxide
NOI	*Notice of Intent to Prepare an Environmental Assessment for the Planned Buckeye XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings*
NO_x	nitrogen oxides
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive area
NWI	National Wetland Inventory
O_3	ozone

OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
°F	Fahrenheit
OPP	over-pressure protection
OVCC	Ohio Valley Conservation Coalition
PEM	palustrine emergent
PFO	palustrine forested
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM	particulate matter
PM_{10}	particulate matter with aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with aerodynamic diameter less than or equal to 2.5 microns
PRCI	Pipeline Research Council International
Project	Buckeye XPress Project
psig	pounds per square inch gauge
PSS	palustrine scrub-shrub
PUB	palustrine unconsolidated bottom
Range	Range Resources-Appalachia, LLC
RFSS	regional forester sensitive species
RS	Regulator Station
SHPO	State Historic Preservation Office
SIO	Scenic Integrity Objectives
SM-80	SM-80 MAOP Restoration Project
SO_2	sulfur dioxide
SPRP	*Spill Prevention and Response Plan for Construction Activities*
SUP	Special Use Permit
TGP	Tennessee Gas Pipeline Company, LLC
U.S.C.	United States Code
UDP	*Unanticipated Discoveries Plan for Cultural Resources and Human Remains*
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VOC	volatile organic compound
VS	Valve Site
WNF	Wayne National Forest
WVDCH	West Virginia Division of Culture and History
WVDEP	West Virginia Department of Environmental Protection

A. PROPOSED ACTION

1. Introduction

On March 26, 2018, Columbia Gas Transmission, LLC (Columbia), a subsidiary of TransCanada Corporation, filed an application with the Federal Energy Regulatory Commission (FERC or Commission) in Docket No. CP18-137-000 for a Certificate of Public Convenience and Necessity (Certificate) under Section 7(c) of the *Natural Gas Act of 1938* (NGA) to construct, abandon, modify, and operate a natural gas transmission pipeline and related facilities in Ohio and West Virginia.

Columbia's proposed Project, referred to as the Buckeye XPress Project (BXP or Project), would include construction of 66.1 miles of new 36-inch-diameter natural gas pipeline, both replacing and expanding upon Columbia's existing R-500 and R-501 pipelines; four new mainline valves (MLV); four new tie-in assemblies; three bi-directional pig[1] launchers/receivers; regulation facilities; a cathodic protection system; and various other appurtenant facilities in Vinton, Jackson, Gallia, and Lawrence Counties, Ohio. In addition, Columbia proposes to install a regulation run at Columbia's existing Ceredo Compressor Station (CS) in Wayne County, West Virginia. As part of the replacement portion of the Project, Columbia would abandon 60.8 miles of existing 20-inch- and 24-inch-diameter pipelines (R-500 and R-501), largely in place; permanently stabilize abandoned pipeline components; remove certain aboveground facilities; and construct the Wellston Lateral to maintain an existing delivery point.

The replacement portion of the Project would help maintain the current R-System's transportation of over 1.0 billion cubic feet per day (bcf/day) of natural gas. Columbia stated that existing customers and contracts would support the replacement and modernization portion of its Project's transportation capacity. The expansion portion of the Project, demonstrated by the replacement of existing 20-inch- and 24-inch-diameter pipelines (essentially acting collectively as a single linear pipeline) with a new 36-inch-diameter pipeline, would enable Columbia to deliver an additional 0.275 bcf/day of natural gas beyond current capacity.

We[2] prepared this Environmental Assessment (EA) in compliance with the requirements of the *National Environmental Policy Act of 1969* (NEPA), the Council on Environmental Quality (CEQ) regulations for implementing NEPA [Title 40 of the Code of Federal Regulations Parts 1500-1508 (40 CFR 1500-1508)], and the Commission's implementing regulations under 18 CFR 380.

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

[2] "We," "us," and "our" refer to the environmental staff of the Office of Energy Projects.

The assessment of environmental impacts is an integral part of FERC's decision on whether to issue Columbia a Certificate to construct, modify, and operate the proposed facilities. Our principal purposes in preparing this EA are to:

- identify and assess potential impacts on the natural and human environment that would result from the proposed action;
- assess reasonable alternatives to avoid or minimize adverse effects to the environment;
- identify and recommend mitigation measures, as necessary, to minimize environmental impacts; and
- facilitate public involvement in the environmental review process.

The FERC is the lead federal agency for the preparation of this EA. The U.S. Forest Service (USFS) and the U.S. Army Corps of Engineers (COE) are federal cooperating agencies who assisted us in preparing this EA because they have jurisdiction by law or special expertise with respect to environmental impacts associated with Columbia's proposal. The federal cooperating agencies may adopt this EA per 40 CFR 1501.3 if, after an independent review of the document, they conclude that their 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 or determinations. Otherwise, they may elect to conduct their own supplemental environmental analyses.

1.1 Federal Energy Regulatory Commission

The FERC is an independent federal agency responsible for evaluating applications for authorization to construct and operate interstate natural gas pipeline facilities. If the Commission determines a project is required by the public convenience and necessity, a Certificate is issued under Section 7(c) of the NGA and Part 157 of the Commission's regulations. As such, the FERC is the lead federal agency for the preparation of the EA in compliance with the requirements of NEPA, the CEQ regulations for implementing the procedural provisions of NEPA (40 CFR 1500-1508), and FERC's regulations implementing NEPA (18 CFR 380).

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

1.2 U.S. Department of Agriculture – Forest Service

The USFS is a civilian federal agency within the U.S. Department of Agriculture (USDA). The mission of the USFS is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations. It is the responsibility of the USFS to manage the surface resources of national forests for multiple uses, such as water, forage, wildlife, wood, recreation, minerals, and wilderness; and to provide products and benefits to benefit the American people while ensuring the productivity of the land and protecting the quality of the environment.

The Project would cross and affect National Forest System (NFS) lands of the Wayne National Forest (WNF). Pursuant to the *Mineral Leasing Act of 1920* and in accordance with federal regulations in 43 CFR 2880, Columbia must secure a Special Use Permit (SUP) from the USFS to cross NFS lands on the WNF in areas with no existing easement. In order to authorize the SUP, the USFS must first conduct an analysis and make a decision under NEPA. A finding must be made by the USFS that the construction, occupancy, and maintenance of the proposed new R-801 pipeline and the abandonment of the R-501 pipeline would not cause significant effects to the human environment, and if no significant effects are identified, then a decision can be made whether to issue a SUP with terms and conditions to protect resources during construction, operation, and maintenance of the Project. This decision would be subject to the pre-decisional administrative review process found at 36 CFR 218. A SUP would only be issued for the areas where Columbia does not hold existing easement rights; however, the entire R-801 construction and R-501 abandonment areas are considered for possible effects because this represents the entirety of the Project (i.e., actions on easement areas are connected to actions on permit areas; neither action would occur without the other).

The USFS will use this EA to review the Project pursuant to 40 CFR 1506.3(c) and in accordance with other applicable regulations and policy guidance including, but not limited to, 36 CFR 251.54, 220, and 219.15; Forest Service Handbook 1909.15 – National Environmental Policy Act Handbook; and Forest Service Manual 2700 – Special Uses Management (Forest Service Manual [FSM] 2700), Chapter 2720 – Special Uses Administration (2726.31b through 2726.31e, 2726.32, 2726.33, 2726.34, etc.). The USFS would consider adopting this EA for agency decisions if, after an independent review of the EA, the USFS concurs the analysis provides sufficient evidence to support agency decisions and is satisfied that agency comments and suggestions have been addressed. Because the proposed R-801 line is greater than 24 inches in diameter, the Responsible Official for making the USFS decision is the Regional Forester for the Eastern Region.

In July 2017 and March 2018, Columbia applied to the USFS for a SUP to replace and operate its pipeline on the WNF. The USFS is considering issuing a SUP that would provide the terms and conditions for replacement and operation of the Project on NFS lands where Columbia does not hold an existing easement in response to Columbia's application. Issuance of the SUP must be in accordance with 36 CFR 251 Subpart B, the *Mineral*

Leasing Act of 1920 (as amended), relevant USFS manual and handbook direction, and the WNF *Land and Resources Management Plan* (Forest Plan). In making this decision, the USFS will consider several factors including conformance with the 2006 WNF Forest Plan and impacts on resources and programs. Following adoption of the EA, the USFS would issue a Decision Notice and Finding of No Significant Impact that documents the decision whether to issue the SUP to Columbia. This decision would be subject to pre-decisional administrative review under 36 CFR 218.

The issuance of a SUP for non-easement areas by the USFS would be in addition to any authorization issued by FERC for the Project. The pipeline right-of-way, if approved, would be authorized by issuance of a short-term SUP from the USFS for the pipeline clearing and construction phase, which would terminate upon completion of construction. A long-term SUP for ongoing pipeline operations and maintenance for up to a 30-year term would then be issued, which would reflect the final location of the pipeline and associated facilities, the associated maintenance corridor, and roads on federal lands that are necessary for Project operations.

USFS policy in FSM 2703.2(2) directs the agency to consider the public interest and authorize use of NFS lands only if a) the proposed use is consistent with the mission of the USFS to manage NFS lands and resources in a manner that will best meet the present and future needs of the American people, taking into account the needs of future generations for renewable and nonrenewable resources; and b) the proposed use cannot reasonably be accommodated off of NFS lands. FSM 2703.2(3) also states to not authorize the use of NFS lands solely because it affords the applicant lower cost or less restrictive location when compared with non-NFS lands.

About 12.6 miles of the proposed R-801 pipeline mainline right-of-way would cross the Ironton District of the WNF in Gallia and Lawrence Counties, Ohio, and 2.6 miles of the WNF would be affected by pipeline abandonment activities. There are no major aboveground facilities (such as compressor stations, metering and regulating stations, or valves) proposed within the WNF, although there would be minor appurtenances that include line markers, which would be entirely contained within the operational right-of-way as required by the U.S. Department of Transportation (USDOT) – Pipeline and Hazardous Materials Safety Administration (PHMSA) safety regulations. A summary of the proposed action as it applies to the WNF is found in EA section A.9, and a detailed accounting of land requirements on NFS lands is provided in section B.5.

1.3 U.S. Army Corps of Engineers

The COE is a federal agency within the U.S. Department of Defense with jurisdictional authority pursuant to Section 404 of the *Clean Water Act* (CWA) (Title 33 of the United States Code, Section 1344 [33 U.S.C. 1344]), which governs the discharge of dredged or fill material into waters of the United States, and Section 10 of the *Rivers and Harbors Act of 1899* (33 U.S.C. 403), which regulates any work or structures that

potentially affect the navigable capacity of a waterbody. Because the COE would need to evaluate and approve aspects of the Project and must comply with the requirements of NEPA before issuing permits under the above statutes, it has elected to participate as a cooperating agency in the preparation of this EA. As the lead federal agency for NEPA, the FERC is required to complete any required consultations, such as those under Section 7 of the *Endangered Species Act of 1973* (ESA) and Section 106 of the *National Historic Preservation Act of 1966*. The COE would adopt the EA per 40 CFR 1506.3 if, after an independent review of the document, it concludes the EA satisfies the COE's comments and recommendations, and all required consultations are complete.

Section 401 of the CWA requires that proposed dredge or fill activities permitted under Section 404 be reviewed and certified by the designated state agency (in this case, the Ohio Environmental Protection Agency [OEPA]) to ensure the Project meets state water quality standards. If the Project is authorized by the Commission, Columbia would not be allowed to commence construction until it had received all necessary federal authorizations including the Section 401 and 404 CWA permits. The COE requires Section 10 permitting due to the proposed water withdrawal from the Ohio River at River Mile 313.9.

The proposed Project is within the Huntington District of the COE. Columbia submitted its pre-construction notifications for Nationwide Permit 12 in March 2018, along with a January 2019 amendment. As an element of its review, the COE must consider whether a proposed project avoids, minimizes, and compensates for impacts on existing aquatic resources, including wetlands, to strive to achieve a goal of no overall net loss of aquatic resource values and functions. Based on its participation as a cooperating agency and its consideration of the EA (including responses to public comments), the COE would issue a Record of Decision to formally document its decision on the proposed action, including required environmental mitigation commitments.

2. Purpose and Need

Columbia states the purpose of the proposed Project is two-fold. Columbia's first objective is to replace 60.8 miles of the aged R-500 and R-501 pipelines with a new pipeline in order to increase reliability and safety of its existing system. Both the R-500 and R-501 pipelines were installed in the 1940s and they developed wrinkle bends, an artifact of decades old construction practices that can weaken the strength of the pipe, potentially causing issues with reliability and safety. Replacement of pipe with wrinkle bends is required by USDOT regulations. Columbia's second objective is to upsize the replacement pipeline from 20-inch- or 24-inch-diameter to 36-inch-diameter (hereinafter R-801) to create an additional 0.275 bcf/day of transportation capacity. The maximum allowable operating pressure (MAOP) for the proposed R-801 pipeline would be 1,440 pounds per square inch gauge (psig) from the McArthur Regulator Station (RS) to the existing Oak Hill CS suction line. The MAOP from the Oak Hill CS discharge line to the Burlington RS would be 900 psig in order to match the existing MAOP on the R-601 and

R-701 pipelines. Columbia stated that it had received substantial bids during a non-binding open season for the Project and that negotiations with various natural gas shippers were ongoing. Columbia also indicated that there was a continuing need to transport increasing natural gas supply from Ohio and the Marcellus and Utica Shales region to markets, particularly in Appalachia, and to support regional power generation. In order to accommodate anticipated future natural gas transportation demand, as well as to minimize potential future impacts on landowners and the environment, Columbia is proposing to increase the overall capacity of its system relative to the existing facilities.

3. Public Review and Comment

On August 1, 2017, the Commission granted Columbia's request to use FERC's pre-filing process under Docket No. PF17-6-000. The pre-filing process is designed to encourage early involvement by citizens, governmental entities, non-governmental organizations, and other interested parties in the development of proposed natural gas transmission projects, prior to the filing of a formal application. During the pre-filing process, we worked with Columbia and interested stakeholders, including federal and state agencies, to identify and resolve Project-related issues. We participated in bi-weekly conference calls with Columbia to discuss relevant Project issues, and we encouraged Columbia to communicate frequently with the public and resource agencies throughout the pre-filing process.

Columbia hosted three open house meetings in Ohio to inform stakeholders about the BXP and provide an opportunity for stakeholders to ask questions and express concerns. These meetings were held on August 15, 2017, in McArthur (31 attendees); August 16, 2017, in Oak Hill (30 attendees); and August 17, 2017, in Ironton (45 attendees). FERC environmental staff attended the open house meetings and conducted site visits in the Project area. Discussion topics raised by open house attendees centered on the planned Project scope and need, schedule, routing, impacts on farming, and tract-specific questions and concerns.

On October 16, 2017, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned Buckeye XPress Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (NOI). The NOI was published in the Federal Register and was mailed to 598 interested parties, including federal, state, and local government representatives and agencies; elected officials; affected landowners; environmental and public interest groups; potentially interested Native American tribes; other interested parties; and local libraries and newspapers. Written comments were requested from the public on specific concerns about the proposed BXP or issues that should be considered during the preparation of the EA.

The Commission received 12 comment letters during the public scoping period (October 16, 2017 through November 16, 2017) in response to the NOI. We also conducted two public scoping meetings in Ohio to accept comments on the proposed Project. Scoping meetings were held on October 24, 2017, in Ironton and October 25, 2017, in Jackson. No commentors spoke on the record at the Ironton meeting. Five individuals spoke at the Jackson meeting expressing their comments for both support of and opposition to the Project, and potential impacts on farming, drain tiles, grazing for horses, safety and shut off valves, loss of existing residential gas service, and water wells. Two written comments were also submitted at the Jackson meeting; topics included seeding, revegetation with pollinator species, need for the Project, wildlife, pipeline abandonment, and pipeline leaks.[3] The environmental comments received in response to the NOI and additional comments received to date are addressed in section B of this EA, while section C contains our evaluation of alternatives. A summary of all comments received is presented in table A-1.

After filing its application on March 26, 2018, Columbia placed copies of its application at six public libraries within the Project area. In addition, Columbia mailed Project information letters to affected landowners just after the FERC issued the Notice of Application on April 9, 2018 and also published a public notice in four newspapers located along the Project route.

[3] Transcripts of the comments are on e-library (Accession Nos. 20171024-4004 and 20171025-4006).

TABLE A-1
Issues Identified During the Public Scoping Process

Issue	EA Section(s) Addressing Issue
Air quality	B.8.1
Alternatives, routing	C
Cultural resources	B.7
Cumulative impacts	B.10
Erosion and sediment control	A.7, B.1
Farming, grazing, soils, drain tiles	A.7, B.1, B.5
Forests, vegetation, seeding, invasive species	B.3
Greenhouse gases and climate change	B.8.1, B.10
Inspections during construction	A.7
Loss of existing residential gas service	A.3
Need, expansion component	A.2, C.3
Noise	B.8.2
Safety, emergency system shutdown, leaks	B.9
Scope of the EA and NEPA analysis	A.1
Socioeconomic impacts	B.6
Threatened and endangered species impacts, wildlife and fisheries, pollinators	B.3, B.4
Wayne National Forest	multiple sections
Wetland and waterbody impacts and mitigation, wells and springs	B.2

4. Proposed Facilities

The locations of the proposed Project facilities are described below, and shown on figure A-1 and detailed location maps in appendix A-1. The Project would consist of two major components: the BXP Replacement (which also includes an expansion element beyond existing facilities including an increase in pipeline diameter from either 20 or 24 inches to 36 inches) and the BXP Abandonment. The BXP Replacement facilities are depicted in figure A-1 and would include:

- construction of 66.1 miles of new 36-inch-diameter natural gas pipeline (R-801) extending from the existing McArthur RS to the existing Burlington RS and crossing portions of Vinton, Jackson, Gallia, and Lawrence Counties, Ohio;
- relocation of an existing bi-directional pig launcher/receiver as well as installation of three new bi-directional pig launchers/receivers;

- construction of four tie-ins;
- construction of four MLVs;
- installation of over-pressure protection (OPP) at three locations; and
- installation of a regulation run.

The BXP Abandonment facilities are also depicted on figure A-1 and would in part include the in-place abandonment of 58.7 miles of Columbia's 20-inch-diameter R-501 pipeline. Columbia's 20-inch- and 24-inch-diameter R-500 pipeline (2.1 miles) would also be largely abandoned in-place, except for small segments that would be replaced within the same trench through the "lift and lay" method as described further below. BXP Abandonment activities would also include the following activities along the R-501 and R-500 pipelines:

- removal of two MLVs;
- removal of crossover piping at valve settings and where the R-501 pipeline would cross the existing R-601 and R-701 pipelines and the proposed R-801 pipeline;
- removal of associated aboveground facilities;
- plugging and removal of consumer taps;
- removal of exposed pipeline segments;
- cutting, plating (including welding a plate to the openings of the pipe where pipeline segments would be removed), and grouting of the pipelines at road crossings, railroad crossings, and under Lake Rupert; and
- installation of connection piping to maintain service to existing customers.

In addition, BXP Abandonment activities would include construction of a new 0.2-mile-long, 4-inch-diameter pipeline lateral to maintain existing service to the City of Wellston (Wellston Lateral) and because of in-place abandonment of 1.1 miles of the 2-inch- and 3-inch-diameter R-530 distribution line.

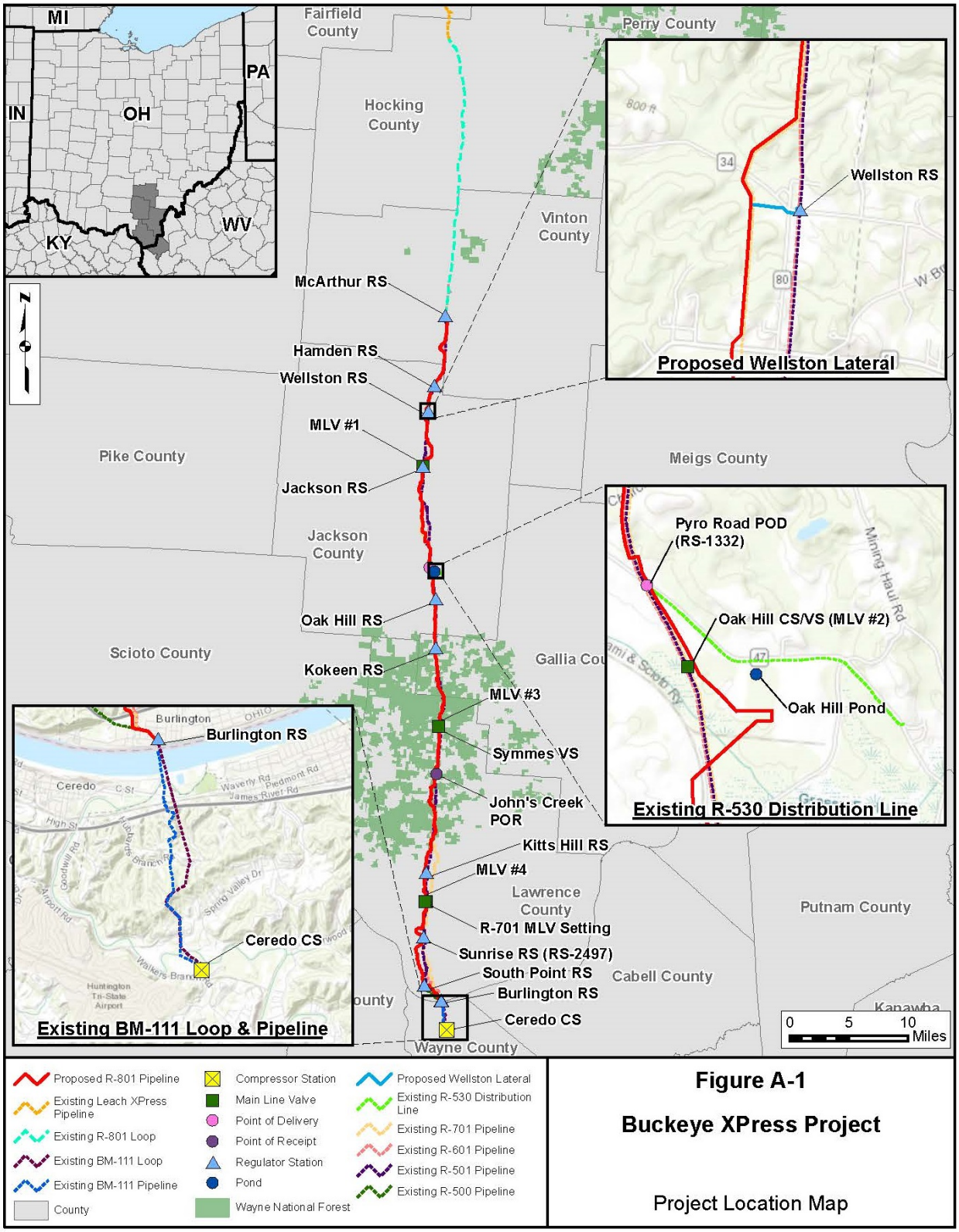


Figure A-1

Buckeye XPress Project

Project Location Map

4.1 Mainline Pipeline Facilities

The 66.1-mile-long, 36-inch-diameter R-801 pipeline would begin at the existing McArthur RS in Vinton County, Ohio at milepost (MP)[4] 0.0 and extend south to the Burlington RS in Lawrence County, Ohio at MP 66.1. Columbia stated that it routed the R-801 pipeline to maximize the extent of collocation, which it defines as locations where the R-801 permanent right-of-way would directly abut an existing right-of-way. Columbia would overlap the new R-801 pipeline construction right-of-way by up to 25 feet in multiple segments of its own existing right-of-way totaling approximately 3 miles. Where the proposed pipeline would abut an existing pipeline, the typical offset from the existing pipeline to the proposed R-801 workspace would be 25 feet.

Columbia adopted additional route alternatives and variations in an October 2018 filing, which reduced the amount of collocated right-of-way from about 53 percent as indicated in the March 2018 application to about 51 percent. Approximately 34 miles of the R-801 pipeline route would be adjacent to existing pipeline corridors, electric transmission lines, or other linear infrastructure.

In addition, minor alignment shifts may be required (if the Project is certificated) prior to and during construction to accommodate currently unforeseeable site-specific constraints related to engineering, landowner, and environmental concerns. All such alignment shifts would be subject to review and approval by the FERC, unless they are minor field realignments (e.g., pipeline centerline shifts contained within the permanent right-of-way) per landowner needs and requirements which would not affect other landowners or sensitive environmental areas such as wetlands.

Columbia would install about 0.3 mile of the R-801 pipeline from MPs 64.1 to 64.2 and from MPs 65.9 to 66.2 within the existing R-500 trench through the "lift and lay" method. At those locations, Columbia would cut, remove, and replace the old sections of the R-500 pipeline in the same trench with the new R-801 pipeline. Columbia would use this technique at these two locations due to residential encroachment and to avoid direct impacts on the adjacent residences. The use of the "lift and lay" technique would result in a 3-week loss of natural gas service via pipeline to the City of South Point, but Columbia would mitigate this outage by coordinating the timing with the City and by temporarily providing replacement natural gas with compressed natural gas tanks. In addition to service interruptions for customers extending for up to 8 months or more, Columbia stated that terrain, environmental conditions, and the existence of numerous other pipelines in or along the existing R-System corridors requiring construction directly over active pipelines

[4] No modifiers are used to denote mileposts along the proposed R-801 pipeline, but modifiers are used for other mileposts as follows: "A" is used for the R-501, "B" is used for the R-500, "C" is used for the Wellston Lateral, and "D" is used for the R-530.

would also preclude use of the "lift and lay" technique at other locations as discussed further in section C.3.2.

Certain segments of the pipeline would not be collocated in order to reduce impacts on sensitive resources, to address residents' and other stakeholders' concerns, and to avoid specific construction constraints, including the presence of other pipelines owned by Columbia and other companies. Additional detail on areas of collocation can be found in section A.5.1.

4.2 Aboveground and Appurtenant Facilities

New Facilities for BXP Replacement

As part of the new R-801 pipeline, Columbia would install multiple new aboveground facilities and associated components, including pig launchers/receivers, tie-ins, MLVs, and OPP facilities. These facilities are listed and detailed in appendix A-2 and are described further below. In addition, Columbia would install a regulation run on Columbia's existing BM-111 Loop at the Ceredo CS, separate from the proposed R-801 pipeline.

Pig Launchers/Receivers

Columbia would remove an existing bi-directional pig launcher/receiver from the McArthur RS and relocate it to the Burlington RS. Two new bi-directional pig launchers/receivers would be installed at the existing Oak Hill CS and Valve Site (VS), and one new bi-directional pig launcher/receiver would be installed at the Burlington RS.

Tie-ins

The BXP would include a tie-in of the proposed R-801 pipeline to Columbia's existing R-801 Loop at the McArthur RS at the northern end of the Project, additional tie-ins of R-801 to Columbia's existing R-601 and R-701 pipelines, and a tie-in of the R-801 pipeline to Columbia's existing BM-111 and BM-111 Loop pipelines at the southern end of the Project.

Mainline Valves

Four new 36-inch MLVs would be installed at MPs 14.4 (west of the existing Jackson RS), 24.7 (near the existing Oak Hill CS), 38.7 (west of the Symmes VS), and 55.3 (near the R-601 pipeline).

Over-Pressure Protection Facilities

Columbia would install OPP at three locations for the R-801 pipeline at existing connections with the Jackson RS, Oak Hill CS/VS, and the Burlington RS.

BXP Abandonment

As part of the Abandonment component of the Project, Columbia would remove or modify multiple aboveground facilities and associated components, including MLVs, aboveground appurtenances, and consumer taps. These facilities are listed and detailed in appendix A-2.

5. Land Requirements

Construction of the Project would affect 1,532.4 acres of land, including pipeline facilities, additional temporary workspace (ATWS), staging areas, access roads, and aboveground facilities. Following construction, 1,054.5 acres would revert to pre-construction conditions and uses. Columbia would retain the remaining 477.9 acres, including the permanent pipeline easements and permanent aboveground facility sites, for operation of the BXP. The acreages presented above consider that construction would use some Project workspaces for both BXP Replacement and Abandonment components, and do not include double counting. Columbia stated that it would retain the easements over the abandoned pipeline, but that vegetation management (i.e., mowing) of the abandoned easements would be discontinued with the exception that the USFS and Columbia are coordinating regarding the continuation of vegetation management within the WNF. Land requirements for the Project are summarized in table A-2.

5.1 Pipeline Facilities

The proposed R-801 construction right-of-way would typically have a width of 125 feet in non-agricultural upland areas, with 25 feet for spoil storage and a 100-foot-wide working side. The construction right-of-way would include a 50-foot-wide permanent easement centered on the pipeline. Columbia stated that it would need an additional 25 feet of workspace, beyond the nominal 125-foot width, to store spoil in sloped areas where full topsoil segregation across the whole construction right-of-way was required, such as in residential or agricultural areas. Columbia indicated that the relatively large width of the construction right-of-way was needed due to steep terrain, rocky conditions, increased spoil storage needs, and for safe and efficient construction. In wetlands, the construction right-of-way width would be reduced to 75 feet with limited exceptions. As noted in table A-2, the BXP Replacement component would affect 1,405.75 acres during construction and 464.4 acres during operation. Typical drawings of numerous construction right-of-way configurations are provided within Columbia's Environmental Construction Standards[5] (ECS) filed with the application.[6] The location, extent, and description of BXP pipeline facilities are presented in table A-3.

[5] Columbia's March 26, 2018 application, including Columbia's ECS, is available on the FERC's eLibrary website, located at http://ferc.gov/docs-filing/elibrary.asp, by searching Docket Number CP18-137-000 and Accession Nos. (20180326-5153, -5154, and -5155).

[6] Available at https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14849774.

TABLE A-2
Summary of Land Requirements

Facility	Land Affected During Construction (acres) a/, b/	Land Affected During Operation (acres) a/, b/
BXP Replacement		
R-801 pipeline right-of-way b/	980.0	401.3
Additional temporary workspace	106.5	0.0
Staging areas and contractor yards	220.2	0.0
Access roads	44.2	18.6
Cathodic protection	21.3	21.3
Oak Hill Pond	10.3	0
Aboveground Facilities	23.2	23.2
BXP Replacement Subtotal	***1,405.7***	***464.4***
BXP Abandonment		
R-501 pipeline right-of-way	125.3	0.1c/
R-500 pipeline right-of-way	1.1	0.0
Wellston Lateral pipeline right-of-way (new)	1.1	1.0
R-530 pipeline right-of-way (abandonment)	0.7	0.0
Additional temporary workspace	7.3	0.0
Staging areas and contractor yards	218.6	0.0
Access roads	30.0	13.0
Oak Hill Pond	10.3	0
Aboveground Facilities	11.8	11.8
BXP Abandonment Subtotal	***406.2***	***25.9***
Project Total d/	**1,532.4**	**477.9**

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/ Certain areas will be used for both BXP Replacement and BXP Abandonment activities. For the purposes of the table, such potential overlap in workspace is not accounted for, rather the area of workspaces affected is presented with each applicable Project component.

c/ Permanent impact associated with a crossover line at the Sunrise RS needed to maintain dual feed to a microwave tower.

d/ The Project total represents the total Project area affected without double counting for workspaces used for both the BXP Replacement and Abandonment components so the column cannot be directly summed.

TABLE A-3
Pipeline Facilities

Pipeline	Begin Milepost a/	End Milepost	Length (miles) b/	County, State	Description
BXP Replacement					
R-801	0.0	4.7	4.7	Vinton, Ohio	Install 66.1 miles of new 36-inch-diameter natural gas pipeline and associated facilities.
	4.7	30.1	25.2	Jackson, Ohio	
	30.1	35.7	5.6	Gallia, Ohio	
	35.7	66.2	30.6	Lawrence, Ohio	
	R-801 Total		**66.1**		
BXP Abandonment					
R-501	A0.0	A4.2	4.2	Vinton, Ohio	Abandon 58.7 miles of 20-inch-diameter natural gas pipeline and associated facilities.
	A4.2	A27.9	23.8	Jackson, Ohio	
	A27.9	A33.3	5.4	Gallia, Ohio	
	A33.3	A58.8	25.4	Lawrence, Ohio	
	R-501 Total		**58.7**		
R-500	B0.0	B2.1	2.1	Lawrence, Ohio	Abandon 2.1 miles of 20-inch-diameter and 24-inch-diameter natural gas pipeline and associated facilities.
	R-500 Total		**2.1**		
Wellston Lateral	C0.0	C0.2	0.2	Jackson, Ohio	Install 0.2 mile of 4-inch diameter natural gas lateral pipeline.
	Wellston Total		**0.2**		
R-530	D0.0	D1.1	1.1	Jackson, Ohio	Abandon 1.1 miles of multi-diameter (2-inch and 3-inch) natural gas distribution pipeline.
	R-530 Total		**1.1**		

a/ The route was modified by Columbia as noted in its October 2018 filing, and the total length of the R-801 pipeline decreased by 0.1 mile. Due to the small modification in length and to maintain consistency with prior submittals, mileposting for Project reference locations was not adjusted.

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.

Columbia has proposed to establish a new 50-foot-wide right-of-way for the operation of the 36-inch-diameter R-801 pipeline for a distance of 32.2 miles, or approximately 50 percent of the route, where it abuts Columbia's existing permanent

easement. As shown in Construction Typical drawing A7192-TYP-07,[7] the R-801 pipeline, as proposed, would be offset 25 feet from the edge of the existing easement and 50 feet from an existing Columbia pipeline. We do not believe that Columbia's proposed 50-foot permanent expansion of the existing right-of-way is needed for operation and maintenance of the proposed 36-inch-diameter pipeline. Based on our experience and review of similar pipeline projects, as well as our understanding of pipeline operations and maintenance procedures, we find that expanding an existing permanent maintained right-of-way by 25 feet (resulting in a total permanent right-of-way width of 50 feet, centered over the pipeline with 25 feet of overlap onto Columbia's existing permanent right-of-way) is sufficient to safely and efficiently operate large-diameter natural gas pipelines. Columbia itself, for example, has proposed to construct 2.9 miles of the R-801 pipeline with a 25-foot-offset from its (and Marathon's) existing pipelines in a new 25-foot-wide right-of-way (see Construction Typical drawing A7192-TYP-10).[8] Further, even though the construction right-of-way would remain 125-feet-wide, by overlapping 25 feet of the construction right-of-way with the existing permanent rights-of-way, this would shift the workspace and result in a reduction of clearing of up to 98 acres, including forested areas, on the outside edge of the proposed temporary right-of-way. Additionally, the new construction and permanent rights-of-way would be 25 feet farther from residences. Therefore, **we recommend that:**

- **Columbia should restrict the new permanent pipeline right-of-way width for the R-801 Line to 25 feet for those portions of the new easement that would be immediately adjacent to Columbia's existing operational right-of-way.**

Based on the Commission's decision regarding adoption of this recommendation, the data presented for the total operational footprint of the Project's Replacement component would be overestimated throughout this document by approximately 98 acres.

The BXP Abandonment component would affect 406.2 acres for construction activities associated with the R-501, R-500, and R-530 abandonments (limited to areas where pipeline segments and consumer taps require removal), and construction of the Wellston Lateral. BXP Abandonment activities would affect 25.9 acres during operation. Abandonment activities would typically be contained within Columbia's existing permanent easements based on site-specific requirements. The Wellston Lateral would be constructed and operated within a 50-foot-wide corridor.

Columbia would require ATWS outside of the R-801 construction right-of-way for certain waterbody and wetland crossings; road and railroad crossings; storage of stripped

[7] Columbia's March 26, 2018 application, is available on the FERC's eLibrary website, located at http://ferc.gov/docs-filing/elibrary.asp, by searching Docket Number CP18-137-000 and Accession No. 20180326-5153, Appendix 1D.

[8] See Accession No. 20180326-5153, Appendix 1D.

topsoil; powerline and pipeline crossover areas; areas with steep vertical or side slopes; equipment turnaround areas; horizontal directional drills (HDD), at the beginning and end of construction spreads; and other site-specific constraints. The use of ATWS during construction would affect 106.5 acres and 7.3 acres, respectively, for the BXP Replacement and BXP Abandonment components. In general, Columbia would restore these areas to pre-construction conditions and they would revert to previous uses following construction. A table listing proposed ATWS areas is provided in appendix A-3.

As previously stated, the proposed R-801 pipeline would be collocated for about 34 miles (51 percent of the route) adjacent to existing natural gas or petroleum products pipeline corridors. The R-801 pipeline would be collocated with Columbia's own existing R-System pipelines in many instances. The pipeline segments that would be collocated with existing linear features are described in appendix A-4a and appendix A-4b identifies collocation segments within the WNF. Pipeline segments that would not be collocated are described, including Columbia's stated reason for the deviation away from existing corridors, in appendix A-4c.

5.2 Aboveground Facilities

The area needed for construction or modification of aboveground facilities associated with the BXP Replacement and the proposed R-801 pipeline, as well as the BXP Abandonment, would vary based on site-specific conditions, including the nature of the construction activity required and whether the facility would be new or a modification of an existing facility. In general, the aboveground facilities including the new MLVs would not be completely contained within the R-801 pipeline permanent right-of-way. The land requirements for each aboveground facility for the Project are listed in appendix A-2.

5.3 Staging Areas and Contractor Yards

Columbia would use 55 staging areas totaling 116.1 acres near the BXP Replacement pipeline route (see appendix A-5). These areas would be used during construction for parking, equipment and material storage, office trailers, and other construction support activities. The identified staging areas would range in size from less than 0.1 acre to 21.8 acres. In addition, Columbia would use 50 staging areas for BXP Abandonment activities (see appendix A-5), some of which would overlap with those used for the BXP Replacement. The BXP Abandonment staging areas would total 114.4 acres; however, collectively the total acreage affected for staging areas would be 118.0 acres, which accounts for the overlap without double counting.

Columbia proposes to use six contractor yards ranging in size from 1.7 to 30.1 acres. These yards would total 104.1 acres and would be used for construction trailers, pipe and equipment storage, and pipe offloading. These areas are listed and described in table A-4. All staging areas yards would be returned to their pre-construction condition and former usage following Project construction.

TABLE A-4
Contractor Yards

Yard Name	Nearest Milepost a/	Distance from Centerline (miles)	Size (acres)	Current Land Use	Proposed Use	Improvement Needed
CY-001A-B	16.4 (offline)	2.3	8.1	Open field	Construction trailers, pipe storage, and equipment storage	Strip topsoil for road beds and lay down geotextile fabric and stone
CY-001-B	16.4 (offline)	2.1	16.6	Open field	Construction trailers, pipe storage, and equipment storage	Strip topsoil for road beds and lay down geotextile fabric and stone
CY-002-B	22.7	<0.1	25.7	Logging yard/ vacant	Construction trailers, pipe storage, and equipment storage	Strip topsoil, perform minor grading, lay down geotextile fabric and stone, and install electric and internet connections
CY-006-B	27.1 (offline)	8.7	21.9	Open field	Construction trailers, pipe storage, and equipment storage	Strip topsoil for road beds and lay down geotextile fabric and stone
CY-004-B	62.4 (offline)	0.9	30.1	Industrial use/vacant	Trailers, pipe storage, and equipment storage	Strip topsoil, perform minor grading, lay down geotextile fabric and stone, and install electric and internet connections
CY-005-B	63.4 (offline)	1.1	1.7	Industrial use	Pipe offloading	No improvements needed

a/ Offline indicates that the facility is more than 500 feet from the proposed pipeline centerline. Milepost numbering is provided as a reference point.

Abbreviation:

CY Contractor Yard

5.1 Access Roads

Columbia proposes 81 access roads to provide temporary and/or permanent access to the pipeline right-of-way during construction or operation. Forty-five of these are existing roads that would be used during construction only. A total of 36 roads would be used to provide operational access to the permanent right-of-way and each of the proposed aboveground facilities. Thirty of the permanent access roads would be improved existing

or partially existing roads, and six would involve the creation of new roads. The use of existing roads may require minor road modifications or improvements, such as tree trimming and minor grading. A list and description of access roads is in appendix A-6 (for the whole Project); roads crossing USFS land are included in section B.5 for the WNF.

Many of the roads would be used for both BXP Replacement and BXP Abandonment purposes and were identified with consideration of minimizing impacts on environmental resources and residents. The general width of access roads would be 25 feet, with site-specific variations as necessitated by intersections, increased turning radius, and other factors. Columbia stated that modifications or improvements to public roads are not anticipated. Columbia would perform required improvements to private roads, including grading, addition of gravel, culvert repair or replacement, widening, and clearing of overhead tree limbs and vegetation.

Columbia would negotiate with landowners for the use of private roads. Columbia would conduct video recordings to document the pre-Project condition of existing roads, and if any of the access roads were damaged by the Project, Columbia would restore the roads to pre-existing condition or better. The 45 temporary access roads would be restored to pre-construction conditions per the terms of the individual landowner easements. The construction and use of temporary access roads along the BXP Replacement pipeline route would affect 44.2 acres of land, while the BXP Abandonment temporary access roads would affect 30.0 acres. The construction and use of permanent access roads along the BXP Replacement pipeline route would affect 18.6 acres of land, while the BXP Abandonment permanent access roads would affect 13.0 acres.

5.2 Cathodic Protection

Columbia would install a cathodic protection system consisting of test stations and ground beds in order to protect the BXP Replacement's R-801 pipeline from corrosion. The system would contain sacrificial anodes; locations were based on the results from Columbia's soil testing and its analysis for the potential for corrosion. The systems would vary in size (see table A-5) and be perpendicular to the permanent right-of-way. The proposed cathodic protection system would affect 21.3 acres both during construction and operation.

5.3 Oak Hill Pond

Columbia proposes to construct a new temporary pond (Oak Hill Pond) via use of a temporary coffer dam structure to support construction activity water requirements. The new pond would be at the Oak Hill CS near MP 24.6, and would be about 1 acre in size and situated on 10.3 acres of land owned by Columbia. The water source for the pond would be a new water well drilled to about 200 feet deep. The purpose of the pond is to support BXP Replacement and BXP Abandonment activities such as HDD operations,

concrete mixing, hydrostatic testing, and dust control as a supplemental water source in addition to surface waterbodies and municipal sources.

TABLE A-5
Cathodic Protection Areas

Nearest Milepost	Approximate Dimensions (feet)	Size (acres)
7.2	50 x 100	0.1
11.0	25 x 1,300	0.7
17.4	25 x 877	0.5
21.8	25 x 762	0.4
21.9	50 x 140	0.2
29.1	25 x 1,477	0.8
37.0	25 x 725	0.4
37.3	20 x 130	0.1
37.9	145-156 x 4,824	11.4
40.0	25 x 1,280	0.7
42.2	31-46 x 1,082	0.9
45.0	25 x 1,060	0.7
46.7	64 x 70	0.1
49.0	25 x 99	0.1
53.6	30-38 x 1,527	0.9
56.2	80 x 175	0.3
56.5	25 x 945	0.5
57.5	25 x 96	0.1
57.8	25 x 428	0.2
59.3	60 x 90	0.1
60.6	120 x 120	0.2
61.6	22 x 23	<0.1
65.7	77 x 135	0.2
66.0	35-75 x 1,700	1.6
Total		**21.3 a/**

a/ Total may not sum accurately due to rounding.

6. Construction Schedule and Workforce

Columbia anticipates that construction for the BXP Replacement component would commence in 2019, subject to receipt of necessary permits and regulatory approvals. Columbia stated that construction would be scheduled to allow for tree felling in accordance with restrictions associated with protected bat species (see section B.4) as well as pre-construction preparation of pipe yards. Columbia anticipates that the facilities would be placed in service by 2020 or 2021, depending upon the rate of permitting and construction progress. The proposed R-801 pipeline construction would be divided into three spreads:

- Spread 1 from MPs 0 to 24.4;
- Spread 2 from MPs 24.4 to 49.4; and
- Spread 3 from MPs 49.4 to 66.2.

Activities for the BXP Abandonment would begin in 2020 or 2021 and would continue for about 2 months. Restoration of the right-of-way would continue until vegetation stabilization is achieved in accordance with permitting requirements.

Columbia anticipates that construction of the pipeline would have an average workforce of approximately 800 people (200 to 300 per spread) and a peak temporary workforce of about 950 people (250 to 350 per spread).

7. Construction, Operations, and Maintenance Procedures

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

Generally, installation of the pipeline would be conducted using conventional overland construction techniques, where each of the construction spreads (crews) proceeds along the pipeline right-of-way in one continuous operation, with the entire process coordinated to minimize the total amount of time a tract of land is disturbed. Columbia would implement its ECS, which meets or exceeds all of the best management practices (BMP) set forth in FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures).[9] Columbia would also implement additional construction, restoration, and

[9] The FERC Plan and Procedures are a set of baseline construction and mitigation measures developed to minimize the potential environmental impacts of construction on upland areas, wetlands, and waterbodies. The Plan and Procedures can be viewed on the FERC website at: www.ferc.gov/industries/gas/enviro/plan.pdf and www.ferc.gov/industries/gas/enviro/procedures.pdf.

mitigation plans prepared for the Project. These plans include the following: *HDD Contingency Plan*, *Spill Prevention and Response Plan for Construction Activities* (SPRP), *Invasive Species Management Plan*, *Traffic Control Plan*, *Unanticipated Discoveries Plan for Cultural Resources and Human Remains* (UDP), *Landslide Mitigation Plan*, *Blasting Plan*, and a *WNF Seed Mix Plan*. A *Winter Season Construction Plan* is included as Section VIII of the ECS.[10] Columbia would utilize its *Construction, Operation, and Maintenance Plan* (COM Plan), developed in coordination with the USFS, for activities conducted within the WNF.

We have reviewed Columbia's general construction and mitigation plans and find them acceptable. Columbia is not requesting any deviations from FERC's Plan. Regarding the FERC Procedures, Columbia provided site-specific justifications for extra work areas and spoil storage within 50 feet of a waterbody or wetland as required by Sections II.A, V.B.2.a, V.B.2.b, and VI.B.1.a, and VI.B.1.b, as well as site-specific justifications for right-of-way width greater than 75 feet in wetlands (Section II.A). These justifications are included in appendices A-3 and A-7, and we find them acceptable.

Additional or alternative workspace areas, as well a minor route realignments, additional access roads, or modification to construction methods could be identified in the future due to unforeseen conditions in the field or construction contractor planning requirements. The Commission has established a variance procedure for such circumstances (see recommended condition 5 in Section D of this EA). If applicable, Columbia would be required to file information (a variance request) for each of those areas for Commission review and possible approval prior to use.

7.1 General Pipeline Construction Procedures

Columbia stated that its construction activities would generally take place during daytime hours. However, Columbia indicated that certain construction activities could be required at night and/or on a 24-hour basis. These activities could include open-cut road crossings, waterbody crossings, for tie-ins (which involve welding of two pipeline segments together), for drying or cleaning of the pipeline following installation, and at HDDs and for hydrostatic testing. Such circumstances are discussed further in section B.8.2. Pipeline construction would typically occur 6 days per week (excluding Sundays), but also sometimes 7 days per week as needed for certain activities that would require continuous activity similar to the above or for repair of erosion control devices, as make up days for inclement weather or slow construction progress, and due to schedule constraints.

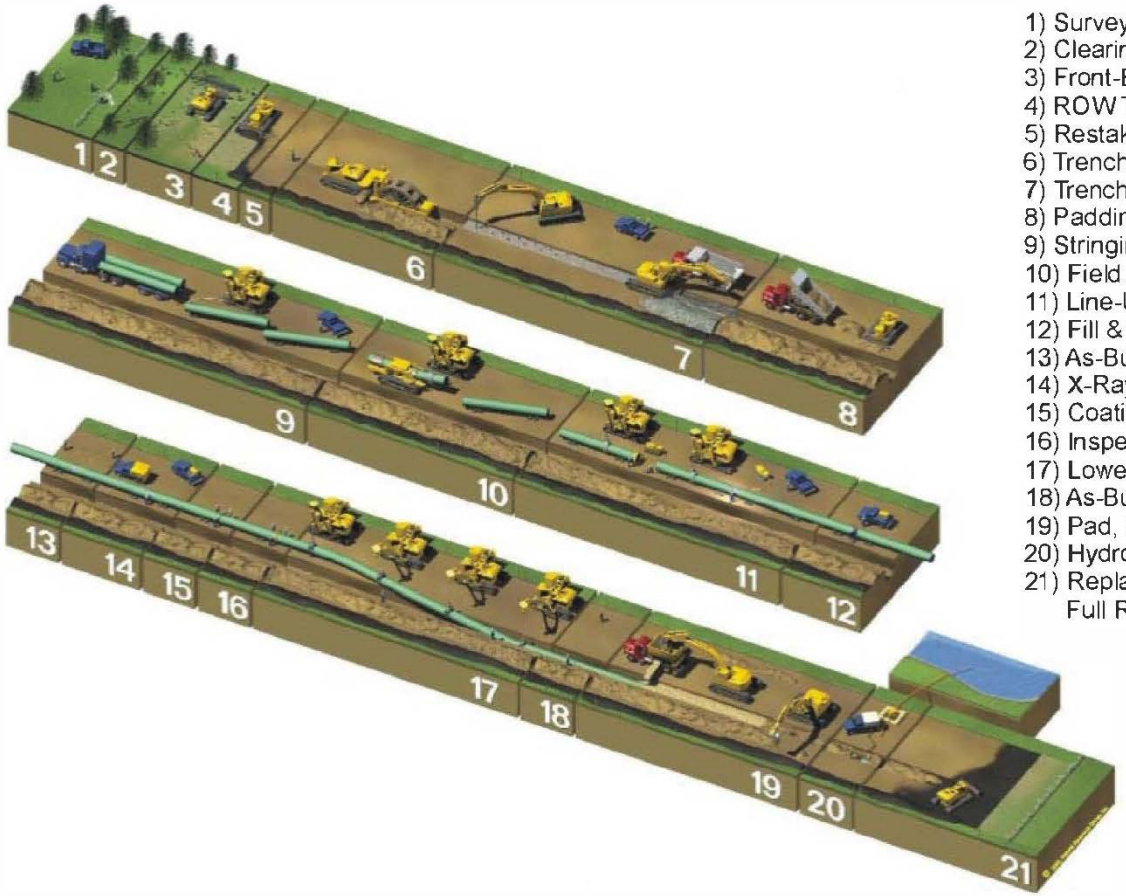
[10] These plans, as well as 61 construction typical drawings, are available within the March 26, 2018 application for viewing on our website (eLibrary under Docket No. CP18-137-000, see appendix 1D, https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14849774).

General pipeline construction procedures would apply for BXP Replacement activities associated with the R-801 pipeline, as well as the Wellston Lateral. Figure A-2 is a depiction of the typical pipeline construction sequence. Prior to construction, Columbia's survey contractor would stake the pipeline centerline and the limits of the construction right-of-way, ATWS areas, highway and railroad crossings, and access roads. Wetland boundaries and other environmentally sensitive areas would also be marked at this time.

Prior to ground-disturbing activities, Columbia's construction contractor would coordinate with the Ohio One-Call system to have existing underground utilities identified and flagged to minimize the potential for accidental damage during pipeline construction. In agricultural areas, any drain tiles would be located at this time. Temporary soil erosion and sedimentation control devices would be installed within 24 hours of ground disturbance in accordance with Columbia's ECS. These erosion and sediment controls would be inspected and maintained throughout construction and restoration of the Project.

A clearing crew would then clear workspaces of vegetation and other obstacles, as needed. Trees would be felled by hand and/or mechanized equipment, directing falling trees back towards the construction right-of-way, and other vegetation would be mowed. Timber and vegetation removal would be minimized to the extent possible; however, the USFS is coordinating with Columbia regarding timber removal and stacking for wildlife habitat on WNF lands. Logs would be stacked along the edge of the right-of-way, including just off the edge if surveys have been completed, no resources would be affected, and in accordance with landowner stipulations. Equipment used for stacking would remain positioned within the approved limits of disturbance, but could reach over to place logs. Timber would be placed in areas accessible to the landowner and in a manner so that retrieval would not result in damage to the restored right-of-way.

Cleared vegetation and stumps would be chipped, hauled off-site to a commercial disposal facility, set aside for beneficial re-use, or otherwise handled per individual landowner agreements. Stumps, wood chips, and vegetation debris would not be buried in the right-of-way. Columbia stated that it did not anticipate the need to burn brush. However, if burning was used, Columbia would first develop a Project-specific fire prevention and suppression plan, obtain and comply with all applicable permits, prohibit burning in wetlands, and obtain landowner permission. Stumps may be ground to 8 to 12 inches below grade. No chips or woody debris would be placed in wetlands or agricultural areas, but otherwise chips may be spread evenly over the right-of-way at a depth not exceeding 2 inches. Chips may also be blown off of the construction right-of-way with landowner approval except for within 50 feet of waterbodies, wetlands, floodplains, or sensitive resources.



1) Survey and Staking
2) Clearing
3) Front-End Grading
4) ROW Topsoil Stripping
5) Restaking Centerline of Trench
6) Trenching (Wheel Ditcher)
7) Trenching (Rock)
8) Padding Trench Bottom
9) Stringing Pipe
10) Field Bending Pipe
11) Line-UP, Initial Weld
12) Fill & Cap, Final Weld
13) As-Built Footage
14) X-Ray Inspection, Weld Repair
15) Coating Field Welds
16) Inspection & Repair of Coating
17) Lowering Pipe in to Trench
18) As-Built Survey
19) Pad, Backfill, Rough Grade
20) Hydrostatic Testing, Final Tie-In
21) Replace Topsoil, Final Clean-Up, Full Restoration

Buckeye Xpress Pipeline

Typical Pipeline Construction Sequence

Figure A-2

Clearing equipment would be allowed one pass through waterbodies prior to the installation of temporary bridging. Columbia would install culverts to support the bridges at waterbodies with an ordinary high water mark of 25 feet or greater. Fence crews would modify fencing, install temporary gates, and protect sensitive resources as needed.

Grading crews would level the work area to facilitate safe and efficient construction, with more extensive grading needed at areas of extensive side slopes and vertical slopes. Columbia would segregate topsoil in accordance with its ECS, in agricultural areas, residential areas, and at landowner request, consisting of at least 12 inches in deep topsoil and the entire topsoil layer in areas with less than 12 inches of topsoil.

Individual sections of pipe (generally in 40-foot to 80-foot lengths) would be trucked to the construction right-of-way and strung along the trenchline in a single, continuous line. Typically, a track-mounted, hydraulic pipe-bending machine would tailor the shape of the pipe to conform to the contours of the terrain. Then the pipe sections would be welded together into long 'strings' and placed on temporary supports. Welding would be conducted in compliance with 49 CFR 192 (*Transportation of Natural and Other Gas by Pipeline Minimum Federal Safety Standards*) and American Petroleum Institute Standard 1104 *Welding of Pipelines and Related Facilities* and Columbia specifications. Completed welds would be inspected to ensure compliance with Part 192, and all pipe welds would be coated to prevent corrosion. The coating would be inspected for defects and repaired, if necessary, prior to lowering the pipe into the trench.

Trenching would be conducted with a backhoe, rotary ditching machine or other similar equipment. Columbia's ECS indicates that Project staff would monitor for evidence of contaminated soils. If such soils are encountered, the ECS outlines notification, testing, and disposal procedures. Excavated soils would be stockpiled along the right-of-way, typically on the side of the trench away from the construction traffic and pipe assembly area (the "spoil side"). Blasting may be required to excavate the trench and is discussed below. Subsoil would be stored adjacent to the trench within the construction right-of-way limits and where topsoil was segregated, subsoil would be maintained separately. Typically, the trench would be excavated to a depth of about 7 feet to allow for a minimum depth of cover over the pipeline, or any associated accessory facilities, after construction. Minimum depth of cover over the pipeline is presented for various scenarios in table A-6.

TABLE A-6
Minimum Depth of Cover Over the Pipeline

Land Use	Cover Depth (feet) a/
Typical minimum cover	3
Agricultural areas	4
Road crossings	5
Railroad crossings	10
Waterbody crossings	5
Wetland crossings	4

a/ The USDOT specifies a cover depth of 1.5 to 2 feet in consolidated rock, depending upon Class designation as further discussed in section B.9.

Prior to lowering-in the pipe, Columbia would inspect the trench to ensure it was free of rocks and other debris that could damage the pipe or its protective coating. Escape ramps would be provided for wildlife as coordinated by Columbia's Environmental Inspector (EI). Dewatering of the trench would occur as needed in a manner that would not cause sediment to impact a waterbody, wetland, or other sensitive area. The pipe would then be lifted from the temporary supports and lowered into the trench using side-boom tractors. As necessary, trench breakers (stacked sand bags or foam) would be installed in the trench around the pipe in steeply sloped areas to control movement of subsurface water along the pipeline. After lowering-in, the tie-in crew would make final welds in the trench.

Columbia stated that it may conduct tie-in activities that include nighttime construction due to the requirement that tie-in welds must be completed within 72 hours. Once the tie-ins were complete, the trench would be backfilled with previously excavated materials. If excavated materials were not suitable (e.g., they are rocky), the pipeline would be covered with more suitable fill (not segregated topsoil) or protected with a rock shield. Padding material for the pipeline would either be imported or obtained by removing rock from the excavated spoil to backfill the area immediately around the pipe up. Materials unsuitable for backfill, such as rock, would be hauled away to a disposal facility or spread evenly over the right-of-way with landowner approval. Previously graded areas would be returned to original contours as near as practicable with a slight crowning at the top of the trench to allow for settling. In rocky areas, rock may be used for backfilling of the trench up to the existing bedrock profile.

After backfilling, pipeline segments would be hydrostatically tested in sections to ensure the system was free from leaks and provides the required safety at operating pressures. Columbia estimated that 6,159,469 gallons of water would be needed for the overall hydrostatic testing. Water obtained for testing would be pumped from the proposed

Oak Hill Pond supplied by a new well, surface waterbodies, or municipal sources along or near the Project. Columbia would transfer test water from one segment to another for re-use and to minimize water usage. No chemicals would be added to the test water prior to use with the exception that antifreeze may be added in the currently unanticipated event that testing takes place during freezing weather conditions. If antifreeze is used, the test water would be collected in tanks and transported off-site to a disposal location suitable to receive such waste. The water in the pipe segments would be pressurized in accordance with 49 CFR 192 and applicable permit conditions for a minimum of 8 hours in general, and for 4 hours at pre-fabricated segments. Any detected leaks would be repaired and then the segment would be re-tested. Upon completion of hydrostatic testing, the water would be discharged to a well-vegetated area and/or dewatering structure in accordance with Columbia's ECS and the requirements of OEPA discharge permits to minimize the possibility of erosion. Refer to section B.2 for additional information on hydrostatic testing, including proposed locations for hydrostatic test water withdrawal and discharge.

Once final tie-ins are completed, Columbia would evaluate the pipeline system to ensure that it is working properly. The pipeline would be cleaned and dried and checked with inspection tools. Columbia stated that it may conduct pipeline drying and/or cleaning activities that include nighttime work in order to achieve the correct drying conditions.

Final cleanup would begin immediately after backfilling as soon as weather and related site conditions allow. Final cleanup (including final grading and installation of permanent erosion control devices) would be completed within 20 days after the trench is backfilled, weather permitting. In residential areas, cleanup and restoration would take place within 10 days of backfilling, weather permitting.

During cleanup, construction debris would be removed from the right-of-way. Pre-construction contours would be restored as closely as possible to pre-existing conditions. Segregated topsoil would be returned to the stripped area, and permanent erosion controls would be installed. Revegetation measures would be implemented in accordance with permit requirements, Columbia's ECS, and based on consultations with the local soil conservation authority, other applicable agencies, or the landowner. Private and public property modifications, such as fences, gates, driveways, and roads disturbed by construction, would be restored to original or better condition.

Columbia would install markers showing the location of the pipeline at fence and road crossings to identify Columbia as the owner and convey emergency information in accordance with applicable government regulations, including USDOT safety requirements.

7.2 Special Pipeline Construction Procedures

Waterbody Crossings

Columbia proposes to cross waterbodies using wet open-cut, dry trench (flume or dam-and-pump), and trenchless (HDD or conventional bore) crossing methods as part of the BXP Replacement R-801 pipeline. Columbia would adhere to the measures specified in its ECS, as well as any additional requirements that may be specified in federal or state waterbody crossing permits.

Except for trenchless crossing methods, woody vegetation would eventually be removed up to the edge of a waterbody, but initial grading would be limited to that needed to create the construction approach and temporary bridging. Sediment barriers would be installed to minimize runoff. In general, fueling would be conducted at least 100 feet away from waterbodies and wetlands, unless the EI determined that there was no practical alternative. Secondary containment sized to be 110 percent of the capacity of a subject piece of equipment's fuel tank or fuel container would be used near waterbodies and wetlands, and Columbia would implement its SPRP. Columbia would use concrete coating or weights within waterbodies and wetlands as needed to provide negative buoyancy.

Columbia would use conventional upland construction techniques at drainages that do not contain perceptible flow at the time of crossing. However, Columbia would stage equipment on site so that a dry trench crossing could be completed if the drainage began to flow during the construction process.

Wet Open-Cut Method

A wet open-cut crossing method involves trenching while water continues to flow through the waterbody. This method is typically conducted with backhoe-type excavators operating from the banks of the waterbody. Columbia would place spoil excavated from the trench at least 10 feet upland from the bank (where possible) for use as backfill. A pre-fabricated segment of pipeline would then be placed into the trench. Concrete coating or set-on weights would be utilized, as necessary, to provide negative buoyancy for the pipeline. Once the trench was backfilled, Columbia would restore the banks as near as practicable to pre-construction contours. Stabilization measures would include seeding, installation of erosion control blankets, or installation of riprap materials, as appropriate. Columbia stated that it may conduct wet open-cut activities that include nighttime construction in order to minimize the duration of the crossing and to comply with time-limited crossing requirements.

Flume Method

The flume method is a standard dry waterbody crossing method that involves diverting the flow of water across the construction work area through one or more flume

pipes placed in the waterbody. The first step involves placing a sufficient number of adequately sized flume pipes in the waterbody to accommodate the highest anticipated flow during construction. Columbia would use stream gauge data from the U.S. Geological Survey (USGS) to determine anticipated flow levels if available, or use other data to estimate waterbody flow including width at the ordinary high water mark, depth, and existing flows. After the flume pipe(s) were placed in the waterbody, sand bags, pea-gravel bags or equivalent dam diversion structures such as water bladders, or metal wing deflectors would be installed in the waterbody upstream and downstream of the trench area. Energy-dissipating devices would be used to prevent scouring in the waterbody channel. These devices serve to dam the stream and divert the water flow through the flume pipe(s), thereby isolating the water flow from the construction area between the dams. Aquatic organisms such as fish or mussels measuring 4 inches or greater remaining within the dewatered area would be removed by qualified personnel and relocated to outside the work zone. Any water remaining in the trench would be pumped out and discharged in a manner that would not cause silt-laden flow to enter a waterbody or wetland. The flume pipe(s) and dams would remain in place during trenching under the flume pipe, installation of pre-fabricated pipe under the flume, and backfill and until the final cleanup of the stream bed and banks were completed. Following cleanup and stabilization, water flow would be returned to the channel.

Dam-and-Pump Crossing Method

The dam-and-pump method is another standard dry trench waterbody crossing method. A dam-and-pump crossing diverts or isolates flow during pipe installation. The dam-and-pump method involves installing temporary dams upstream and downstream of the proposed waterbody crossing, typically using materials described above. Following dam installation, appropriately sized pumps with hoses would be used to transport the streamflow around the construction work area and trench. Columbia would use stream gauge data from the USGS to determine anticipated flow levels if available, or use other data to estimate waterbody flow including width at the ordinary high water mark, depth, and existing flows. Additional pumps would be used to dewater the area between the dams. Aquatic organisms such as fish or mussels measuring 4 inches or greater remaining within the dewatered area would be removed by qualified personnel and relocated to outside the work zone. Silt-laden trench water would not be allowed to affect waterbodies or wetlands. Columbia committed to having at least one back-up pump on-site to provide a replacement in the event of a pump failure. Intake screens would be installed at the pump inlets to prevent or limit entrainment of aquatic life, and energy-dissipating devices would be installed at the pump discharge point to minimize erosion and streambed scour. Trench excavation and pipe installation would then commence through the dewatered and relatively dry portion of the waterbody channel. After pipe installation, backfilling of the trench, and restoration of the stream banks, the temporary dams would be removed and flow through the construction work area would be restored.

HDD Method

Columbia proposes to use the HDD method at four locations, as listed in table A-7. The HDD method would avoid disturbing surface and shallow subsurface features (such as waterbodies, wetlands, vegetation, man-made structures, and public use and protected areas) between two construction areas. The HDD method typically involves establishing workspaces in upland areas on both sides of the feature(s) to be crossed and confining the work and equipment to these areas. The process commences with the drilling of a pilot hole in an arced path (drill profile) 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 section long enough to span the entire crossing is staged and welded on one side of the crossing (typically the exit side) and then hydrostatically tested to ensure the integrity of the welds. When the reaming is complete, the pre-fabricated pipe section is pulled through the pre-reamed drilled hole back to the entry side. Columbia estimated that the fully reamed hole would typically be approximately 48 inches in diameter.

TABLE A-7
Proposed Horizontal Directional Drill Locations

HDD Name	Location (MP)	Applicable Resources
Highway 32	12.7 to 12.9	Two wetlands; County Road 87, State Highway 32
Highway 35	17.7 to 18.2	Two waterbodies and one wetland; County Road 79, U.S. Highway 35
Wetland W-545B	20.1 to 20.4	Two waterbodies and one wetland
Wetland W-558B and Railroad	24.8 to 25.1	Three wetlands and the Ohio South Central Railroad

Between HDD entry and exit points foot traffic would be required to place guide wires to track the progress and guide the movement of the drilling cutterheads and monitor for inadvertent releases (IR) of drilling fluids (as described further below). Columbia stated that the placement of the guide wires would not require tree felling.

Throughout the drilling process, the drilling slurry would consist of non-toxic bentonite clay, clay, water, and if needed other additives potentially including stabilizers, soda ash, surfactants, detergents, and naturally occurring materials such as crushed walnut shells, cottonseed hulls, hay, polymers, and additives. Potential additives are discussed further in section B.1. The slurry would be pressurized and pumped through the drilling head to lubricate the drill bit, remove drill cuttings, and hold the hole open. Columbia stated that water for the slurry would come from the proposed Project-constructed Oak Hill Pond or a municipal source. Excess drilling fluid would be taken to a commercial disposal facility. This slurry, referred to as drilling mud or drilling fluid, has the potential to surface

as an IR. The pipeline route as well as seeps and springs near the drill path would be monitored (along with instrumentation and observation of the circulation of drilling mud throughout the HDD operation) for indications of an inadvertent drilling mud release and Columbia would immediately implement corrective actions if a release was observed or suspected. If a release was suspected but not located, Columbia would contact abutting landowners for permission to assess adjacent areas on foot. Boats, all-terrain vehicles, or aerial means may also be used to look for any IRs. Columbia would inspect the HDD path at least every 4 hours and maintain a data log documenting that the inspections were completed. The corrective actions that Columbia would implement, including the agencies it would notify and the steps it would take to contain, clean up, and dispose of a release are outlined in its HDD Contingency Plan, which is discussed in section B.2. These measures would be the same regardless of whether a release occurred within or outside of the approved workspaces although as noted above, landowner permission would be obtained where necessary.

It is possible for HDD operations to fail, primarily due to the encountering of unexpected geologic conditions during drilling or if the pipe were to become lodged in the hole during pullback operations. Columbia stated that the geotechnical evaluations for the HDDs were favorable for successful HDD operations considering its adoption of its independent third-party engineering firm's HDD recommendations. The feasibility of the HDDs are discussed further in section B.1. Columbia would be required to seek approval from the Commission and other applicable agencies prior to abandoning any drilled hole in favor of another construction method.

Conventional Bore Method

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

Wetlands

Columbia would use open-cut, push-pull, or trenchless crossing methods in wetlands as part of the BXP Replacement R-801 pipeline. Trenchless methods of HDD and conventional bore are discussed above, and the crossings would be similar for both wetlands and waterbodies. The construction right-of-way in wetlands would generally be 75 feet wide.

Wetland boundaries would be delineated and marked in the field prior to construction activities. Except for trenchless crossings, woody vegetation within the construction right-of-way would be cut off at ground level and removed from the wetlands, leaving the root systems intact. The pulling of tree stumps and grading activities would be limited to the area directly over the trenchline unless it was determined that safety-related construction constraints require otherwise. Columbia would install temporary sediment control devices as necessary after initial disturbance of wetlands or adjacent upland areas to prevent sediment flow into wetlands in accordance with its ECS. These devices would be maintained until revegetation of the wetlands was complete. Trench plugs would be installed as necessary to maintain wetland hydrology. Construction equipment operating in wetland areas would be limited to that needed to clear the right-of-way, dig the trenches, install the pipeline, backfill the trenches, and restore the right-of-way. The trench would be dewatered if necessary and discharged in a manner that would not allow silt-laden water to enter a wetland or waterbody.

Topsoil would be stripped from the area directly over the trenchline (except in areas of standing water or in saturated conditions) and stockpiled separately from the subsoil. Following pipeline installation, Columbia would backfill the trenches with subsoil and topsoil in accordance with its ECS.

Specific wetland crossing procedures would depend on the level of soil stability and saturation encountered during construction. In saturated wetlands, Columbia would create a trench with a backhoe, dragline, clamshell dredge, or a combination of the equipment and then push a pre-fabricated pipe section from the edge of the wetland or pulling the pipe from the opposite bank of the wetland with a winch (push-pull method). Pipe storage sites and fabricating areas would be outside the flooded portion of the wetland. Floats would be attached to the pipe to achieve positive buoyancy if warranted. After the pipe was floated into place, the floats would be cut and removed and the pipe would settle to the bottom of the trench. Excavated material would be used as backfill and placed over the pipe to fill in the trench. Any excess soil would be removed in an effort to maintain groundwater and surface flow patterns within the wetland. Columbia stated that it does not currently anticipate using the push-pull method to cross wetlands, but the method could still be used during construction if site-specific conditions dictate.

In unsaturated wetlands, construction would be conducted following upland construction procedures (open-cut method), except timber mats would be used to minimize disturbance to wetland hydrology and maintain soil structure. Mats would be used in wetlands in unstable areas to provide access and a safe working area as needed and then removed during cleanup. After the trench was backfilled, timber mats would be removed during rough grading and final cleanup, and pre-construction contours of each wetland would be restored.

Columbia would install permanent erosion control measures such as earthen berms along wetland boundaries in accordance with its ECS, and would stabilize temporarily

disturbed areas within wetlands with a cover species such as annual ryegrass as soon as weather conditions permitted. The construction right-of-way would then be allowed to return to pre-construction conditions using the original seed stock contained in the conserved topsoil layer.

Some staging areas may be required adjacent to wetlands for the assembly and fabrication of the pipeline to perform a wetland crossing. These ATWS would be at least 50 feet from the edge of the wetland except in cases where this was not feasible (e.g., as identified in appendix A-3). We have reviewed these locations and Columbia's justifications for the setback distances and find them acceptable.

Road and Railroad Crossings

Columbia would construct across public and private roadways, highways, and railroads using open-cut or trenchless crossing methods, depending on permit conditions as part of the BXP Replacement R-801 pipeline. A summary of road and railroad crossings is provided in table A-8, and a detailed listing is provided in appendix A-8 (whole Project) and in section B.5 for the WNF. The Wellston Lateral would not cross roads or railroads.

TABLE A-8
Public Roads and Railroads Crossed by the Proposed R-801 Pipeline

		Roads (Ownership)				
County, State	**Railroads**	**State**	**County**	**Township**	**U.S. Forest Service**	**Total**
Vinton, Ohio	0	1	3	1	0	5
Jackson, Ohio	4	7	12	13	0	36
Gallia, Ohio	0	0	3	5	0	8
Lawrence, Ohio	0	3	16	9	1	29
Total	**4**	**11**	**34**	**28**	**1**	**78**

Columbia's open-cut technique would be used on driveways and roads with low traffic densities. This technique requires the re-routing of traffic around the open trench during installation. Traffic may be redirected by constructing temporary bypass roadways, by diverting traffic to another lane (on multi-lane roads), or by creating a detour around the workspace using alternate, nearby roadways. Crossing paved roads using this method requires the cutting, removal, and appropriate disposal of the portion of the pavement over the proposed trench. Columbia would excavate the trench, install the pipe, and backfill the trench. Most open-cut road or driveway crossings would be completed and the surfaces restored in a few days. Columbia would keep steel plates on-site to create a temporary platform so that emergency vehicles could pass and has stated that it could install such plates within 5 minutes. Columbia stated that on a limited basis, it may conduct open-cut

road crossing activities that include nighttime construction in order to minimize road closures. Project transportation and traffic concerns are discussed further in section B.6.

All major roads and active railroads would be crossed by HDD or conventional bore. These crossing methods are discussed above. All crossings would be conducted in accordance with the local agencies or the Ohio Department of Transportation (ODOT) permit requirements. Columbia would use ODOT's online system to generate specific traffic control measures, minimize traffic conflicts through enhanced scheduling, use signage, and develop detours as necessary in accordance with Columbia's Project-wide Traffic Control Plan.

Foreign Utility Crossings

The R-801 pipeline would cross 330 existing pipelines, power lines, and telephone lines as summarized in table A-9. Columbia stated that it was the owner of 50 of the crossings. The Wellston Lateral would not cross any utility lines. The R-801 pipeline would typically be installed under existing pipelines to maintain the required soil cover over the pipelines along with a safe separation (at least 24 inches) between the pipelines during construction and operation. Due to the increased depth of excavations, ATWS typically would be required at utility crossings for spoil storage and topsoil segregation. ATWS would also often be required to avoid driving and operating equipment over active pipelines and near transmission lines. Columbia's construction contractor must prepare a site-specific safety plan for crossings of all underground or overhead utilities, make all necessary notifications to utility owners, and field verify utility locations. Columbia would also require dedicated safety personnel, warning signs, grounding equipment, provisions for suspending work during thunderstorms, and parking restrictions in order to manage work near high voltage power lines.

TABLE A-9
Utility Lines Crossed by the Proposed R-801 Pipeline

County, State	Pipelines	Power Lines	Telephone Lines	Total
Vinton, Ohio	6	5	5	16
Jackson, Ohio	83	61	34	178
Gallia, Ohio	5	6	6	17
Lawrence, Ohio	54	38	27	119
Total	**148**	**110**	**72**	**330**

Agricultural Areas

Construction in agricultural areas, including active hayfields and cultivated land, would be conducted in a manner similar to conventional pipeline construction in

accordance with the ECS. Columbia would implement additional measures to conserve topsoil. The full layer of topsoil (up to 12 inches) would be segregated from subsoil unless otherwise specified by the landowner. Columbia would store topsoil and subsoil in separate windrows along the construction right-of-way to prevent soil mixing. ATWS could be required for topsoil stockpiling in agricultural areas. An additional 1 foot of cover would be required by Columbia in agricultural lands beyond the 3 feet of cover utilized in typical situations. Given the associated deeper trench, and needs for spoil and topsoil storage, additional workspaces would be needed. During backfill operations, subsoil would be used to initially backfill the trench, and then the topsoil would be reapplied to the top of the trench and the graded right-of-way. Should compaction of soils occur during construction activities, Columbia would decompact these areas prior to replacing topsoil. Fencing would be installed, modified, and repaired as needed, and provisions for temporary livestock relocation or management would be accomplished. Columbia would locate existing drainage and irrigation systems prior to construction and monitor them throughout construction and restoration to ensure no Project-related damage has occurred. Should Project activities impact these systems (including those beyond the trenchline), Columbia would repair them to their pre-construction level of function.

Residential Areas

Columbia has prepared site-specific construction plans for residences within 50 feet of proposed construction work areas. These plans are in accordance with FERC's Plan and are provided in appendix A-9 of this report. Measures that Columbia would use at these residences include site-specific workspace setbacks, installation of safety fence extending for 100 feet on either side of a residence, maintaining access, and owner pre-notification of construction activities. As noted in section B.5.2, there are over 80 residences within 50 feet of the Project work areas. Site-specific residential plans are included in appendix A-9, and we invite landowners to provide comments on the plan for their individual property.

Steep Terrain

Portions of the R-801 pipeline route would cross steep vertical and side slopes (greater than 30 percent) which can be susceptible to instability and slips during construction and following the trench backfill. Columbia stated that it attempted to avoid or minimize crossing these areas during the routing process to the extent possible. These steep areas are identified in appendix A-10a andA-10b. Columbia is proposing measures to facilitate construction and to reduce the potential for slips in these areas, including:

- tethering of equipment via winch lines;
- deeper burial of the pipeline in areas prone to erosion and exposure;
- installation of reinforced silt fence to keep sediment and rock on the right-of-way and jersey barriers to keep falling rock away from roads;

- using spotters and flaggers to alert motorists of falling rock;
- using trench breakers to limit flow of water along the trench following backfill;
- increased application rates for seeding;
- mulching or installing riprap as needed in areas where seed would not germinate; and
- installation of temporary and/or permanent drainage structures to manage flow from seeps or springs.

In addition, Columbia has developed a *Landslide Mitigation Plan* and committed to employing third-party geotechnical specialists during construction and restoration in areas where slopes are greater than 30 percent. These specialists would assist with identification of potential areas of instability and develop mitigation methods. Columbia would also require its contractor to develop a *Steep Slope Work Plan* with BMPs for each identified area. Potential impacts associated with steep slopes, as well as associated mitigation measures, are further discussed in section B.1.

Portions of the pipeline route would cross areas of steep side slope or rolling terrain that may require the use of cut-and-fill grading to provide for safe working conditions. In these areas, grading activities would cut the upslope side of the construction right-of-way. Material from the cutting would be used to fill the downslope side of the construction right-of-way to create a safe and level surface for travel lanes and equipment operation. ATWS would likely be required downslope. Following pipeline installation and backfilling, Columbia would place excavated materials back in the area of the cut, compact the soil to restore the surface of the right-of-way to original contours, and stabilize the surface in accordance with its ECS.

Blasting

Blasting would likely be required in areas where shallow bedrock is within 5 feet of the proposed pipeline's surface. Columbia would attempt to rip or hammer surficial rock if possible. Should it be necessary, blasting would be conducted in accordance with Columbia's Project-wide *Blasting Plan* to prevent damage to above and below-ground structures, impacts on water resources such as wells, and the scattering of loose rock. Columbia would require its contractor to develop a site-specific *Blasting Plan* which would incorporate the Project-wide *Blasting Plan* and be approved by a Columbia engineer. The site-specific plan would include all permits, required notifications, locations of other utilities or sensitive resources, and inspections. Columbia would notify occupants of nearby homes and businesses prior to blasting, and all blasting activities would take place during daylight hours. Columbia acknowledged that it would be ultimately responsible regarding the resolution of damage claims involving blasting. Blasting in waterbodies may be required and would be performed after grading but before the waterbody crossing with

potentially several weeks elapsing in between. Columbia would perform temporary restoration of the waterbody bank if more than 10 days would elapse between blasting and the initiation of the crossing. Potential impacts of blasting and associated mitigation measures are further discussed in section B.1.

Winter Construction

Columbia would utilize its *Winter Season Construction Plan*, which is part of its ECS, from essentially November 1 through March 15, adjusted as needed based on weather and site conditions. Columbia would employ measures during winter conditions including:

- storage of snow within the approved workspaces (outside of waterbodies or wetlands) with care taken to not mix snow and soil, or alternately snow could be blown off of the approved workspaces with landowner approval;
- use of sand for additional traction on mats, except in wetlands;
- installation of signage or high visibility fencing at sensitive resource areas and other areas such as established horse and all-terrain vehicle trails;
- inspection of temporary erosion controls within 24 hours following 6-inch or greater snowmelt events with an EI and environmental crew on-site or on-call to monitor conditions and thaw cycles, and make repairs as necessary;
- segregating topsoil same as during non-winter conditions, taking care to remove the required topsoil layer if frozen, restoring topsoil (and subsoil) following thawing and dry conditions, and stabilizing topsoil piles with mulch or seeding;
- minimizing the amount of time that the trench is open during frozen conditions; and
- not allowing backfilling, topsoil replacement, or restoration activities with snow or frozen soil.

7.3 Aboveground Facility Construction Procedures

Aboveground facility construction would be conducted in accordance with Columbia's ECS, and federal and state approvals, as applicable. In general, construction of new aboveground facilities would entail work associated with the BXP Replacement R-801 pipeline including tie-ins, reconnections, MLVs, OPP, and metering and regulating facilities. Construction would begin with clearing and grading of the area to be fenced. Grading would also occur at areas required to create or modify access roads. Subsequent activities would include soil compaction, preparing foundations, installing underground piping, erecting and installing buildings, installing aboveground piping and machinery,

testing the piping, testing the control equipment, cleaning up, and stabilizing the work area with either gravel or seeding and mulching.

7.4 BXP Abandonment Procedures

The construction activities associated with the BXP Abandonment include removal of MLVs, crossover pipes, aboveground facilities, and sections of exposed pipeline. BXP Abandonment activities would be conducted in accordance with Columbia's ECS. Specific construction methods would be tailored to each site and based on the facility-specific requirements. Except for the lift and lay method described above, generally Columbia's abandonment activities would involve the in-place abandonment of the R-501, R-500, and R-530 pipelines. Aboveground facilities would be relocated or removed and properly disposed of at suitable locations. Columbia stated that it would retain the easements over the abandoned pipeline, but that vegetation management (i.e., mowing) of the abandoned right-of-way would be discontinued with the exception that the USFS and Columbia are coordinating regarding the continuation of vegetation management within the WNF.

Columbia would cut the pipe, purge the natural gas in the abandoned pipelines, use cleaning pigs to remove residual natural gas liquids, weld steel plates on the ends, and restore the right-of-way. Collected liquids would be properly disposed after testing.

Columbia indicated that 78 road or railroad crossings (see appendix A-8) would be cut, have a steel plate welded on, and then grouted. Both sides of the road or railroad would be excavated to accomplish the activity. Grout would be added from an opening cut on the high elevation side of the pipe. If the pipeline segment had an encasement pipe, then a larger work area would be needed and the pipeline segment would be removed and properly disposed. The encasement pipe would remain in place and grouted as described above followed by backfill and restoration. Where applicable, pipe segment crossings that contained petroleum grease would be managed to contain, collect, and properly dispose of the grease and associated pipe segment.

Pipe exposures[11] at 35 locations would be excavated, followed by cutting and removal of the subject pipe segment. There would be nine pipe exposures addressed within the WNF. Consumer taps would be disconnected and plugged or have a steel plate welded on at 26 locations. Crossover piping would be removed at 68 locations in order to avoid potential interference with the proposed R-801 pipeline's cathodic protection system. In all three cases, the subject areas would then be backfilled and restored. Test stations, needed to maintain cathodic protection on the existing and active R-601 and R-701 pipelines, would be retained and supplemented as needed. Pipe segments and the building associated with the Pyro Road point of delivery that would be removed would be tested for asbestos and properly disposed of as required. Columbia stated that any future pipeline

[11] Such exposures have been caused over time by erosion, changes in a waterbody channel, or unauthorized disturbance.

exposures would be addressed after being prioritized relative to integrity, reliability, and safety considerations.

Columbia stated that it does not have any plans for facility abandonment beyond the BXP Abandonment activities described in its application. Those activities are summarized in this EA. Further, Columbia also stated that it has no current plans for facility expansion other than the upsizing which is a component of the BXP Replacement as described in section A.4.1. However, Columbia indicated that it is continually assessing its system capacity and evaluating customer needs. If this assessment results in a need for additional pipeline facilities, then Columbia would seek additional permitting and FERC authorization in a separate process.

7.5 Environmental Compliance Inspection and Monitoring

Columbia would minimize environmental impacts by implementing its ECS and other construction, restoration, and mitigation plans. Prior to construction, Columbia would conduct environmental training for the company and contractor supervisory personnel. The training program would focus on Columbia's ECS, Project-specific Certificate and other permit conditions, and other Project-specific mitigation plans, drawings, and specifications. Columbia stated that it would require its contractor(s) to comply with the Project's requirements, including stop-work orders and remedial actions if necessary. Columbia would coordinate with the FERC staff as needed during construction.

Columbia would be represented during construction by a Chief Inspector. The Chief Inspector would be assisted by at least one EI per spread during construction and restoration. The EIs would report directly to Columbia's Chief Inspector. The EIs' responsibilities, as specified in the FERC *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and in the ECS, would include: (1) monitoring the contractor's compliance with environmental measures required by the Certificate, other environmental permits or approvals, and all other construction, restoration, and mitigation plans; (2) taking corrective actions, including issuing stop-activity orders to the contractor if needed; (3) documenting compliance with environmental requirements; and (4) preparing status reports for submittal to the Commission's environmental staff. Additionally, FERC staff or their designees may conduct periodic inspections of Project activities during construction and restoration.

Columbia would conduct post-construction monitoring to document restoration and revegetation of the right-of-way and other disturbed areas. Columbia would monitor upland areas after the first and second growing seasons following restoration or until revegetation was successful in accordance with its ECS. Columbia would also submit quarterly monitoring reports to the FERC to document the status of revegetation in disturbed areas. These reports would describe the results of post-construction inspections, any problem areas, and corrective actions taken. Areas meeting performance standards at

the end of the second year (or in any subsequent year) no longer would be monitored. Columbia would continue to file wetland revegetation monitoring reports for the first 3 years on an annual basis and these would continue until revegetation efforts were considered successful. In addition, FERC staff would continue to monitor and inspect the vegetation along the Project route until restoration and revegetation were deemed successful.

Columbia has established a landowner complaint resolution process. The procedures would provide landowners with directions for identifying and resolving environmental concerns or issues during construction and restoration of the Project. Prior to construction, Columbia would mail a letter describing the procedure to landowners whose property would be affected by the Project. The letter would:

- provide a local contact that landowners should call first with their concerns; the letter would indicate how soon landowners should expect a response from the local contact;
- instruct landowners that, if they are not satisfied with the response from the local contact, they should call Columbia's 24-hour hotline; the letter would indicate how soon landowners should expect a response from Columbia's hotline; and
- instruct the landowners that, if they are not satisfied with the response from Columbia's local contact and hotline, they should contact the Commission's Dispute Resolution Division at 1-877-337-2237 or by e-mail at LandownerHelp@ferc.gov.

7.6 Operations and Maintenance

Columbia would operate and maintain the new pipeline, aboveground facilities, and modified facilities in accordance with all applicable federal and state requirements, including the minimum USDOT's Federal Safety Standards identified in 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline*.

Columbia would periodically inspect the pipeline from the air and on foot in accordance with applicable regulatory requirements to identify potential concerns that may affect the safety and operation of the pipeline. If pipeline patrols or vegetation maintenance identify areas on the right-of-way where erosion was occurring, Columbia would repair existing erosion control devices or install additional devices as necessary to stabilize the area and prevent future erosion, throughout the life of the Project. If landslides were observed after construction, Columbia committed to employ geotechnical experts to assess the situation, and then develop and implement long-term solutions.

To maintain accessibility to the right-of-way and accommodate pipeline integrity surveys, vegetation along the permanent pipeline right-of-way would be cleared

periodically, using mechanical mowing or cutting where necessary, and in accordance with the ECS. Additionally, in accordance with the ECS, routine vegetation maintenance would not be conducted more frequently than every 3 years. An exception would be a 10-foot-wide corridor centered on the pipeline, which would be maintained in an herbaceous state to allow for periodic corrosion and leak surveys; this corridor may be cleared at the frequency necessary to perform these surveys. In no case would routine vegetation maintenance clearing occur between April 15 and August 1 of any year unless permission was granted by the U.S. Fish and Wildlife Service (FWS). This restriction is designed to minimize potential impacts on migratory birds during operation of the pipeline facilities.

Active cropland would be allowed to revert to pre-construction use for the full width of the right-of-way. In wetlands, a 10-foot-wide corridor centered over the pipeline would be maintained in an herbaceous state, and trees within 15 feet of the pipelines with roots that may compromise the pipeline integrity may be selectively cut and removed from the right-of-way.

Columbia personnel also would perform regular operation and maintenance activities on equipment at aboveground facilities. These activities would include calibration, inspection, and scheduled routine maintenance. Operational testing would be performed on safety equipment to ensure proper functioning, and problems would be corrected.

8. Non-Jurisdictional Facilities

Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of the FERC. These non-jurisdictional facilities may be integral to the Project (e.g., a gas-fueled power plant at the end of a jurisdictional pipeline) or they may be minor, non-integral components of the jurisdictional facilities that would be constructed and operated as a result of the Project.

The Project facilities would require connections to existing electric transmission lines (see table A-10) for cathodic protection and aboveground facilities. Columbia sited its proposed R-801 pipeline according to existing points, and facilities were not sited based on the location of electric utilities. The design of the electric facilities and coordination with the utility providers is not yet completed; however, these facilities would be private projects under the jurisdiction of state and local agencies, and not under FERC permitting or control. In general, these non-jurisdictional facilities would result in minimal impacts (see table A-10). Most impacts would be temporary and confined to areas that would be affected by construction of the proposed facilities or that have been previously disturbed by existing pipeline, roadway, or electric transmission line facilities. These non-jurisdictional facilities are discussed and included in our cumulative impacts analysis in section B.10. None of the non-jurisdictional electric lines would cross the WNF.

TABLE A-10
Non-Jurisdictional Facilities for the Buckeye XPress Project

Nearest Milepost	Non-Jurisdictional Facility Description	Utility Provider	Permitting Status
11.0	Installation of an approximately 300-foot long distribution line from an existing power pole.	Buckeye Rural Electric Cooperative (BREC)	BREC would permit, construct, own, and operate the electrical powerline.
29.1	Installation of an approximately 250-foot long distribution line from an existing power pole.	American Electric Power (AEP)	AEP would permit, construct, own, and operate the electrical powerline.
40.0	Installation of an approximately 100-foot long distribution line from an existing power pole.	BREC	BREC would permit, construct, own, and operate the electrical powerline.
45.0	Installation of an approximately 200-foot long distribution line from an existing power pole.	BREC	BREC would permit, construct, own, and operate the electrical powerline.
53.6	Installation of an approximately 600-foot long distribution line from an existing power pole.	BREC	BREC would permit, construct, own, and operate the electrical powerline.
56.5	Installation of an approximately 1,300-foot long distribution line from an existing power pole.	AEP	AEP would permit, construct, own, and operate the electrical powerline.

9. Summary of the Proposed Action within the Wayne National Forest

Project activities within the WNF would include the general pipeline construction and abandonment procedures described above, as well as the use of access roads, cathodic protection areas, staging areas, the conventional bore road crossing method, the open-cut waterbody crossing method, and the dam-and-pump waterbody crossing method. No aboveground facilities, contractor yards, HDDs, flumed waterbody crossings, or constructed ponds would be on NFS lands.

The BXP R-801 Replacement component would consist of 15 separate crossing segments on the WNF from MPs 31.1 to 50.5, totaling 12.6 miles and affecting 229.9 acres during construction (approximately 149 acres of existing easement areas and approximately 81 acres of SUP-required areas) and 86.9 acres during operation. Maps depicting the proposed WNF crossing are provided in appendix A-11. The BXP Abandonment component would consist of 18 separate crossing segments on the WNF from MPs A29.9 to A46.0 totaling 2.6 miles and affecting 33.1 acres during construction and 2.6 acres during operation.

The BXP Replacement component would include four temporary access roads extending for 1.6 miles and temporarily affecting 4.7 acres on the WNF (see section B.5).

The BXP Replacement component would include five permanent access roads extending for 1.0 mile and affecting 3.3 acres permanently (see section B.5). Only one different road, a permanent access road extending for 0.1 mile and affecting 0.2 acre on the WNF would be used for the BXP Abandonment component. A total of 19 staging areas would be on NFS land (see appendix A-5). Nine pipeline exposures on the WNF would be addressed as part of the BXP Abandonment component, at MPs A30.1, A30.2, A30.3 (two separate occurrences), A33.1, A34.9, A44.0, and A45.8 (two separate occurrences). Construction activities on the WNF would be guided by the COM Plan (appendix A-12), which would be finalized prior to construction.

10. Permits and Approvals

Table A-11 provides a list of the federal and state permits related to construction and operation of the proposed Project. Columbia is responsible for obtaining all required permits, regardless if they appear in the table below.

TABLE A-11
Environmental Permits, Approvals, and Consultations

Agency	Permit/Approval/Consultation	Submittal Date (anticipated)	Receipt Date (anticipated)
Federal			
FERC	NGA, Section 7b – Authorization to Abandon NGA, Section 7c – Certificate of Public Convenience and Necessity	March 26, 2018 and supplements on October 3, 2018	Pending
COE Huntington District	CWA, Section 404 Dredge and Fill Permit Rivers and Harbors Appropriation Act, Section 10 - needed due to the proposed water withdrawal from the Ohio River at River Mile 313.9	March 8, 2018/revised - January 2019 (Section 10 application pending)	(First or Second Quarter 2019) **a/**
FWS, Ohio Ecological Services Field Office	ESA, Section 7 consultation	March 1, 2018	partial clearance June 7, 2018; (remainder First Quarter 2019) **a/**
	Migratory Bird Treaty Act coordination	March 1, 2018	June 7, 2018
	Bald and Golden Eagle Protection Act coordination	March 1, 2018	June 7, 2018
FWS, Midwest Ecological Services Regional Office	Multi-Species Habitat Conservation Plan implementation coordination	March 1, 2018	n/a
USFS, WNF	SUP Authorization in conjunction with NEPA review and Decision Notice	July 26, 2017 March 2, 2018	(August 2019)

TABLE A-11
Environmental Permits, Approvals, and Consultations

Agency	Permit/Approval/Consultation	Submittal Date (anticipated)	Receipt Date (anticipated)
Ohio			
Ohio Department of Natural Resources (ODNR)	Fish and Wildlife Coordination Act, Environmental Review	June 13, 2017	September 8, 2017
	Fish and Wildlife Coordination Act, State-listed Species Coordination	October 11, 2018; November 13, 2018; December 28, 2018	Pending (First or Second Quarter 2019)
	Floodplain Permit(s)	(March 2019)	Pending (April 2019)
OEPA	CWA, Section 401 Water Quality Certification	March 8, 2018/revised - January 4, 2019	Pending (First or Second Quarter 2019) **a/**
	CWA, Section 402 NPDES – General Permit for Discharges of Hydrostatic Test Water	Prior to construction	(To be determined)
	CWA, Section 402 NPDES – General Permit to Discharge Wastewater from Temporary Discharges	Prior to construction	(To be determined)
	Construction Storm Water Discharges from Oil and Gas Linear Transmission Line and Gathering Line Installation – General Permit	Prior to construction	(To be determined)
Ohio State Historic Preservation Office, Ohio History Connection	National Historic Preservation Act, Section 106 consultation	January 29, 2018; January 2, 2019	(First or Second Quarter 2019) **a/**
West Virginia			
West Virginia Department of Environmental Protection	CWA, Section 402 NPDES – General Permit for Discharges of Hydrostatic Test Water	Prior to construction	(To be determined)
West Virginia Division of Culture and History	National Historic Preservation Act, Section 106 consultation	January 29, 2018	February 26, 2018

a/ Columbia anticipates the potential for supplemental filings with various permitting agencies in 2019. Columbia's supplemental filings will likely affect and extend the anticipated receipt date for permits.

Abbreviations:

n/a not applicable

NPDES National Pollutant Discharge Elimination System

B. ENVIRONMENTAL ANALYSIS

In this section, we discuss the affected environment as it currently exists, general construction and operational impacts, and proposed mitigation measures for each resource, as applicable. Columbia, as part of its proposal, agreed to implement certain measures to reduce impacts on environmental resources. We evaluated Columbia's proposed mitigation measures to determine whether additional measures would be necessary to reduce impacts. Where we identified the need for additional mitigation, the measures appear as **bulleted, boldfaced paragraphs in the text**. We will recommend that these measures be included as specific conditions to any authorization that the Commission may issue to the applicant.

The environmental consequences of constructing and operating the Project would vary in duration and significance. Four levels of impact duration were considered: temporary, short-term, long-term, and permanent. A temporary impact would generally occur during construction, with the resource returning to pre-construction conditions almost immediately afterward. A short-term impact could continue for up to 3 years following construction. An impact was considered long-term if the resource would require more than 3 years to recover. A permanent impact would occur as a result of an activity that modifies a resource to the extent that it would not return to pre-construction conditions during the life of the Project, such as the installation of an aboveground facility. We considered an impact to be significant if it would result in a substantial beneficial or adverse change in the physical environment and/or the relationship of people with the environment.

1. Geology and Soils

1.1 Geology

The Project would be within the Allegheny (Kanawha) Plateaus section of the Appalachian Plateaus physiographic province. The Project would cross the Ironton Plateau and Marietta Plateau physiographic regions (Ohio Department of Natural Resources [ODNR], 1998). These physiographic regions are dissected plateaus with moderately high to high relief (300 feet and 350 feet, respectively), and elevations ranging from 515 to 1,400 feet above mean sea level (ODNR, 1998).

Surficial geologic materials in the Project area consist primarily of colluvium deposits, alluvium deposits, low-level valley train glacial outwash, and lacustrine deposits (ODNR, 1999a). Cenozoic-era colluvium deposits consisting of weathered bedrock material, residuum, soils, and landslide debris cover bedrock along the majority of the proposed Project route.

According to the USGS (2005a; 2005b) and the ODNR (2011), two Pennsylvanian-period bedrock groups—the Conemaugh Group and the Allegheny and Pottsville Group—underlie the majority of the Project footprint. Lithology of these groups consists of shale,

siltstone, multicolored mudstones, and sandstone. The Alleghany and Pottsville Conemaugh Group is the primary bedrock unit in Lawrence and southern Gallia Counties. The maximum bedrock thicknesses for the Conemaugh and Allegheny and Pottsville Groups are 500 feet and 700 feet, respectively. The Alleghany and Pottsville Group contains layers of coal units that may be thick enough for local economic development, and Conemaugh Group limestone may contain common marine fossils and intermittent layers of coal.

Columbia would conduct all activities at the Ceredo CS in Wayne County, West Virginia, within the fenceline of existing facilities that were previously disturbed to the same or lesser depths, and evaluated by the FERC in prior NEPA documents (e.g., Leach XPress final Environmental Impact Statement [final EIS], Docket No. CP15-514-000).[12] As such, except for a limited discussion below regarding prime farmland soils, the Ceredo CS is not discussed further.

Mineral Resources

The primary mineral resources produced/extracted in the Project vicinity are coal, oil, natural gas, limestone, and clay (ODNR, 2012). These resources are discussed below, and mines within 0.25 mile of the Project are listed in appendix B.1-1.

Coal Resources

The ODNR maintains the Mines of Ohio database of active, permitted/planned, released,[13] and inactive/abandoned underground and surface mines. This database includes mines dating as far back as 1840. According to this database, there are no active underground coal mines within about 5 miles of the Project (ODNR, 2017a) and there are no permitted or planned underground or surficial coal mines within 0.25 mile of the Project (ODNR, 2017a).

The BXP Replacement component would be within 0.25 mile of 19 inactive or abandoned underground coal mines, of which 8 would be crossed. The BXP Abandonment component would be within 0.25 mile of 17 inactive underground coal mines; none of which would be crossed. The nearest inactive underground coal mine to the BXP Abandonment component is approximately 225 feet west of MP 26.3. Due to the relative proximity of the Project Replacement and Abandonment components, a total of 19 underground coal mines would be within 0.25 mile of both Project components. Underground coal mines in the vicinity of Project components are summarized in table B.1-1.

[12] Accession number 20160901-4001.

[13] A released mine is retired/closed and has been reclaimed.

TABLE B.1-1
Summary of Underground Coal Mines within 0.25 mile of Construction Work Areas

Project Component	Active	Inactive/Abandoned	Released	Permitted/Planned
BXP Replacement	0	19	0	0
BXP Abandonment	0	17	0	0
Project Total a/	**0**	**19**	**0**	**0**

a/ All of the BXP Abandonment sites are within 0.25 mile of the BXP Replacement sites.

The BXP Replacement component would be within 0.25 mile of two surface coal mines (D-0285 and D-0712). Surface coal mine D-0712 is 512 feet southeast of MP 28.2, active, and would not be crossed by the Project. Surface coal mine D-0285 is listed as an active mine; however, Columbia states that it has confirmed that the operator (Waterloo Coal Company) no longer exists. The BXP Replacement would cross a reported haul road for this mine and the mine property at MPs 25.1 (766 feet crossing length) and 25.3 (123 feet crossing length). Columbia has been granted permission by the current landowner to develop an access road through the area. The BXP Replacement would also be within 0.25 mile of 17 inactive or abandoned surface coal mines and 5 released surface coal mines; none would be crossed. The nearest inactive surface coal mine would be adjacent to MP 39.3 but would not be crossed.

The BXP Abandonment component is within 0.25 mile of two active surface coal mines, 18 inactive or abandoned surface coal mines, and 5 released surface coal mines; none would be crossed. There are six inactive or abandoned surface coal mines adjacent to the Project (C-128, C-268, C-486, C-854, C-1337, and C-1469). Due to the relative proximity of Project Replacement and Abandonment components, 2 active surface coal mines, 19 inactive or abandoned surface coal mines, and 5 released surface coal mines would be within 0.25 mile of both Project components (ODNR, 2012; 2017a). Surface coal mines in the vicinity of Project components are summarized in table B.1-2.

TABLE B.1-2
Summary of Surface Coal Mines within 0.25 mile of Construction Work Areas

Project Component	Active	Inactive/Abandoned	Released	Permitted/Planned
BXP Replacement	2	17	5	0
BXP Abandonment	2	18	5	0
Project Total a/	**2**	**19**	**5**	**0**

a/ Some sites are within 0.25 mile of both Project components, therefore the columns are not additive.

The Project is in an area with a high density of primarily historic surface and subsurface coal extraction. However, no active or planned/permitted surface or subsurface coal mines would be crossed by the Project. Inactive/abandoned and released coal mines would be crossed; however, we conclude that there would not be any impacts on these mines because operations have ceased at those locations. Given the distance to the nearest area of active surface coal mining extraction (512 feet), as well as permissions received from landowners, we conclude that the Project would not impact the availability of or access to coal resources.

Oil and Natural Gas Resources

Review of the ODNR online Oil and Gas Well mapping service (ODNR, 2018a) identified a total of 14 active oil/gas wells and 167 inactive oil/gas wells within 0.25 mile of the Project (ODNR, 2017b; 2017c). Wells within 0.25 mile of the Project and the status of each well are listed in appendix B.1-2.

Two gas wells, including one active well, would be within Project workspaces. The active well would be within the southeastern corner of a proposed staging area (SA-027-B) near MP 41.0. This staging area would be subject to only minor construction activities, and Columbia would install safety fencing around the well as a visual aide for avoidance during construction. The second gas well would be within a temporary workspace near MP 52.1. This well was previously identified as active, but based on landowner information the well was capped in 1959. Columbia stated that this well would be cut and re-capped (by Columbia) prior to the start of construction. The well is approximately 17 feet from the proposed pipeline centerline, outside of the construction trenchline. Another active oil and gas well is about 50 feet from proposed permanent access road PAR-LA-001.3A-R near MP 41.3, but no impacts are anticipated on this well because it would be outside the limits of disturbance. In addition, eight other inactive oil and gas wells would be outside of the proposed workspaces, but within 100 feet of the Project footprint. The construction activities proposed in areas where active gas and oil wells are within 100 feet of the workspaces would consist of minor ground disturbances, and no impacts are anticipated.

There are no planned or permitted oil or natural gas wells within the Project area (ODNR, 2017b; 2017c). Further, the Project would not significantly affect future oil and gas exploration and production because the use of unconventional (directional) drilling techniques would allow for oil and gas wells to be drilled outside of the pipeline right-of-way.

Columbia has committed to work with landowners and well owners to identify well locations prior to construction. Given these findings and Columbia's proposed measures, we conclude that the Project would not significantly impact oil and gas resource extraction.

Non-Fuel Mineral Resources

Review of data provided by the ODNR to Columbia identified two active and eight released non-fuel mines within 0.25 mile of the Project (see table B.1-3). Of the two active sites, Columbia would cross one by the BXP Replacement component. This site is a surficial clay mine owned by the Waterloo Coal Company, which Columbia states is out of business. The second active mine is 102 feet west of MP 28.7 and is owned by the Cedar Heights Clay Company and deeded to Crescent Brick Company (Crescent). Columbia states that the Project would not interfere with current or proposed activities; however, Columbia has committed to continuing coordination with Crescent. The BXP Replacement would cross eight released non-fuel mines. No newly permitted or planned surface or underground non-fuel mines are within 0.25 mile of the Project. The BXP Abandonment would not cross any additional non-fuel mines.

TABLE B.1-3
Summary of Surface Industrial Mines within 0.25 mile of Construction Work Areas

Project Component	Active	Inactive/Abandoned	Released	Permitted/Planned
BXP Replacement	2	0	7	0
BXP Abandonment	2	0	4	0
Project Total a/	**2**	**0**	**8**	**0**

a/ Some of the same sites are found in both Project components, therefore the columns are not additive.

Columbia has committed to meet and coordinate with Crescent regarding any future mine plans in the vicinity of the Project. Because the only non-fuel mineral resource that would be crossed is a surface mine that is no longer in business, we conclude that construction and operation of the Project would not result in a significant impact or additional restriction on current or future mining.

Geologic Hazards and Impact Mitigation

Geologic hazards are natural, physical conditions that can result in damage to land and structures or injury to people. Such hazards typically are seismic-related, including earthquakes, surface faulting, and soil liquefaction; landslides, flooding, and karst terrain; or ground subsidence hazards. These hazards, as well as the feasibility of utilizing HDD based on hydrogeologic conditions in the Project area, and the potential for an IR of drilling fluid to the ground surface during HDD activities, are discussed below.

Seismicity

The shaking during an earthquake can be expressed in terms of the acceleration as a percent of gravity (g), and seismic risk can be quantified by the motions experienced at

the ground surface or by structures during a given earthquake expressed in terms of g. USGS National Seismic Hazard Probability Mapping shows that for the Project area, within a 50-year period, there is a 2 percent probability of an earthquake with an effective peak ground acceleration of 6 to 8 percent g; and a 10 percent probability of an earthquake with an effective acceleration of 2 to 3 percent g being exceeded (USGS, 2014). For reference, a peak ground acceleration of 10 percent g (0.1 g) is generally considered the minimum threshold for damage to older structures or structures not constructed to resist earthquakes.

In general, modern pipeline systems have not sustained damage during seismic events, except due to permanent ground deformation or traveling ground-wave propagation greater than or equal to a Modified Mercalli Intensity of VIII (similar to a Richter scale magnitude around 6.8 to 7.0) (O'Rourke and Palmer, 1996; USGS, 2018a). Based on a review of ODNR database information, since 1804, the closest known earthquake had an epicenter 2.5 miles east of the BXP Replacement route near MP 1.6 in Vinton County with a magnitude of 3.8 (ODNR, 2018b). Further, the Kentucky River-Ohio River-Rome Trough Fault systems are within the Precambrian basement rock 0.96 mile south of MP 66.0 (ODNR, 2002). However, in Ohio few faults are visible near the surface, and no known surface faults are associated with historic earthquakes (ODNR, 2017d). Additionally, these faults do not exhibit evidence of movement during recent (Holocene) time and most have not been active since the Paleozoic era (ODNR, 2017d). Due to the low potential for seismicity, the lack of recent surficial faults, and the ability of modern arc welded pipelines to withstand seismic events of a typical magnitude experienced in the Project area, we consider the potential for seismic hazards to significantly impact Project facilities to be low.

Induced seismicity can be caused by natural gas drilling and extraction or by waste water injection. The ODNR regulates extraction and injection wells to address the potential for induced seismicity and can at its discretion require testing, seismic surveys, and restriction or mitigation (ODNR, 2017e). The ODNR has documented three induced seismic events in the state of Ohio. The most recent and closest to the Project occurred in September 2015 in the town of Freeport, Ohio, approximately 95 miles northeast of the proposed Project (ODNR, 2017e). The USGS (2019) developed forecast maps depicting the chance of damage resulting from both natural and induced seismicity, which indicate that seismicity in Ohio and West Virginia would be very low, estimated at less than 1 percent per year. Based on this information, we conclude that there is no significant risk to the proposed Project resulting from induced seismicity.

Soil Liquefaction

Soil liquefaction is a phenomena associated with seismic activity in which saturated, non-cohesive soils temporarily lose their strength and liquefy (i.e., behave like a viscous liquid) when subjected to forces such as intense and prolonged ground shaking. All three of these conditions (non-cohesive soils, near surface saturation, and seismicity) are

necessary for soil liquefaction to occur. The Project is in an area of low seismicity. As such, the potential for soil liquefaction to occur is negligible.

Landslides

Landslides involve the downslope movement of materials under the force of gravity. Natural causes of landslides might include slope destabilization resulting from adverse bedrock conditions, steep incline, water content and flow, precipitation, freeze/thaw cycles, and soil characteristics (USGS, 2008). Man-made causes or contributing factors to landslides could include construction activities, such as ground disturbance on steep slopes or altered surface or subsurface drainage patterns.

The Project area in Vinton and northern Jackson Counties is considered to have high susceptibility to and low to moderate incidence of landslides. In southern Jackson, Gallia, and Lawrence Counties, Ohio, the Project has high susceptibility to and moderate incidence of landslides (Ohio Department of Public Safety, 2011; USGS, 1982). Areas susceptible to landslides in the Project area have terrain consisting of steep ravines, side slopes, existing or historic slips, or any combination thereof along with contributing factors associated with soil type and groundwater characteristics such as shallow depth to groundwater, groundwater seepage, and perched water tables. Review of Light Detection and Ranging (LiDAR) terrain modeling performed by staff of the Ohio Geological Survey identified six areas, all within about 500 feet of the proposed R-801 pipeline, of recent or historic landslide activity. These areas are listed in table B.1-4. One feature (a temporary workspace near MP 50.0) is within the proposed Project footprint. Areas more generally subject to increased risk for landslides along the proposed R-801 pipeline based on the LiDAR terrain modeling are listed in appendix B.1-3.

TABLE B.1-4
Features Consistent with Landslide Morphology Within 500 Feet of the R-801 Pipeline a/

Milepost	Facility	Distance from Centerline (feet)	Direction from Centerline/ Project Footprint	Distance from Project Footprint (feet)
46.3	Permanent right-of-way	72	East	47
47.9	Temporary workspace	165	Northwest	65
48.0	Permanent right-of-way	284	Southeast	259
50.0	Temporary workspace	35	West	0
57.9	Permanent right-of-way	301	South	276
65.1	Temporary workspace	358	Southwest	258

a/ Identified using LiDAR data

The presence of springs and seeps can be indicative of a shallow water table, which can contribute to slope instability. Five springs were identified within 150 feet of BXP Replacement and Abandonment pipeline activities (see section B.2.1). No seeps were identified within 150 feet of any aboveground facility.

Red beds (red mudstone) are particularly susceptible to rapid weathering and slope instability. Red beds occur in the Conemaugh bedrock group, which underlies about 41 percent of the proposed R-801 pipeline route. In addition, landslide incidents are more frequent in areas of steep slopes. The R-801 pipeline would traverse 13.8 miles of 15 to 30 percent vertical slopes, 14.9 miles of 15 to 30 percent side slopes, 4.2 miles of 30 percent or greater vertical slopes, and 1.2 miles of side slopes greater than 30 percent (see appendix B.1-3).

Potential triggers of landslides related to Project construction activities include vibrations from machinery or traffic, blasting, alterations to slope morphology caused by earthwork, the addition of new loads on an existing slope, removal of deep-rooted vegetation that binds shallow soils to bedrock, or changes in water volume infiltrating into the soil after precipitation as a result of construction disturbance. In areas with steep slopes, soils may be unstable and present erosion management problems when disturbed, often requiring various erosion and sedimentation control measures during pipeline construction and operation.

Preliminary geohazard assessment reports completed by Columbia's geotechnical consultant indicate that the BXP Replacement would cross 0.4 mile of high landslide hazard zones and 33.8 miles of moderate to high landslide hazard zones. This preliminary determination was based on a landslide hazard model that utilized ESRI ArcGIS geoprocessing tools based on publicly available topography, slope data, rock type, and stream erosion data.

Columbia has committed to hiring a third-party geotechnical firm to perform a desktop assessment of conditions that could contribute to landslides, followed by a field study. Both assessments would occur prior to the start of construction, and would be submitted to the FERC for review. These studies would evaluate geotechnical conditions and groundwater patterns in relation to geologic hazards, locate areas subject to high erosion potential and/or ground instability, and develop measures to be used during construction and operations designed to prevent, minimize, or mitigate landslides.

Columbia would also implement the measures described in its ECS and *Landslide Mitigation Plan* to reduce the potential for slope failure and minimize the impacts associated with erosion of steeply sloping terrain. Prior to the start of construction, Columbia's construction supervisors and monitors, including contractors, would be trained in the recognition and management of potential landslides. Columbia would require the construction contractor to prepare a *Steep Slope Work Plan* for any area with slopes greater than 30 percent, which would include defining potential hazards, monitoring weather

conditions, and assessing soil conditions. The *Steep Slope Work Plan* measures would also include an engineering analysis that included field testing, hazard recognition and identification of soil limitations, hazards, and weather, as well as specialized compaction, backfill, and excavation methods. Some other measures Columbia would implement include installing trench plugs and/or French drains to prevent water from flowing down the trench and along the pipeline. If temporary stabilization is needed prior to permanent restoration and establishment of permanent vegetation, Columbia would use mulch, hydromulch, and/or mulch tackifiers to cover the seeding, and would use increased rates of mulch and jute netting on slopes exceeding 8 percent. Columbia would re-establish pre-construction contours and drainage patterns to the greatest extent practical in disturbed work areas to reduce the potential for landslides. For these reasons, we conclude that potential Project effects related to landslides would be adequately minimized, and the risk of landslides would not be significant.

Subsidence

Ground subsidence, involving the localized or regional lowering of the ground surface, may be caused by karst formation from limestone or gypsum bedrock dissolution; sediment compaction from groundwater pumping and/or oil and gas extraction; and underground mining. No karst terrain is present, and the lithology that could lead to bedrock dissolution and karst development does not generally occur within the Project area (ODNR, 1999b). The geology in the Project area consists predominantly of sedimentary bedrock, and regional or local lowering of the water table from excess groundwater withdrawals does not occur. Oil and gas extraction occurs in the Project vicinity; however, there have been no reported subsidence hazards as a result of these activities. Therefore, and except as discussed below related to subsidence hazards from underground mining, adverse impacts on the Project from subsidence hazards are not anticipated.

Mine Hazards

As was previously described, the Project is in an area of extensive and primarily historic surface and subsurface resource extraction. Coal mining in Ohio has historically utilized strip, longwall, and room and pillar mining techniques (Gordon, 2009). Surface mining, which includes strip mining and open pit mining techniques, removes overburden materials to access resources beneath. Surface mining can steepen slopes, thereby increasing the potential landslide hazard. Longwall mining and room and pillar mining are subsurface mining techniques. Longwall mining proceeds by excavating rectangular panels and employing the use of hydraulic supports designed so that the ceiling of each panel is supported temporarily while excavation is ongoing. When excavation is complete, the supports are withdrawn to deliberately collapse the mine ceiling. Room and pillar mining leaves pillars of mineable material, or in some cases timbers, to support the mine; the coal between the pillars is removed and the pillars left in place to provide support and minimize surface subsidence (Gordon, 2009). Consequently, the surface above a room and pillar mine should not subside unless the columns of coal and/or timbers left in place in an

abandoned mine deteriorate, they are intentionally collapsed, and/or give way under the weight of the overburden. Improper mitigation of surface mining could lead to an increase in landslide incidence due to mine-induced steeper slopes or surface exposure of weaker bedrock units such as red beds (see appendix B.1-3).

Five areas of known subsidence suspected to be artifacts of prior mine collapse were identified within 1 mile of the Project area (see table B.1-5) near MPs 25.9 to 26.4 of the proposed R-801 pipeline route; all of these artifacts occurred outside of proposed work areas. The nearest known subsidence feature to the Project would be 0.2 mile west of an ATWS near MP 25.9. Columbia indicated that it has not observed subsidence features along its existing R-System pipelines, which would be collocated with the proposed R-801 pipeline for about 51 percent of its length.

TABLE B.1-5
Subsidence Features within 1 mile of Construction Work Areas

Nearest Milepost/ Facility a/	County, State	Distance and Direction from Pipeline Centerline (miles)	Distance and Direction from Project Footprint (miles)	Description
25.9 ATWS	Jackson, Ohio	0.4 west	0.3 west	15 feet in diameter, subsidence 5 feet deep
25.9 ATWS	Jackson, Ohio	0.3 west	0.3 west	20 feet in diameter, 15 feet deep
25.9 ATWS	Jackson, Ohio	0.2 southwest	0.2 west	15 feet in diameter, 5 feet deep
SA-013-B	Jackson, Ohio	1.1 west	0.6 north	10-foot diameter hole in a field; no open pit, but appears to be active
SA-013-B	Jackson, Ohio	1.6 west	0.9 northwest	15 feet in diameter by 5 feet deep, 8 feet from road

a/ Due to the proximity of the BXP Replacement Project components to the BXP Abandonment Project components, subsidence events recorded within 1 mile of BXP Replacement Project components are also within 1 mile of BXP Abandonment Project components. As such, and for the purposes of this table, the distance and direction from the BXP Replacement component was used for all recorded subsidence locations.

ODNR, 2017a

Abbreviations:

SA Staging Area

Underground mining poses risks to overlying engineered structures because the overlying strata can collapse into the void formed by resource extraction. Based on available information, only room and pillar mining has been used beneath the proposed pipeline route (ODNR, 2014; Sorrell, 2017). Information regarding known abandoned

mines is provided in appendix B.1-1; however, there could be unmapped and unknown underground mines throughout the Project area.

Identified underground mines have been abandoned for over 100 years, but data are insufficient to determine previous operating depths. It is possible that settlement has already occurred at some locations given the age of the mines. Two types of subsidence may occur in areas above historic underground mines: pit subsidence and trough subsidence. Pit subsidence may occur above underground mines that are less than 180 feet deep. Pit subsidence sites can vary from 2 to 40 feet in diameter and with settlement depths of 2 to 25 feet, the variations in rock type due to local geologic conditions and mine properties will affect the ranges in settlement depths (Illinois Department of Natural Resources, 2018; Pennsylvania Department of Environmental Protection, 2018). Trough subsidence events are commonly larger in area, but form relatively shallower depressions due to failures of underground room and pillar mines. Subsidence troughs are typically elliptical in shape and can range from 350 to 450 feet in diameter and with vertical settlement ranging from slight visual notification near the edges and 1 to 3 feet near the center of the subsidence trough. The variations in rock type due to local geologic conditions and mine properties affect the ranges in settlement depths (IDNR, 2018).

Preliminary subsidence geohazard reports completed by Columbia's geotechnical contractor were based on desktop analysis of publicly available mine data from the ODNR (pillar locations and pillar thicknesses) and indicate that there are low, moderate, and high areas of potential subsidence along the Project alignment. The preliminary reports identified areas associated with inactive/active/reclaimed/abandoned underground mines and surface mines for additional investigations to evaluate the risk of subsidence during pipeline construction. Table B.1-6 provides the location (mileposts) of areas where potential subsidence risks were identified, as well as recommendations provided by Columbia's geotechnical contractors to address potential hazards.

In addition to the recommendations described in table B.1-6, Columbia's contractor recommended that any area where underground mining has been identified within 0.25 mile of the R-801 pipeline centerline have geotechnical borings conducted to ascertain potential subsidence risks by determining subsurface conditions.

TABLE B.1-6
Preliminary Identified Underground Mine Subsidence Risk Areas

Begin MP (miles)	End MP (miles)	Ground Subsidence Risk a/	Subsidence Risk to Pipeline a/	Distance from Pipeline (feet)	Direction from Pipeline	Recommendations
7.7	8	Moderate	Moderate	0		Visual assessment followed by geotechnical borings (in association with Mine Code JKN-027).
7.5	9.2	Moderate	Moderate	0		Visual assessment including confirmation of shaft location near MP 8.3 followed by 5-6 geotechnical borings up to 30 - 150 feet.
8.2	9.15	High	Low	1,228	East	None at this time.
7.6	9.15	High	Moderate	599	West	Visual assessment followed by geotechnical borings (in association with Mine Code JKN-027).
9.15	10.53	Moderate	Moderate	0		Visual assessment followed by 6-8 geotechnical borings up to 150 feet.
10.53	11.2	Moderate	Moderate	0		Visual assessment followed by 4-5 geotechnical borings up to 50 - 150 feet.
11.2	11.35	Moderate	Moderate	0		Visual assessment followed by 1 geotechnical boring up to 70 - 140 feet.
22.4	22.5	High	Moderate	404	East	Visual assessment followed by 1 geotechnical boring up to 30 feet.
25.65	25.9	High	Moderate	932	West	Visual assessment followed by 1 geotechnical boring up to 30 feet.
26.05	26.2	High	Moderate	346	West	Visual assessment of the area in association with Mine Code JKN-056 and JKN-148.
25.93	26.1	High	High	0		Visual assessment including confirmation of air shaft location and direction near MP 26.02 followed by 1-2 geotechnical borings up to 70 feet.
26.1	26.2	High	High	0		Visual assessment including confirmation of mine shaft location near MP 26.2 followed by 1 geotechnical boring up to 70 feet.

TABLE B.1-6
Preliminary Identified Underground Mine Subsidence Risk Areas

Begin MP (miles)	End MP (miles)	Ground Subsidence Risk a/	Subsidence Risk to Pipeline a/	Distance from Pipeline (feet)	Direction from Pipeline	Recommendations
26.25	26.45	High	High	0		Visual assessment including assessment of drift opening locations and directions followed by 1-2 geotechnical borings up to 40 - 85 feet.
26.3	26.45	High	Moderate	208	West	Visual confirmation of angle shaft location and directions and 1 geotechnical boring up to 70 feet.
26.8	26.9	High	Moderate	713	West	Visual confirmation of angle shaft locations and 1 geotechnical boring up to 70 feet.
27.4	27.6	High	Moderate	299	West	Visual assessment including confirmation of air shaft location approximately 250 feet west of the R-801 alignment and 1 geotechnical boring up to 30 feet.

a/ A value of "low" was prescribed to areas where mining occurred at a depth of over 100 feet from land surface. A value of "moderate" was used to describe mines that were constructed using long slender pillars which may lead to subsidence. A value of "high" was used to describe areas where mining was conducted near the surface. In areas where mine data are not available, a conservative risk evaluation is provided. This analysis is based on Columbia's Third-Party review of ODNR mine maps and calculated support capacity of mapped pillars that is extrapolated for the mined areas.

Columbia's geotechnical contractor also identified areas of moderate to high risk of ground subsidence caused by land surface topography and where restoration with mine spoil fill materials followed the completion of surface mining operations. The areas were identified utilizing ODNR mine data (i.e., mine maps, estimated coal seam elevations and Project-specific LiDAR contours) to ascertain probable mine spoil depths of surface mines based on data interpolations. Areas where potential mine spoils are greater than 20 feet in depth were considered hazards where crossed by the proposed R-801 pipeline. Table B.1-7 provides the location (by milepost) of areas with potential subsidence risks based on the preliminary analysis. Recommended actions in these areas to field-verify potential subsidence risks include conducting a field exploration program that may include visual assessments, geotechnical borings, and geophysical surveys to characterize subsurface materials.

TABLE B.1-7
Preliminary Identified Surface Mine Subsidence Risk Areas

Begin MP (miles)	End MP (miles)	Subsidence Risk to Pipeline a/	Recommendations
15.95	16.05	Moderate	Visual assessment of the area followed by geophysical survey and geotechnical boring for presence of mine spoils.
16.9	17.2	Moderate	Visual assessment of the area followed by geophysical survey and geotechnical borings at MPs 16.9, 17.5 and 17.7 for presence of mine spoils.
22.05	22.73	High	Review service records for the abandonment line within this area for subsidence evidence to update hazard evaluation. Also recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by one geotechnical boring within each historic mine area to supplement and support characterization by geophysical methods.
22.95	23.05	Moderate	Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by geotechnical borings within each historic mine area to supplement and support characterization by geophysical methods.
23.8	-	Moderate	Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by geotechnical borings within each historic mine area to supplement and support characterization by geophysical methods.
25.3	25.7	High	Attempted coordination with Waterloo Coal Company Inc. former employees to obtain more details regarding mined areas and depths. Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by geotechnical borings within each historic mine area to supplement and support characterization by geophysical methods.
25.4	26.2	High	Same as MPs 25.3 to 25.7
25.44	26.12	High	Same as MPs 25.3 to 25.7

TABLE B.1-7
Preliminary Identified Surface Mine Subsidence Risk Areas

Begin MP (miles)	End MP (miles)	Subsidence Risk to Pipeline a/	Recommendations
26.45	26.6	Low - Moderate	Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by one geotechnical boring near MP 26.5 to supplement and support characterization by geophysical methods.
26.75	27.23	Moderate	Coordination with Paul Adams Coal Company to obtain more information on extents and depth of mining activity. Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by two geotechnical borings to supplement and support characterization by geophysical methods.
27.28	27.33	High	Attempted coordination with Waterloo Coal Company Inc. former employees is recommended to determine extents and depth of mine activities. Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by one geotechnical boring to supplement and support characterization by geophysical methods.
27.4	27.65	High	Attempted coordination with Waterloo Coal Company Inc. former employees is recommended to determine extents and depth of mine activities. Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by one geotechnical boring to supplement and support characterization by geophysical methods.
28	28.6	High	Coordination with Cedar Heights Clay Company regarding extents and depth of mining, as well as any backfill of mined areas to inform hazard assessment. Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by one geotechnical boring to supplement and support characterization by geophysical methods.
28	28.2	High	Review service records for the abandonment line within this area for subsidence evidence to update hazard evaluation. Also recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, potentially followed by one geotechnical boring within the BXP Replacement corridor within each historic mine area to supplement and support characterization by geophysical methods.
39.3	39.73	High	Recommend performance of geophysical imaging along the pipeline alignment to characterize depth to bedrock, followed by 2-3 geotechnical borings within the BXP Replacement corridor within each historic mine area to supplement and support characterization by geophysical methods.

All of Columbia's pipeline facilities would be designed by state-licensed engineers and constructed in accordance with USDOT regulations codified in 49 CFR 192.317 and in accordance with all state and local codes. The USDOT regulations require the pipeline operator to design and construct pipeline facilities in a manner which provides protection from hazards (e.g., subsidence) that could cause pipeline facilities to move or sustain abnormal stresses. USDOT regulations (Electronic Code of Federal Regulations, 2019) also require periodic monitoring of the right-of-way during operation to detect abnormal conditions, such as subsidence. In Class 1 and 2 areas (see section B.9), the inspection interval at highway and railroad crossings would be 7.5 months (at least twice each calendar year) and 15 months (at least once each calendar year) at all other locations. In Class 3 areas, the inspection interval at highway and railroad crossings would be 4.5 months (at least four times each calendar year) and 7.5 months (at least twice each calendar year) at all other locations.

Because of the high density of historic surface and subsurface mineral extraction in the Project vicinity, and given that Columbia has not completed geohazard investigations pertinent to mine hazards, or detailed how recommendations for further investigation (provided by its geotechnical contractor within preliminary geohazards assessments) would be addressed, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary, for review and written approval by the Director of the OEP, an *Abandoned Mine Investigation and Mitigation Plan*. This plan should include the final results of Columbia's geohazard investigations pertinent to mine hazards, the results of secondary investigations to further characterize potential mine-related features (addressing the recommendations of Columbia's geotechnical contractor), and site-specific mitigation and monitoring measures Columbia would implement when crossing abandoned mine lands, including measures to manage and dispose of contaminated groundwater.**

Acid mine drainage may occur in areas of abandoned coal mines and is the result of minerals such as pyrite (iron sulfide) or unremoved coal being exposed to air and water, which causes the materials to weather and degrade under oxidizing conditions, resulting in the acidification of groundwater. As the pH in groundwater decreases (i.e., becomes more acidic), additional metals are dissolved into the groundwater, degrading its quality (Ohio University, 2018). Where such drainage from groundwater systems seeps or flows into waterbodies, the low pH can harm aquatic habitats for species such as fish, invertebrates, and amphibians.

The ODNR Division of Mineral Resources (DMR) manages an Acid Mine Drainage Abatement Program (ODNR-DMR, 2018) that allocates federal funds for cleanup and restoration at areas affected by acid mine drainage. All four counties crossed by the Project in Ohio have either completed acid mine drainage abatement and treatment plans or were

determined to have acid mine drainage present, including hydrologic unit code (HUC)-12 watersheds that the Project would cross, such as the Headwaters Symmes Creek and Storms Creek watersheds (ODNR-DMR, 2018).

Columbia has not provided a detailed plan to address construction and handling procedures for acid-producing rock, soils, and groundwater that could be encountered in areas of active or previous mining activities where sulfide minerals are exposed to runoff. Therefore, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary, for review and written approval by the Director of the OEP, an *Acid Mine Drainage Mitigation Plan*.**

In consideration of Columbia's proposed measures and our recommendations, we conclude that impacts associated with mine hazards would be adequately minimized.

Flood Hazards

Due to steep slopes and narrow river valleys, there is the potential for flash flooding to occur in the Project area. The *National Weather Service Flash Flood Guidance* estimates that the amount of rainfall needed to generate flash flooding in the counties crossed by the Project is 1.7 to 1.9 inches per hour (NOAA, 2018).

Table B.1-8 identifies areas where the Project crosses the Federal Emergency Management Agency (FEMA) 100-year floodplain. Two existing aboveground facilities (Symmes VS and the South Point RS) and two proposed aboveground facilities (MLV-3 and MLV-4) would be in a FEMA 100-year floodplain. Alternatives for MLV locations, where applicable, are discussed in section C.3.3.

Columbia stated that the aboveground facilities would be constructed according to county and other applicable floodplain ordinances, regulations, and permits. Columbia also indicated that aboveground facilities in the 100-year floodplain would consist of limited piping components and assemblies. Therefore, installation of the pipeline would not affect floodplain storage, as almost all Project components would be installed subsurface, and ground surface contours would be restored following the completion of construction activities. The area of impervious surfaces associated with installation of the aboveground facilities in floodplains would be relatively minor when compared to the floodplain as a whole.

TABLE B.1-8
Crossing of FEMA 100-year Floodplains for the Buckeye XPress Pipeline

Nearest Milepost/Facility a/			
Begin Milepost	**End Milepost**	**Flood Zone Type b/**	**Crossing Length (feet)**
Pipeline Facilities			
2.8	2.9	A	523
24.7	24.8	A	655
29.8	30.1	A	1,588
30.1	30.1	A	235
38.1	38.1	A	331
38.6	38.6	A	44
38.6	38.7	A	785
40.8	41.0	A	822
43.1	43.3	A	897
55.2	55.3	A	158
58.7	58.7	A	292
64.0	64.1	A	254
65.8	66.0	AE	967
66.0	66.0	AE	98
		Pipeline Subtotal (feet)	***7,649***
Access Roads			
38.7	PAR-LA-001-R	A	103
41.1	PAR-LA-001.3A-R c/	A	192
55.1	PAR-LA-002-B	A	49
55.3	PAR-LA-002.1-R	A	47
		Access Road Subtotal (feet)	***391***
		Project Total	**8,040 feet**
Aboveground Facilities		**Flood Zone Type b/**	**Acres**
38.7	Symmes VS c/	A	0.5
38.7	MLV #3	A	0.1
55.3	MLV #4	A	0.2
64.0	South Point RS c/	A	2.6
		Aboveground Facility Subtotal (acres)	***3.4***
		Project Total	**3.4 acres**

TABLE B.1-8
Crossing of FEMA 100-year Floodplains for the Buckeye XPress Pipeline

Nearest Milepost/Facility a/			
Begin Milepost	**End Milepost**	**Flood Zone Type b/**	**Crossing Length (feet)**

Sources: FEMA, 2017

a/ Certain new or expanded permanent facilities (e.g., aboveground facilities, access roads) would be used for activities associated with both BXP Replacement and BXP Abandonment components. As such, and for the purposes of this table, the milepost location for the BXP Replacement component was used.

b/ Flood Zone A – an area inundated by 100-year flooding, for which no base flood elevations have been determined.

Flood Zone AE – an area inundated by 100-year flooding, for which base flood elevations have been determined.

c/ Existing facility or access road that would be expanded.

Abbreviations:

n/a not applicable PAR Permanent Access Road

Seasonal and flash flooding hazards are a potential concern where facilities cross or are near major streams and small watersheds. Although flooding itself does not generally present a risk to pipeline facilities, bank erosion and/or scour could expose the pipeline or cause sections of pipe to become unsupported. Flooding can also affect the pipeline by increasing buoyancy, causing the pipe to rise toward the land surface where it may become exposed. Columbia would implement several mitigation measures, as needed, within floodplains to minimize potential impacts from flood events. These measures include:

- increasing pipeline burial depth at waterbodies to 5 feet (2 feet deeper than minimum cover);
- using concrete coating on the pipeline to maintain negative buoyancy;
- installing and maintaining erosion and sediment control structures;
- restoring floodplain contours and waterbody banks to their pre-construction condition; and
- conducting post-construction monitoring to ensure successful revegetation and stable waterbody banks.

Given that Columbia would comply with all applicable permitting requirements for floodplains and would implement measures to prevent or minimize impacts from scour at waterbodies, we conclude that no adverse impacts on floodplain storage or resulting from flood hazards would occur during construction and operation of the Project.

Shallow Bedrock and Blasting

Based on prior construction experience in the area, field observations, and publicly available data, Columbia estimates that 46.3 miles (71 percent) of the R-801 pipeline would cross areas that may require blasting. Columbia would not require blasting for BXP Abandonment activities.

Columbia would first attempt to rip or hammer rock near the ground surface using heavy equipment. If those techniques fail to dislodge rock within trench excavations, then blasting may be needed. All blasting techniques would comply with federal, state, and local regulations and permits governing the safe storage, handling, firing, and disposal of explosive materials. In addition, Columbia has prepared a general *Blasting Plan* to minimize the effects of blasting and ensure safety during blasting operations. As outlined in its *Blasting Plan*, Columbia would use the minimum charges needed; ensure pre-notification to nearby occupants and farmers at least 48 hours in advance, use blasting mats or padding to prevent the scattering of debris; and conduct pre- and post-blast inspections and monitor peak particle velocity at any water wells or potable springs used for domestic or livestock purposes, as well as at homes and commercial buildings within 150 feet of proposed blasting. In addition, Columbia would develop a site-specific *Blasting Plan*, reviewed by an engineer, tailored to the specific requirements at each location and nearby resources.

Columbia would address potential slope instability issues associated with blasting by blasting only in areas where it was necessary and by using high frequency, small displacement blasts that would limit impacts on slope stability and reduce the potential for the fracturing rocks outside of the trench line. However, Columbia has not provided the site-specific potential for blasting-induced slope instability and associated mitigation measures it would implement to reduce potential impacts should blasting be necessary within these areas. Therefore, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary, for review and written approval of the Director of the OEP, its final geohazard report. The geohazard report shall include the results of Columbia's site-specific identification of the slopes that would require blasting, quantification of the potential for blasting-induced slope instability or movement for each slope, developed measures to mitigate and monitor the sites post-construction, and include descriptions of and distances to nearby and downslope environmental and human receptors from potential blast-induced landslides or debris flows.**

Given Columbia's use of its proposed measures and our recommendation, we conclude that potential impacts associated with blasting would be adequately minimized.

HDD Feasibility and Geotechnical Investigation

Length of an HDD alignment, pipeline diameter, and subsurface material are factors in the technical feasibility of an HDD installation. Subsurface conditions that can affect feasibility of an HDD installation include excessive rock strength and abrasiveness, unconsolidated gravel and boulder materials, poor bedrock quality, solution cavities, and artesian conditions. It is also possible for HDD pipeline installations to fail, primarily due to encountering unexpected geologic conditions such as transitioning from coarse unconsolidated materials into bedrock or if the pipe were to become lodged in the hole during pullback operations. During HDD operations, drilling fluid consisting primarily of water and bentonite clay is pumped under pressure through the inside of the drill pipe and flows back (returns) to the drill entry point along an annular space between the outside of the drill pipe and the drilled hole. Because the drilling fluid is pressurized, in certain conditions it can seep into the surrounding rocks and sediment. Formational drilling fluid losses typically occur when the drilling fluid flows through the pore spaces in the soil through which the HDD drilling profile passes or within fractures contained in the rock formation. IRs are more likely to occur in more permeable soils or via fractures or fissures in bedrock. Chances for an IR to occur are greatest near the drill entry and exit points where the drill path has the least amount of ground cover.

Columbia has proposed the use of the HDD method to cross infrastructure (roads, railroads, and utility corridors) and sensitive resources (wetlands and waterbodies) at four locations. A summary of geotechnical investigations and feasibility assessments completed for each crossing follows.

Highway 32

Columbia would cross Highway 32 and County Road 87 with one 1,153-foot-long HDD. Columbia completed three geotechnical borings along the proposed alignment to depths of 100 feet below the ground surface (fbs).

Overall, Columbia's geotechnical contractor determined that the current HDD design is feasible and meets the minimum requirements of Pipeline Research Council International (PRCI) PR-227-144507 and American Society of Mechanical Engineers (ASME) code B31.8-16; however, several potential concerns were identified. Columbia's geotechnical contractor concluded that the proposed drill path would remain above the bedrock formation for the entire length of crossing. However, given potential topographic variability of the bedrock surface, there is a possibility of the drill encountering the upper reaches of the bedrock formation. The bedrock in the upper portion of this formation was found to be soft and decomposed; therefore, steering issues that would be present with a shallow angle intersect into hard materials are not anticipated.

A risk of hydraulic fracture was identified along the second half of the drill alignment approaching the exit, with the exception of the portion of drill crossing beneath the County Road 87 embankment. Further, though it is not anticipated that the drill would

intercept the coal seams identified in the geotechnical borings, there may be other coal seams present along other portions of drill path which could create an elevated risk of IR as pressurized drilling fluid could migrate from the borehole into the soft and porous materials. The potential for settlement of Highway 32 and County Road 87 in excess of the typical recommended limit of 0.5 inch was also identified.

The risk of hydrofracture and IR as well as settlement could be reduced or mitigated if the drill alignment was deepened and/or passed through competent bedrock. Based on geotechnical information and competency of bedrock encountered, Columbia's geotechnical contractor estimated that the drill path would need to be deepened by roughly 25 feet in order to allow the drill to pass through competent bedrock beneath Highway 32 and County Road 87. Columbia has stated that due to workspace and right-of-way restrictions, the required modifications to the HDD geometry to provide this additional depth are not possible.

Highway 35

Columbia would cross Highway 35, an overhead powerline right-of-way, and County Road 79 with one 2,300-foot-long HDD. Columbia completed a geotechnical investigation for this crossing consisting of the installation of three borings on the north (exit) side of the alignment, to depths of approximately 100 fbs. Geotechnical information was not collected in the immediate vicinity of the entry location, and the proposed drill path would be below the terminal depth of all borings with the exception of the one nearest the drill exit point.

Columbia's geotechnical contractor determined that the current HDD design meets the minimum requirements of PRCI PR-227-144507 and ASME code B31.8-16 and would be feasible. Columbia's geotechnical contractor completed a hydrofracture risk assessment which determined that there would be an elevated risk along roughly the last 250 feet of the drill but that the risk over the length of the HDD profile would be low. The drill is anticipated to cross through competent bedrock beneath Highway 35 and County Road 79. Therefore, surface infrastructure should not experience settlement. The current proposed pipe staging workspace (north of the exit location) would require the pullback to be performed in two sections with one intermediate-weld. The inclusion of an intermediate-weld during pullback can add risk to an installation in unconsolidated material due to potential slough or swell in the borehole during the delay for the weld. However, the vast majority of this drill would be within competent rock where sloughing and swelling are of minimal concern.

Wetland 558B

Columbia would cross forested Wetland 558B and two streams with one 1,609-foot-long HDD. Columbia completed two geotechnical borings, one on either end of the alignment to depths of 100 fbs.

Columbia's geotechnical contractor determined that overall, the current HDD design meets the minimum requirements of PRCI PR-227-144507 and ASME code B31.8-16, and would be feasible. However, several concerns were identified. Based on the interpolated top-of-bedrock surface, the HDD would encounter bedrock shortly into the entry build curve and would penetrate bedrock at a moderate angle, with minimal risk of the drill bit deflecting off of the bedrock surface. However, geotechnical information was not collected near the mid-point of the drill; Columbia's geotechnical contractor concluded that it was not confident of the location of the bedrock surface given potential topographic variability over the alignment.

A hydrofracture risk assessment determined that there would be an elevated risk along roughly the last 300 feet of drill approaching the exit. Furthermore, though it is not anticipated that the HDD would encounter the coal seams observed in the geotechnical borings, there may be coal seams or other organic material present along the drill path which could create an elevated risk of IR.

Wetland 545B

Columbia would cross Wetland 545B, South Central Railroad tracks, and three buried pipelines with one 1,680-foot-long HDD. Columbia completed two geotechnical borings to depths of 100 fbs, one at each end of the proposed alignment.

Overall, Columbia's geotechnical contractor concluded that the current HDD design meets the minimum requirements of PRCI PR-227-144507 and ASME code B31.8-16, but is considered to be at risk of problematic and extended construction. Columbia's geotechnical contractor was not confident that the drill would intersect the bedrock layer because the elevation of bedrock could drop below the proposed drill depth and Columbia did not collect geotechnical information near the mid-point of the crossing. However, based on the interpolated depth of bedrock, Columbia's geotechnical contractor determined that the HDD would be approximately 10 feet within the bedrock layer at the bottom elevation. Steering issues may occur near the bottom tangent due to a very shallow angle of intersection with the bedrock interface. Drilling along the transition zone between softer surface soils and harder bedrock can be problematic, and typically an optimal HDD design would stay above the transition zone or try to intersect into bedrock at a relatively steep angle.

Columbia's hydrofracture risk assessment identified an elevated risk of IR along roughly the last 350 feet of drill approaching the exit; the risk of hydrofracture along the remainder of the alignment was considered to be low. Furthermore, while it is not anticipated that the HDD would encounter the coal seam identified in the geotechnical boring, there may be coal seams or other organic material present along other portions of drill path which could create an elevated risk of IR. It was also determined that there would be a risk for settlement of the Ohio South Central Railroad line nearest the HDD exit point above the typical recommended limit of 0.5 inch.

The above-referenced concerns could be minimized if the drill path were deepened to remain within competent bedrock over the majority of the crossing. Columbia's geotechnical contractor concluded that this would require deepening the path by roughly 25 feet; however, due to limitations with the current design geometry, the exit location would need to be extended 120 feet. Columbia has stated that modifying the entry and exit locations is not feasible due to workspace and right-of-way restrictions, including a residence, road, and wetlands at the exit point and a road, pipeline point of intersection, waterbodies, and wetlands at the entry point.

General Impacts and Mitigation

Based on the results of geotechnical investigations, Columbia's geotechnical contractor provided general recommendations which are incorporated into Columbia's *HDD Contingency Plan* and/or which Columbia has included within its construction standards. These measures include: ensuring HDD designs meet the minimum requirements of PRCI and ASME code; installing the product pipe in one continuous section (as possible and with the exception of the Highway 35 HDD); providing measures on-site to contain and clean up drilling fluid in the event of an IR; tracking and documenting drilling operations using an electronic drilling recorder which includes the use of a generated electromagnetic field to monitor drill position in real-time; and requesting the construction contractor review all workspaces and HDD designs. Columbia has stated it would also utilize buoyancy control for all drills.

Drilling fluids associated with HDD operations would consist primarily of water and bentonite clay. Columbia would receive pre-approval from FERC for the use of any additional proposed additives, and all additives would comply with applicable permit requirements. Columbia would monitor drilling pressures continuously during construction activities and use a down-hole annular pressure tool during the HDD pilot hole drilling phase to ensure that the drilling contractor could respond to a loss or spike in drilling fluid pressure which would be indicative of a potential hydrofracture and an IR. Columbia's *HDD Contingency Plan* would ensure that drill operations were monitored and adjusted to avoid potential IRs, and if one should occur, the release would be contained to the extent practicable and remediated. Columbia's *HDD Contingency Plan* states that drilling operations would be monitored continuously and stopped immediately at the first sign of an IR. If a significant pressure drop with no return fluid occurs, Columbia will implement pedestrian surveys on adjoining properties to identify any potential IR. Columbia's *HDD Contingency Plan* provides IR response and clean-up efforts to be used if an IR occurs in either upland areas, waterbodies or wetlands, and also in areas outside approved workspaces or outside the survey corridor. The *HDD Contingency Plan* also has procedures in place to notify the appropriate agencies within 24 hours of an IR reaching a water source. All personnel training, inspection activities, and IR response actions would be documented. We have reviewed Columbia's *HDD Contingency Plan* and find it acceptable.

Potential settlement of infrastructure crossed by the Highway 32 and Wetland 545B drills could be controlled or mitigated by implementing a settlement monitoring plan at these locations during and after construction. Potential settlement impacts should also be discussed with the owners of the infrastructure to determine if there are any specific settlement thresholds that must be adhered to. Therefore, **we recommend that:**

- **Prior to construction of the Highway 32 and Wetland 545B HDDs, Columbia should file with the Secretary for review and written approval by the Director of OEP, settlement monitoring, minimization, and mitigation plans developed in coordination with the owners of overlying infrastructure.**

Additionally, given limited geotechnical information collected at the Wetland 558B and Wetland 545B drills and the potential for variable depth to bedrock along the alignments, there could be complications with the drill encountering bedrock and a transitioning of the drilled hole through unconsolidated overburden materials into and out of bedrock. This could not only present challenges during drilling, but also during pullback of the product pipeline due to misalignment of the drilled hole. Given these potential complications**, we recommend that:**

- **Prior to construction of the Wetland 558B and Wetland 545B HDDs, Columbia should complete and file with the Secretary additional geotechnical and/or geophysical investigations along the proposed HDD alignment to better define the topography of the bedrock surface. If the results of these investigations lead to changes in the drill path or HDD entry/exit locations, Columbia should file with the Secretary, for review and written approval by the Director of OEP, the modifications to the Wetland 558B and Wetland 545B HDDs.**

Based on the above analyses, we conclude that subsurface conditions identified by the geotechnical studies would not render the HDDs infeasible. With consideration of Columbia's mitigation measures and our recommendations, we conclude that potential impacts from HDD construction and IRs would not be significant.

Paleontological Resources

The Pennsylvanian-period bedrock units within eastern Ohio were typically laid down in marsh-type conditions. Well-preserved plant fossils and possible insect and amphibian fossils can be found within these rocks; however, there are no state-protected or known sensitive paleontological resources in the Project area (Wright, 2017; Peter, 2017). Additionally, the *Antiquities Act of 190*6 and the *Paleontological Resources Preservation Act of 2009* protect objects of antiquity and fossils, respectively, on federal lands. No such protection for paleontological resources exists in laws or regulations for non-federal lands.

If any fossils of significant paleontological value (i.e., a fossil specimen of rare or exceptional value to the scientific community) were discovered and identified during the proposed construction activities, work in the immediate vicinity of the discovery would be suspended and the area would be protected. Columbia, in coordination with the ODNR (and WNF if applicable), would then develop an evaluation and treatment plan for paleontological resources, if required. Given these measures, we conclude that potential impacts on paleontological resources would be avoided or adequately mitigated.

Wayne National Forest

The same construction practices and mitigation measures described above would be implemented in the WNF to minimize impacts on mineral resource availability and extraction and from geologic hazards within the WNF boundary. Generally, the effects of the Project on the geologic features and resources within the WNF would be similar to the overall Project. This would include areas that may be susceptible to landslides and hazards from inactive mines. Columbia has committed to hiring a third-party geotechnical firm that would perform a desktop assessment of conditions that could contribute to landslides, followed by a field study. Both assessments would take place prior to the start of construction. These studies would evaluate geotechnical conditions and groundwater patterns in relation to geologic hazards, locate areas subject to high erosion potential and/or ground instability, and develop measures to be used during construction and operations designed to prevent, minimize, or mitigate landslides. The USFS staff would review the assessments and continue to coordinate with Columbia regarding mitigation measures on NFS lands, as needed.

The WNF would provide input to Columbia for a final COM Plan for the Project that details required resource protection and/or mitigation measures to be implemented during construction. Columbia would also adhere to the mitigation measures described above and within its ECS while working within the WNF. Columbia would work with WNF staff to develop an operating plan for the Project that would specify resource protection and/or mitigation measures regarding paleontological resources if required.

The majority of pipeline construction through the WNF would consist of new pipeline (R-801) installation in a new excavated trench in or adjacent to existing rights-of-way, backfilling, and then restoration and revegetation. Approximately 3 miles of the route in the WNF would consist of new corridor disturbance. The remainder of the R-801 pipeline would be collocated within the existing rights-of-way. Portions of the existing R-501 pipeline would either be abandoned in place or removed as described above and in section A.

Mineral Resources

The Project would cross one inactive coal surface mine within the WNF near MP 39.3; there are no other mines within 100 feet of the Project inside the WNF. Columbia

coordinated with USFS staff and determined there is no active mineral mining or related activity in the section of the WNF that the Project would cross. Records indicate that the Project would cross a single inactive gas well near MP 38.1 within the WNF. The Project would also be within 100 feet of one other inactive well within the WNF at MP 41.3. The exact location of these wells would be determined through field verification.

Geologic Hazards and Impact Mitigation

Landslides

Within the WNF, the Project would cross about 8.2 miles with vertical slopes in the Conemaugh Group bedrock. The Project would cross about 1.1 miles of areas of the WNF with vertical slopes greater than 30 percent, also in the Conemaugh Group bedrock. These areas have an increased potential for landslides.

Columbia would minimize risks to pipeline construction progress, construction crews, and water and vegetation resources adjacent to the construction right-of-way posed by potential landslides through its employment of specialized procedures in steep slopes during construction and operation. Columbia would minimize and mitigate landslides by implementing its *Slip Mitigation Procedures*, as well as various surface and subsurface measures described in its ECS, including waterbars, trench breakers, bleeder drains, and appropriate placement and protection to spoil piles to prevent downslope movement.

Drainage along Columbia's existing pipeline right-of-way across WNF lands, and that within proposed rights-of-way, could be hydrologically disconnected from the surrounding landscape. This disconnection may pose problems for proper drainage of the pipeline installation, potentially resulting in saturation-induced slippages (i.e., landslides). Columbia's use of trench and slope breakers to facilitate water draining across the right-of-way would minimize water from flowing down the trench line. On WNF lands, the spacing of erosion controls would be adjusted accordingly in order for Columbia to meet steep slope construction procedures. This adjustment would be based upon the site-specific design criteria outlined in the final COM Plan.

Karst Terrain

No karst features were identified or located in parcels under WNF land.

Flood Hazards

Within the WNF the proposed pipeline crosses the FEMA 100-year floodplain between MPs 38.1 and 38.7 (Buffalo Creek) for a total of 1,160 feet (see table B.1-8). No aboveground facilities would be sited within that segment of the Project. Smaller valleys also have a potential for flash flooding. Several areas within the WNF have occasionally flooded or frequently flooded according to available data, and most of these areas are in the northern portion of the WNF that would be crossed by the Project.

Shallow Bedrock and Blasting

Much of the construction within the WNF (about 65 percent) would likely encounter bedrock between 30 and 50 inches beneath the soil surface, particularly in the southern portions of the forest. These areas would require additional effort with heavy equipment or blasting to get the trench constructed through the rock. Further discussion of this topic is found in the Soils section below.

Conclusion for Geological Resources

With strict adherence to the mitigation measures identified in Columbia's ECS and as described above, impacts on geologic or mineral resources from construction and operation of the Project would not be significant, and geological hazards would not pose a significant risk to the Project.

1.2 Soils

Soil characteristics in the Project area were assessed using the USDA Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database, Web Soil Survey, and soil series descriptions. (USDA NRCS, 2018a; 2018b; 2018c). Several general soil characteristics and soil classifications have the potential to affect, or be affected by, construction and operation of the Project. These include hydric soils, prime farmlands, compaction potential, erosion potential, shallow depth to bedrock, and revegetation potential. Table B.1-9 summarizes soil characteristics and limitations by Project component and county. Given that the data are presented by each Project component, the totals presented for the BXP Replacement and the BXP Abandonment are not additive because some Project components overlap.

Prime Farmland Soils

The USDA defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses" (USDA NRCS, 2018c). Soils that do not meet all of the requirements to be considered prime farmland may be considered soils of local importance if they are capable of producing a high yield of crops when treated or managed according to accepted farming methods.

TABLE B.1-9
Soil Characteristics Affected by Project Construction (acres) a/

County, State	Total Acres in County	Hydric Soils b/	Compaction Prone c/	Highly Erodible d/	Revegetation Concerns e/	Prime Farmland b/	Stony/ Rocky f/	Shallow Bedrock g/
BXP Replacement h/								
Pipeline Facilities								
Vinton, Ohio	82.6	6.9	6.9	0.0	41.6	8.8	0.0	0.0
Jackson, Ohio	563.3	77.8	77.8	2.1	43.8	165.8	17.0	39.2
Gallia, Ohio	116.8	24.0	24.0	54.1	53.8	29.4	0.0	4.9
Lawrence, Ohio	619.9	72.1	72.1	285.3	8.5	81.8	10.4	37.1
Wayne County, West Virginia	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Subtotal	***1,382.5***	***180.8***	***180.8***	***341.5***	***147.7***	***285.9***	***27.4***	***81.2***
Aboveground Facilities								
Vinton, Ohio	4.4	0.0	0.0	0.0	4.2	0.0	0.0	0.0
Jackson, Ohio	2.5	1.2	1.2	0.0	0.0	2.5	0.0	0.0
Gallia, Ohio	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawrence, Ohio	4.4	1.5	1.5	0.0	0.0	2.9	0.0	0.0
Wayne County, West Virginia	11.8	0.0	0.0	0.0	0.0	11.8	0.0	0.0
Subtotal	***23.2***	***2.7***	***2.7***	***0.0***	***4.2***	***17.2***	***0.0***	***0.0***
BXP Replacement Total	**1,405.7**	**183.5**	**183.5**	**341.5**	**151.9**	**303.1**	**27.4**	**81.2**
BXP Abandonment h/								
Pipeline Facilities								
Vinton, Ohio	9.4	1.7	1.7	0.0	5.4	1.7	0.0	0.0
Jackson, Ohio	192.6	40.5	40.5	0.0	7.5	91.9	4.2	9.6
Gallia, Ohio	40.5	21.2	21.2	8.8	8.5	24.0	7.9	0.7
Lawrence, Ohio	152.1	53.4	53.4	31.5	1.1	45.7	0.1	6.4

TABLE B.1-9
Soil Characteristics Affected by Project Construction (acres) a/

County, State	Total Acres in County	Hydric Soils b/	Compaction Prone c/	Highly Erodible d/	Revegetation Concerns e/	Prime Farmland b/	Stony/ Rocky f/	Shallow Bedrock g/
Subtotal	***394.4***	***116.8***	***116.8***	***40.3***	***22.5***	***163.3***	***12.1***	***16.7***
Aboveground Facilities								
Vinton, Ohio	4.4	0.0	0.0	0.0	4.2	0.0	0.0	0.0
Jackson, Ohio	2.1	0.7	0.7	0.0	0.0	1.4	0.0	0.0
Gallia, Ohio	0.7	0.7	0.7	0.0	0.0	0.7	0.0	0.0
Lawrence, Ohio	4.4	2.0	2.0	0.8	0.0	1.9	0.0	0.0
Subtotal	***11.8***	***3.4***	***3.4***	***0.8***	***4.2***	***4.0***	***0.0***	***0.0***
BXP Abandonment Total	**406.2**	**120.1**	**120.1**	**41.1**	**26.7**	**167.3**	**12.1**	**16.7**

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/ As designated by the NRCS.

c/ Includes soils with a hydric designation and a soil rutting hazard classification of "severe" as designated by the NRCS. A soil with a soil rutting hazard classification of "not rated" is conservatively assumed to be compaction prone.

d/ Includes soils with an erosion hazard rating of severe or very severe as designated by the NRCS.

e/ Includes coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained and soils with an average slope greater than or equal to 9 percent.

f/ Includes soils with surface textures that include the modifiers cobbly, stony, bouldery, channery, flaggy, very gravelly, or extremely gravelly as designated by the NRCS.

g/ Includes soils consisting of lithic (hard) or paralithic (soft) bedrock within 60 inches of the soil surface.

h/ Certain work areas (e.g., aboveground facilities, temporary workspace, staging areas, contractor yards, access roads) would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these work areas are included with each applicable Project component.

Unique farmland is defined as "land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables" (USDA NRCS, 2018d). Unique farmland has the special combination of soil quality, growing season, moisture supply, temperature, humidity, drainage, and elevation needed to economically produce sustainable high yields of these crops when properly managed (USDA NRCS, 2018d).

The BXP Replacement would disturb 303.1 acres of prime farmland. This total includes 11.8 acres of soils within the existing Ceredo CS in Wayne County, West Virginia which is designated as prime farmland by the NRCS, but has already been permanently converted to industrial land. New permanent impacts on prime farmland soils would be limited to soils within the footprint of new aboveground facilities, which quantitatively represent 1.5 acres. The BXP Abandonment would temporarily disturb 167.3 acres of prime farmland, with no permanent impacts.

Hydric Soils

The NRCS classifies a hydric soil as a soil that is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil column (USDA NRCS, 2018c). Additionally, soils that have been inundated by flooding or that have been artificially drained are also classified as hydric soils if the soil type in its undisturbed state meets the classification criteria of a hydric soil. Hydric soils are typically poorly drained or very poorly drained. The BXP Replacement would temporarily disturb 183.5 acres of hydric soil, of which 2.2 acres would be permanently affected for new aboveground facilities. The BXP Abandonment would temporarily disturb 120.1 acres of hydric soil with no permanent impacts.

Soil Compaction

Soil compaction modifies the structure of soil and, as a result, alters its strength and drainage properties. Soil compaction decreases pore space and water-retention capacity, which restricts the transport of air and water to plant roots. As a result, soil productivity and plant growth rates may be reduced, soils may become more susceptible to erosion, and natural drainage patterns may be altered. Soil compaction is of particular concern in agricultural areas and in areas of hydric soils. The susceptibility of soils to compaction varies based on moisture content, composition, grain size, and density of soil. The BXP Replacement would disturb 183.5 acres of compaction prone soil and the BXP Abandonment would disturb 120.1 acres of compaction prone soil.

Soil Erosion

Soil erosion is the wearing-away of physical soil properties by wind and water, and could result in a loss of soil structure, organic matter, and nutrients, all of which, when

present, contribute to healthy plant growth and ecosystem stability. Factors such as soil texture, structure, slope, vegetation cover, rainfall intensity, and wind intensity can influence the degree of erosion. Soils most susceptible to erosion by water typically have bare or sparse vegetation cover, non-cohesive soil particles with low infiltration rates, and are on moderate to steep slopes. Soils more resistant to erosion by water include those that occupy low relief areas, are well-vegetated, and have high infiltration capacity and internal permeability. Clearing, grading, and equipment movement can accelerate the erosion process and, without adequate protection, result in discharge of sediment to waterbodies and wetlands. An estimated 341.5 acres of soils classified as highly erodible would be disturbed by the BXP Replacement and 41.1 acres would be disturbed by the BXP Abandonment.

Low Revegetation Potential

Revegetation may be more difficult in areas that are considered to have poor drainage, shallow depth to bedrock, rockiness, and steep slopes. The BXP Replacement would disturb 151.9 acres of soils with low revegetation potential and the BXP Abandonment would disturb 26.7 acres of soils with low revegetation potential.

Rocky Soils/Shallow Depth to Bedrock

Rocky soils are soils with textures described as bouldery, cobbly, stony, or very or extremely gravelly. The presence of shallow bedrock, which is defined as bedrock within 60 inches of the land surface, is often used as an indicator of the potential for introduction of rock into the surface layer of soils, which may occur during construction activities such as trenching or blasting.

The BXP Replacement would disturb 27.4 acres of stony/rocky soils. An estimated 81.2 acres of shallow bedrock would be crossed by the BXP Replacement. The BXP Abandonment would disturb 12.1 and 16.7 acres of stony/rocky soils and shallow bedrock, respectively.

General Impacts and Mitigation

Typical soil impacts that may occur during construction include mixing of topsoil and subsoil layers, compaction, rutting, erosion, and alteration of drainage characteristics. Construction activities such as clearing, grading, trench excavation, backfilling, heavy equipment traffic, and restoration along the construction right-of-way have the potential to adversely affect natural soil characteristics, such as water infiltration, storage and routing, and soil nutrient levels, thus reducing soil productivity. Clearing removes protective vegetation cover and exposes soils to the effects of wind and water, which potentially increases soil erosion and the transport of sediment to sensitive resource areas.

Columbia's ECS requires that both topsoil and subsoil be tested for compaction in agricultural and residential areas and that severely compacted soils be plowed or otherwise mitigated. With implementation of these measures, we conclude that potential soil compaction would be adequately mitigated. Soils underlying permanent aboveground facility foundations would be permanently affected by compaction; however, these effects would be highly localized and minor. Columbia's mitigation measures designed specifically to address construction in wetlands would mitigate impacts on hydric soils. These measures are discussed in section B.2.3.

Potential impacts on agricultural soils would be minimized and mitigated in accordance with the FERC Plan and Columbia's ECS. These include measures to conserve and segregate the full topsoil layer (up to 12 inches), alleviate soil compaction, protect and maintain existing drainage tile and irrigation systems, prevent the introduction of weeds, and retain existing soil productivity, thereby minimizing the potential for long-term impacts on agricultural lands. Therefore, we conclude that the majority of impacts on prime farmland would be temporary and not significant. Installation of new aboveground facilities would permanently affect 1.5 acres of prime farmland, and would remove it from agricultural use. However, the 1.5 acres of prime farmland would represent less than 1 percent of the overall prime farmland that would be affected by the Project, and far less than 0.01 percent of the total area of prime farmland (97,580 acres) within Vinton, Jackson, Gallia, and Lawrence Counties, Ohio (USDA, 1985; 1997; 1998; 2004). Impacts on prime farmland from construction and operation of aboveground facilities would therefore be permanent, but not significant.

To minimize or avoid potential impacts due to soil erosion, Columbia would implement controls in accordance with the FERC Plan and Procedures and its ECS. Temporary erosion controls, including interceptor diversions and sediment filter devices, such as silt fences, would be installed immediately following land disturbing activities. Columbia would inspect these devices on a regular basis and after each rainfall event of 0.5 inch or greater to ensure proper function. Columbia would additionally utilize dust-control measures, including routine wetting of the construction workspace as necessary where soils are exposed. Temporary erosion control devices would be maintained until the Project area is successfully revegetated, at which time they would be removed and disposed of at an appropriate facility.

Columbia reviewed guidance documentation related to soil conservation from the NRCS, ODNR, and Ohio Department of Agriculture for recommendations and applicability. Columbia states the erosion and sediment control measures detailed within Columbia's ECS encompass the applicable agency recommendations. Given that the erosion control measures that Columbia would employ are consistent with the FERC Plan, which was designed in part to facilitate sufficient mitigation of impacts, we conclude that soil erosion would be adequately minimized.

Further, to increase the potential for successful revegetation of construction workspaces, Columbia would restore disturbed areas to pre-construction contours, apply fertilizer and lime in uplands as specified in section V.D.2 of the FERC Plan and Columbia's ECS, use approved seeding mixes (such as described in Columbia's ECS or as approved by an agency or landowner), apply mulch following seedbed preparation, and install erosion control fabric and matting on steep slopes. Given these measures, we conclude that permanent or significant impacts due to poor revegetation potential are not anticipated.

The introduction of stones or rocks to surface soil layers may reduce soil moisture-holding capacity, resulting in a reduction of soil productivity. To minimize the introduction of stones or rocks to surface soil layers, the FERC Plan requires that rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. The FERC Plan also requires that the size, density, and distribution of rock on the construction work area in agricultural lands be similar to adjacent areas undisturbed by construction and requires that excess rock be removed from at least the top 12 inches of soil in agricultural areas or in compliance with landowner agreements. Through adherence of these measures, we conclude there would not be a significant increase to the rock content of the topsoil.

Inadvertent Spills or Discovery of Contaminants

During construction, contamination from accidental spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely impact soils. The effects of contamination are typically minor because of the low frequency and small volumes of spills and leaks. Columbia would implement the measures in its ECS and SPRP to prevent, respond to, contain, clean up, and dispose of, if necessary, accidental spills of any material that may contaminate soils. Areas along the proposed Project with known contaminated sites are discussed in section B.5.

In its ECS, Columbia outlined the actions to be taken to prevent spills or to be implemented in the event of unanticipated discoveries of contaminated media. These measures include:

- ensuring that fuel storage and refueling occur at least 100 feet from waterbodies and wetlands (unless there is no alternative and special precautions such as secondary containment are used and with approval by the EI);
- maintaining a 200-foot setback from active private water wells and a 400-foot setback for municipal and community wells for equipment and vehicle refueling and maintenance activities and hazardous materials storage;
- using secondary containment at bulk storage sites for hazardous materials;

- suspending work activities in the vicinity of a spill or an unanticipated discovery of hazardous materials ;
- flagging or fencing off areas where a discovery of hazardous materials occurs;
- notifying Columbia's staff responsible for oversight of spill clean-up activities; and
- mobilizing a qualified contractor to clean up and dispose of the contaminated media in a manner consistent with applicable laws and regulations if determined to be hazardous.

Given these measures and implementation of the ECS and SPRP, we conclude that the potential for impacts on soils resulting from spills or unanticipated discoveries of hazardous materials would be adequately minimized and would not be significant.

Wayne National Forest

The WNF would provide Columbia with input for a final COM Plan for the Project that would detail required soil resource protection and/or mitigation measures during construction. Columbia would also adhere to the mitigation measures described above and within its ECS regarding soils while working within the WNF. Generally, the effects of the Project on the soil resources within the WNF would be similar to the overall Project. As noted above, Columbia has committed to engaging a third-party geotechnical firm to assess the potential for landslides.

Most of the native soils in the WNF portion of the Project corridor formed in residuum or thin colluvium over residuum on upland slopes. Slopes range from 3 percent to greater than 70 percent and include summit, shoulder, backslope, and footslope positions. Tree-throw pit and mound microtopography range from little or none to prevalent on the upland slopes. Smaller areas of deeper colluvium and/or alluvium are present on valley floors. The native soils range from shallow to deep, with most soils falling in the moderately deep class (20 to 40 inches to paralithic (Cr) or lithic (R) contact). Drainage classes range from somewhat-poorly drained to excessively drained with most soils occurring in the well-drained class. Surface rock content ranges from about 15 percent to as much as 80 percent or more (including rock outcrop) and rocks range from large gravels to boulders depending on landscape position and local bedrock geology. Coarse fragment content of the natural subsoils varies widely, ranging from 15 percent or less to as much as 80 percent or more, and varies from gravels and channers to flags, cobbles, and boulders, depending on the parent materials. The content and distribution of surface and subsurface rock in the natural soils has implications for soil segregation and management during construction.

Hydric Soils

Several hydric soils are mapped within the WNF along the Project corridor. These hydric soils are generally mapped on valley floors and consist of somewhat-poorly and poorly drained soils formed on flood plains and low terraces. Map units include the Stokly-Philo silt loams, 0 to 3 percent slopes, frequently flooded, and the Stendal silt loam, 0 to 3 percent slopes, occasionally flooded. Many, but not all the hydric soils are associated with mapped wetlands. Not every wetland is characterized by a hydric soil at the map unit scale. There are also small areas of hydric soils included in soil mapped units named for predominantly well drained or moderately well drained soils on floodplains and low terraces.

Soil Compaction

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. Compaction could also negatively affect restoration of microbial populations important for maintaining soil fertility during pipeline operations. The degree of compaction depends on the moisture content and soil texture. Fine-textured soils that are moist during construction are the most susceptible to compaction. The soils that are compaction prone are hydric soils characterized by somewhat poor to very poor drainage classes (seasonal high-water table within 36 inches of the surface) and surface textures of sandy clay loam and finer. These soils are mostly the soils listed as hydric. Most of the soils have a severe or moderate soil rutting hazard.

Construction of a pipeline should be done when soils are firm enough to avoid rutting and thereby minimize associated processes of compaction and mixing of subsoils with topsoil. During construction in soft or saturated soils, Columbia would use measures outlined in its ECS, including the use of low-ground-weight equipment and/or temporary installation of timber equipment mats. Columbia's ECS includes a provision that the EI assigned to the Project is responsible for advising the Chief Inspector when environmental conditions (such as wet weather or frozen soils) make it advisable to restrict or delay construction activities to avoid topsoil mixing or excessive compaction.

The EI would determine if soil compaction has occurred by testing with a COE-style cone penetrometer, or other appropriate devices and comparing the values to pre-construction results as outline in Columbia's ECS. If compacted soils are identified, appropriate methods of decompaction would be employed. Site-specific conditions during construction that are recognized by the EI as exhibiting high levels of soil moisture or excessive amounts of standing water for crews to be able to avoid soil rutting or mixing of subsoil and topsoil would require the EI to ensure that appropriate measures such as low-ground-weight equipment, timber matting, prefabricated equipment mats or terra mats are used to stabilize saturated or ponded areas.

Erosion

Erosion potential of soils on a pipeline construction site is dictated mainly by slope and soil properties such as texture, structure, and moisture content. Once the vegetation is removed, the soil is exposed to rainfall, wind, and flowing water. The soil erosion hazard along the Project corridor in WNF ranges from slight to severe mostly correlated with slope.

Soils would be exposed from initial grading until the completion of final restoration grading, including construction activities such as trenching, spoil storage, pipeline layout, fabrication, lowering and backfilling. Typically, the trench would not remain open for more than 30 days in any area unless authorized by the EI for weather-related delays. Erosion and sediment control devices would be installed prior to or immediately following initial ground disturbance, which typically follows the tree and woody vegetation clearing phase. Columbia would install as needed, and maintain all installed erosion controls throughout each construction phase. In addition, right-of-way areas surrounding the trench would be susceptible to rutting and subsequent erosion. Where site-specific conditions exist, making earthen slope breakers difficult to install, alternative diversion structures using devices such as silt fences and compost filter socks, or other agency-approved advanced controls will be used.

Where required, the stripped topsoil would be stored separately on the right-of-way from the trench spoil and would be restored to its original position on the top of the soil profile after the pipeline is installed and the trench is backfilled. Topsoil and subsoil would be stockpiled separately from each other in protected spoil piles, typically on the spoil side of the construction right-of-way. On steep slopes, Columbia would use temporary erosion control devices as necessary to prevent excavated spoil piles from being eroded or mixed with each other. The topsoil and subsoil would be replaced in the proper order during backfilling and final grading.

Columbia is not currently proposing to segregate topsoil within the WNF because a portion of the construction workspace outside the pipeline trench is forested. Topsoil segregation is often not ideal in forested areas where construction crews would need to pull stumps to grade the surface of the right-of-way to create a level surface to safely operate equipment. The pulling of stumps would mix topsoil and subsoil horizons and increase soil erosion potential. In addition, stockpiling topsoil requires additional workspace. In areas on steep slopes, topsoil segregation outside the immediate trench area would not be feasible where machinery would be winched up or down the slopes. Winching of equipment should be minimized to the fewest number of passes as possible for worker safety and to mitigate the potential for compaction. We note that the USFS has the final decision regarding topsoil segregation on NFS lands.

Rocky Soils and Shallow Bedrock

Much of the construction within the WNF (about 65 percent) would likely encounter bedrock between 30 and 50 inches beneath the soil surface, particularly in the southern portions of the forest. The soils in these areas are formed in residuum (weathered bedrock) or thin colluvium over bedrock. These areas may require additional effort with heavy equipment or blasting to get the trench constructed through the rock. In the WNF only a few soil map units were listed as being stony/rocky, defined as soils with texture surface modifiers of cobbly, stony, boulder, channery, flaggy, very gravelly, or extremely gravelly as designated by the USDA NRCS.

Paralithic horizons (Cr horizons) indicate materials that are partially weathered bedrock or weakly consolidated bedrock, such as sandstone, siltstone, or shale that can be excavated with some difficulty using a spade. Paralithic bedrock can generally be fractured and excavated using standard construction equipment. Lithic contact, indicated by an R horizon, represents consolidated bedrock that cannot be excavated using a spade. Lithic bedrock may require special construction techniques such as heavier construction equipment, or blasting.

Excess rock and excavated rock, including blast rock, may be used to backfill the trench, but only up to a level that is even with the top of the existing bedrock profile. Any excess excavated materials or materials unsuitable for backfill would be spread or windrowed off the edge of the construction right-of-way area. Columbia 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 like adjacent non-right-of-way areas. Larger rocks may be used to create or enhance rocky habitat adjacent to the right-of-way for wildlife in specific locations.

Revegetation

Factors affecting re-establishment and sustainment of vegetation of disturbed soils in the WNF include compaction and soil fertility. Soil acidity/alkalinity and health of microbial communities also contribute to the success of short- and long-term revegetation by directly affecting soil fertility. For this reason, using non-native trench fill materials (e.g., imported subsoil and topsoil), if not of a similar mineral content, is not advised as this would introduce a contrasting acidity or alkalinity to the adjacent undisturbed soils. Columbia's planned efforts to reduce or mitigate for compaction and presence of initial revegetation should allow disturbed microbial populations to recolonize the soil profile in the root zone over the long-term.

Vegetation re-establishment in the WNF would primarily involve reseeding of areas within the work areas disturbed by construction activities. Revegetation would occur according to specifications outlined in the final COM Plan. The WNF-approved seeding lists would be contained in the final COM Plan. Additionally, the USFS and Columbia are

continuing to coordinate regarding proposed construction activities and potential mitigation measures. Columbia would be required to adopt USFS-mandated mitigation measures on NFS lands.

Conclusion for Soil Resources

With strict adherence to the mitigation measures identified in Columbia's ECS and as described above, impacts on soil resources from construction and operation of the Project would not be significant.

2. Water Resources and Wetlands

Potential impacts associated with construction and operation of the proposed facilities upon water resources are discussed below in sub-sections for groundwater, surface water, and wetlands.

The modifications that would be conducted at the existing Ceredo CS in Wayne County, West Virginia would be completed wholly within existing, previously disturbed facility sites. There are no wetlands or waterbodies within the boundaries of this compressor station. Further, the modifications would not require an increase in water use, and no subsurface activities are anticipated that would expose groundwater. Therefore, proposed modifications to the Ceredo CS are not discussed further in this section.

2.1 Groundwater Resources

Existing Groundwater Resources

The proposed pipeline and associated facilities (including staging areas and contractor yards) are within the Central Allegheny Plateau and Western Allegheny Plateau defined major land resource areas, and underlain by the principal Pennsylvanian aquifers. The Pennsylvanian aquifers are divided into several groups and are comprised of consolidated sandstone bedrock aquifers consisting of layered siltstone, shale, and clay beds (USGS, 1995). The Project is within the Pennsylvanian Allegheny and Pottsville Groups Undivided Aquifer which has a thickness of 450 to 630 feet (ODNR, 2019a). Groundwater well depths range from about 26 to 300 feet below ground level (ODNR, 2018c). The average well depth is about 220 feet, and groundwater in the area is suitable for all uses (OEPA, 2014).

Source Water Protection Areas

Groundwater Protection Areas

Under the Source Water Assessment and Protection Program for Ohio, the OEPA, in coordination with local municipalities, identifies drinking water source protection areas for public water systems. These protection areas are delineated, and risks for contamination are identified. The Project would cross one Groundwater Protection Area, as designated by Ohio's Source Water Assessment and Protection Program and mandated by the OEPA's Division of Drinking and Ground Waters (OEPA, 2018a). As depicted in figures B.2-1a and B.2-1b, Columbia would cross the Wellston Public Water System by the R-801 replacement pipeline from MPs 7.6 to 11.4; as well as at associated abandonment segments, staging areas, access roads, and cathodic protection locations (see table B.2-1). The City of Wellston has designated a Groundwater Protection Area Inner Management Zone, which the Project would not cross, and a broader Groundwater Protection Area for its public drinking water groundwater wells, which would be crossed (OEPA, 2003). The

McArthur Public Water System Groundwater Protection Area in Vinton County, Ohio would not be crossed by the Project and is approximately 1 mile to the east of the R-801 pipeline near MP 0.0 and the McArthur RS. The South Point Groundwater Protection Area in Lawrence County, Ohio also would not be crossed by the Project and is approximately 1 mile west of the South Point RS and the proposed pipeline centerline near MP 64.0.

Water Intakes and Surface Water Protection Areas

There are four surface water intakes within 3 miles downstream of the Project area (OEPA, 2018a); all are operated by the City of Wellston. As discussed above, the City of Wellston's public water supply system is supplied through a conjunctive use of both surface water and groundwater. The City of Wellston's surface water intakes are at Little Raccoon Creek, Wellston Impoundment, Lake Rupert, and Lake Alma. The closest City of Wellston's surface water intake to the Project is the Lake Rupert intake at the Lake Rupert Dam, 2.4 stream miles downstream of the proposed R-801 pipeline crossing of Little Raccoon Creek at MP 2.8. Lake Rupert is between the proposed pipeline crossing of Little Raccoon Creek and farther downstream of the other three intakes.

The Project would cross three public water systems (the City of Wellston, City of Portsmouth, and the Ironton Public Water Systems) within the City of Wellston Surface Water Protection Area and within the Ohio River Surface Water Protection Area. The closest City of Ironton surface water intake is in the Ohio River 6.4 miles west (downstream) from the proposed R-801 pipeline; and the closest City of Portsmouth surface water intake is about 20 miles west (downstream) from the proposed R-801 pipeline, also in the Ohio River. The OEPA's Division of Drinking and Ground Waters mandates that all surface water supply systems have an associated source water assessment and protection program (OEPA, 2018a). A source water protection area is defined as the drainage area upstream of the point where a public water system withdraws water from a surface source. Corridor management zones are subdivisions of the surface water protection areas, which includes a buffer zone around major tributaries contributing to the surface water supply. Certain activities (e.g., animal feeding operations, wastewater treatment land application, storage or land application of sewage sludge, and landfills) are regulated or prohibited within source water protection areas and corridor management zones (OEPA, 2018a).

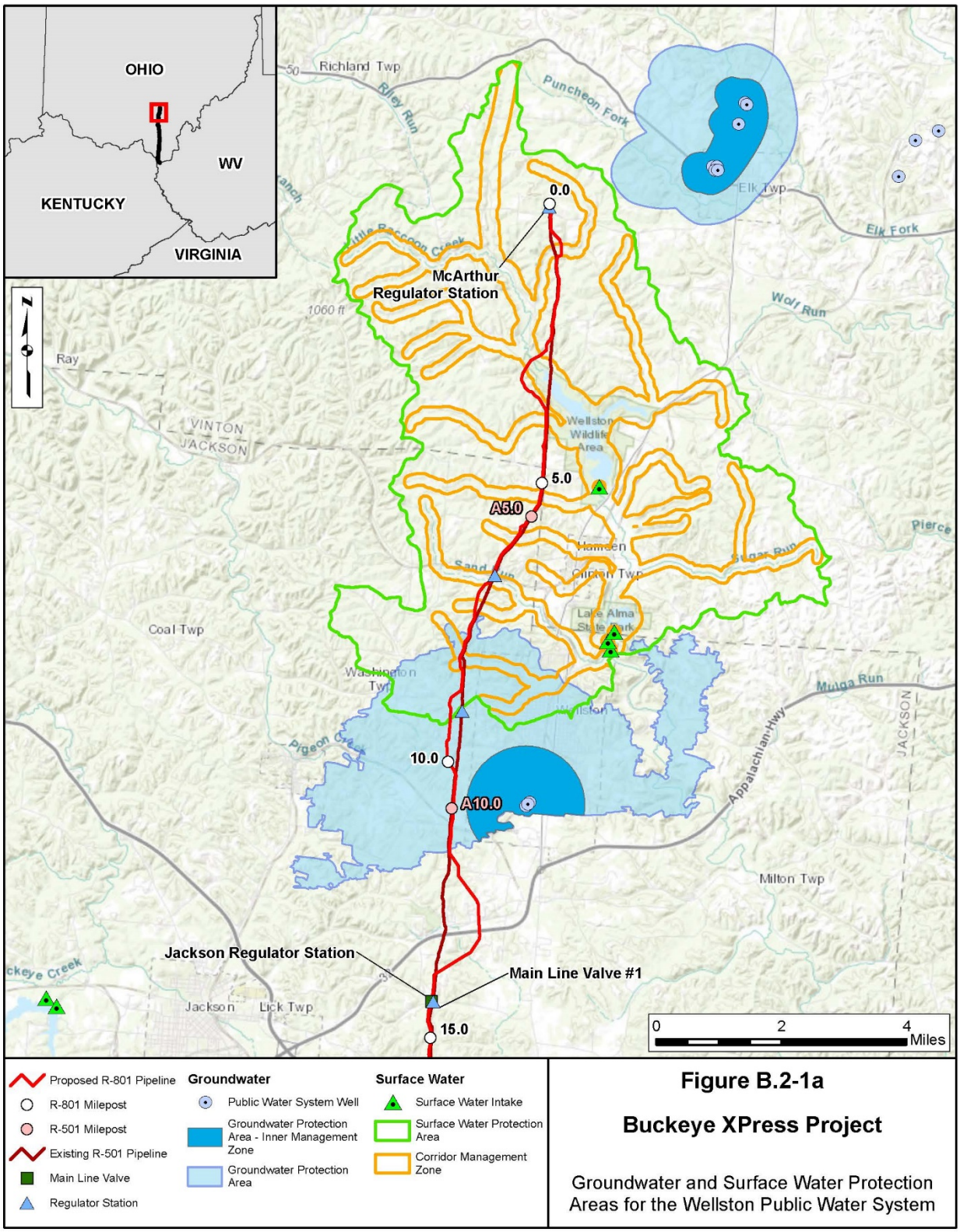


Figure B.2-1a

Buckeye XPress Project

Groundwater and Surface Water Protection Areas for the Wellston Public Water System

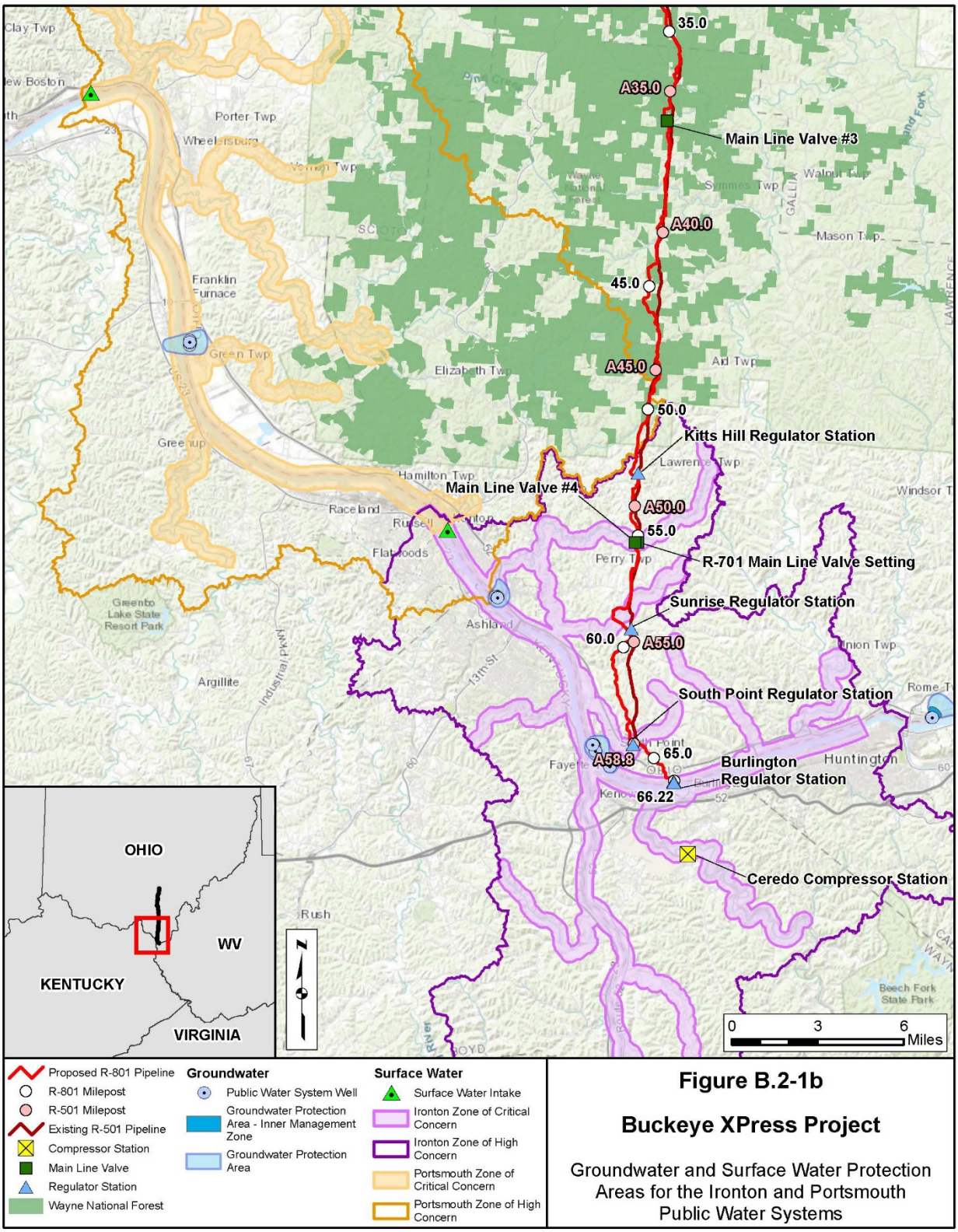


Figure B.2-1b

Buckeye XPress Project

Groundwater and Surface Water Protection Areas for the Ironton and Portsmouth Public Water Systems

TABLE B.2-1
Wellston Public Water System (ID# OH40019192) Groundwater Protection Areas That Would Be Crossed by the Project a/

Begin Milepost	End Milepost	Crossing Length (feet)
R-801 Replacement		
7.6	7.7	395
7.8	11.4	19,237
Staging Areas and Contractor Yards		
11.1	SA-005-B	n/a
Access Roads		
10.6	TAR-JA-004.5-B	2,791
11.1	PAR-JA-000.2-B	594
Cathodic Protection		
11.0	n/a	n/a
BXP Abandonment		
A7.6	A7.6	127
A7.6	A7.6	173
A8.4	A8.4	67
A8.4	A8.5	119
A8.9	A8.9	121
A8.9	A9.0	455
A9.0	A9.2	586
A9.4	A9.8	1,977
A10.2	A10.2	120
A10.2	A10.3	184
A10.3	A10.3	141
C0.1	C0.2	916
C0.2	C0.2	81
Staging Areas and Contractor Yards		
A10.3	SA-005-B	n/a
Access Roads		
A9.0	TAR-JA-003.9-A	423
A9.1	TAR-JA-004-A	599
A9.8	TAR-JA-004.5-B	2,657
A10.2	PAR-JA-000.2-B	480
Aboveground Facilities		
A8.4	Wellston RS	n/a

Source: OEPA 2018a.
a/ All of these areas are in Jackson County, Ohio; and no aboveground facilities would be crossed.
Abbreviations:
n/a not applicable
PAR Permanent Access Road
RS Regulator Station
TAR Temporary Access Road

As noted in figure B.2-1a, the pipeline facilities would cross 9.2 miles of the City of Wellston Surface Water Protection Area and Corridor Management Zone between MPs 0.0 and 9.2. The facilities would cross the City of Ironton's surface water protection Zone of High Concern for 14.2 miles between MPs 52.0 and 66.2; and the Zone of Critical Concern from MPs 55.0 to 66.2 (see figure B.2-1b). The facilities would also cross the City of Portsmouth surface water protection Zone of High Concern for 3.0 miles between MPs 49.0 to 52.0 (see figure B.2-1b). Zones of high or critical concern are subdivisions of the source water protection areas similar to corridor management zones. Construction activity for aboveground facilities and the BXP Abandonment component would also occur in these same general areas. Construction, operation, and maintenance of the Project would not include any activities that are regulated or require a permit within source water protection areas or corridor management zones.

The City of Wellston operates three wells that are cased to a depth of 70 feet below the ground surface and draw water from an abandoned coal mine within the Groundwater Protection Area Inner Management Zone. The depth to water within the wells is about 44 feet below the ground surface (OEPA, 2003). The R-801 pipeline near MP 10.6 would be 1.1 miles to the west of the Groundwater Protection Area Inner Management Zone for all three groundwater wells. The City of Wellston has not identified utility line installation as a potential source for contamination, and no additional permitting would be required. Columbia has not planned any HDDs within the broader Groundwater Protection Area. Therefore, we conclude the proposed Project activities would not adversely impact the Wellston Public Water System.

Designated Sole Source Aquifers

The U.S. Environmental Protection Agency (EPA) defines sole or principal source aquifers as those aquifers that supply at least 50 percent of the drinking water consumed in the area overlying the aquifer, where there is no alternative drinking water source(s) that could physically, legally, and economically supply all those people who depend on the aquifer for drinking water. The Project is not within any EPA designated sole source aquifers (EPA, 2018a).

Public and Private Water Supply Wells

As previously noted, one groundwater drinking water source protection area would be crossed near the City of Wellston in Jackson County, Ohio. The Project would not cross the designated Groundwater Protection Area Inner Management Zone and the closest groundwater supply wells for the Wellston Public Water System would be 1.2 miles from the Project. The City of Wellston does not have any established ordinances related to the drinking water source protection area, but recommends mitigation measures such as preventing contaminated surface water runoff into the underground reservoir, identifying and remediating inadequate septic systems, and controlling agriculture and cattle pasture runoff. The Project does not include any facilities or activities that are subject to the state

of Ohio siting and setback requirements in relation to drinking water source protection. As noted below, Columbia has developed a SPRP as well as measures outlined in Columbia's ECS, which would be implemented throughout construction to minimize impacts from contamination and surface water runoff from Project workspaces.

Columbia identified 50 groundwater wells and 5 springs within 150 feet of the Project workspaces and aboveground facilities (see table B.2-2, appendix B.2-1). Fourteen wells are Jackson County groundwater monitoring wells at an existing construction staging area about 0.2 mile south of a known groundwater contamination site, as described below. Columbia proposes to utilize this staging area (SA-013) for construction trailers and equipment storage and would not utilize groundwater at this location. In addition, 16 private domestic groundwater wells were identified along with 20 groundwater wells with unknown end use. Of the identified private groundwater wells, one is within the proposed staging area SA-025-B within the WNF.

TABLE B.2-2
Summary of Groundwater Wells and Springs within 150 feet of the Proposed Buckeye XPress Project

Project Facilities	Private Groundwater Wells	Public Groundwater Wells	Unknown Use Groundwater Wells	Springs
BXP Replacement (Pipeline Facilities)	**7**	**0**	**13**	**3**
Staging Areas/Contractor Yards	6	13	3	0
Access Roads	1	1	1	0
Cathodic Protection	1	0	0	0
Aboveground Facilities	1	0	1	0
BXP Replacement Subtotal	*16*	*14*	*18*	*3*
BXP Abandonment (Pipeline Facilities)	**2**	**0**	**8**	**2**
Staging Areas/Contractor Yards	7	13	4	0
Access Roads	0	1	1	0
Aboveground Facilities	2	0	1	0
BXP Abandonment Subtotal	*11*	*14*	*14*	*2*
Total a/	**16**	**14**	**20**	**5**

a/ Total is the number of individual water wells and springs within 150 feet of the Project area without double counting water wells and springs within 150 feet of the Line 801 Replacement and BXP Abandonment.

Water would be required through all phases of construction in order to mix concrete, conduct HDDs, fill hydrostatic test pipeline segments, and suppress dust. Columbia

estimates about 8,139,469 gallons of water would be required during construction. Columbia proposes to drill a new permanent groundwater well near its existing Oak Hill CS at MP 24.6 in Jackson County, Ohio. The well would be drilled to an approximate depth of 200 feet and provide non-potable water for hydrostatic testing of Spread 2, dust suppression, and other construction activities. Columbia estimates that approximately 3,000,000 gallons of water would be withdrawn from the well at a rate of about 140 gallons per minute and would be stored in a temporary pond constructed using a coffer dam (structure at the site). The remaining quantity of water required for the Project would be obtained from surface water and municipal sources. The ODNR would require registration of the new well, but not permitting (ODNR, 2019b). Following construction, Columbia would maintain the well for use during operation at the Oak Hill CS, as well as for local fire and emergency management agencies.

Contaminated Groundwater

There is one documented source of contaminated groundwater and soil 0.5 mile west of the proposed R-801 pipeline between MPs 62.3 and 64.5. The South Point Plant in Lawrence County, Ohio is on the Superfund List and has a long-term remedy currently in place for groundwater contamination (EPA, 2018b). Columbia proposes two contractor yards (CY-004-B and CY-005-B) at the South Point Plant location. Activities at these two contractor yards would not require use or withdrawal of groundwater, but there could be limited grading. The site would be used for trailers and storage of pipe and equipment. Columbia documented that the EPA indicated that use of the site as a contractor yard would be acceptable if ongoing groundwater remediation efforts were not affected. However, Columbia did not commit to any specific measures to protect ongoing site remediation efforts at the South Point Plant from use of the proposed contractor yard, nor did Columbia commit generally to incorporating any measures recommended by the EPA. Given those factors, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary, for review and written approval by the Director of OEP, a *Site Mitigation Plan* for the proposed use of the South Point Plant location as contractor yards. The Plan should include measures designed to protect the ongoing groundwater contamination remediation efforts, and Columbia shall document that it has developed the Plan in consultation with the EPA.**

Columbia identified three other sites within 0.25 mile of the Project with possible groundwater contamination. These locations have limited testing results available in order to confirm the extent of groundwater contamination (Ohio Department of Commerce, 2018). These locations include:

- Main Express, 0.2 mile north of staging area SA-013-B in Jackson County, Ohio;

- Oak Hill Union Local Schools, 0.2 mile northwest of staging area SA-013-B in Jackson County, Ohio; and
- Gas-N-All Inc., 0.2 mile southwest of the South Point RS in Lawrence County, Ohio.

Given the distance of all three facilities to proposed work areas and due to the nature of two of these work areas (i.e., staging areas), we conclude that Project activities would not encounter contaminated groundwater from these sites.

Mining activity is a potential source of groundwater contamination as it can affect both the flow and quality of groundwater. The proposed Project does not cross any active underground mines; however, the Project would cross numerous abandoned mines (see section B.1). Should Columbia encounter groundwater contaminated from historic mining activities, it would use the measures described in Columbia's ECS, which are discussed below.

Wayne National Forest

As noted above, one private domestic drinking water well is on NFS lands of the WNF within staging area SA-025-B. No other private groundwater wells were identified within 150 feet, nor were any other public groundwater wells identified within 1 mile, of the Project workspaces or facilities relative to the WNF. Additional measures to protect groundwater resources within the WNF would be specified in the final COM Plan.

Impacts and Mitigation

Construction of the pipeline would generally require the excavation of a trench to a depth that allows for a minimum of 3 feet of backfill over the pipeline (typically the trench would be 7 to 14 feet in depth). Construction activities could result in minor, temporary impacts on groundwater resources. In areas where the water table is near the surface, groundwater could sustain minor impacts from temporary changes in overland water flow and recharge from clearing and grading of the right-of-way. In addition, soil compaction from construction could reduce the ability of the soil to absorb water. Columbia would dewater pipeline trenches where a high water table exists or following a heavy precipitation event. Columbia would also dewater bore pits associated with the conventional bore installation of the pipe at seven waterbodies. Dewatering operations could temporarily draw down groundwater levels, but impacts would be minor and temporary, as dewatering activities in a particular location would generally be completed within a few days. Columbia would discharge water pumped from the trench and bore pits into areas with adequate vegetation to serve as filter medium or into approved dewatering structures (as described in Columbia's ECS) that allow the water to re-infiltrate the soil surface. Columbia would test restored soils for compaction in agricultural and residential areas, and mitigate (e.g., plow) if needed.

An inadvertent spill of fuel or hazardous liquids during refueling or maintenance of construction equipment could also affect groundwater if not cleaned up appropriately. Soils contaminated by such spills or leaks could continue to leach and add contaminants to groundwater long after a spill has occurred. To minimize the risk of potential fuel or equipment fluid spills, Columbia has developed a SPRP as well as measures outlined in Columbia's ECS, which it would implement throughout construction. Specific measures from this plan include:

- training personnel on the proper handling of fuels and other hazardous materials;
- implementing appropriate spill cleanup and notification procedures;
- maintaining equipment in good operating condition by inspecting equipment daily and repairing equipment;
- maintaining a 400-foot setback for hazardous materials storage and equipment/ vehicle maintenance and refueling activities from community and municipal wells, and a 200-foot setback from active private water wells; and
- storing hazardous materials such as fuel, oil, hydraulic fluid, engine coolants, chemical additives, and pipe coatings more than 100 feet from any waterbody or wetland and within secondary containment.

In addition, re-fueling should occur at least 100 feet from any waterbody or wetland, unless site-specific conditions require otherwise. In these situations, Columbia would continuously monitor and surround the equipment with temporary containment. Each construction crew, including all service vehicles, would be equipped with spill kits for immediate response to any leaks or spills from equipment.

Columbia would follow protocols outlined in its ECS in the event that it encountered contaminated groundwater during construction. These measures include, but are not limited to, immediately issuing a stop-work order; notifying Columbia's health, safety, and environmental permitting staff; and mobilizing a qualified contractor to properly clean up and dispose of the contaminated material. At the South Point Plant, where Columbia proposes two contractor yards, the use of the site would be limited to commercial and industrial uses. The two contractor yards would not require the use or withdrawal of groundwater by Columbia.

Columbia proposes to use water from a new permanent groundwater supply well installed near MP 24.6 to conduct hydrostatic testing on Spread 2, mix concrete, and suppress construction-related dust. A qualified contractor would install the well in accordance with permit requirements. Columbia would store water in a temporary pond on-site at the Oak Hill CS. Current non-project groundwater withdrawals in the Project area are about 518,000,000 gallons per day. At the proposed withdrawal rate, temporary

impacts on groundwater levels in the immediate area near MP 24.6 could occur; however, we conclude that long-term impacts on groundwater supplies would not occur and the temporary withdrawal would be negligible compared to ongoing groundwater usage in the area.

Source Water Protection Areas

As noted above, the proposed pipeline facilities would cross three public water systems within the City of Wellston Surface Water Protection Area and within the Ohio River Surface Water Protection Area (the City of Wellston, City of Portsmouth, and the Ironton Public Water Systems). The Project would cross the Wellston Public Water System Groundwater Protection Area from MPs 7.6 to 11.4. Construction, operation, and maintenance of the Project would not include any activities that are regulated or require a permit within source water protection areas.

The construction and operation of the Project would not include regional OEPA-identified sources of potential contamination, including contaminated surface water runoff, leaching from inadequate septic tanks, agricultural runoff, and runoff from cattle pastures. In addition, the City of Wellston does not have established drinking water source protection ordinances. Contamination could occur during construction from spills and leaking construction equipment into surface waters and via sediment runoff. However, Columbia would implement the measures outlined in its SPRP and its ECS to minimize the potential for spills, contamination of source water protection areas crossed by the Project, and to contain sediment runoff. These measures include:

- requiring construction across waterbodies to be completed as quickly as possible;
- maintaining adequate flow rates throughout construction to protect aquatic life and prevent the interruption of existing downstream uses;
- requiring temporary erosion and sediment control measures to be installed and maintained 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;
- ensuring that hazardous materials to be used during construction would be stored at least 100 feet from surface waters;
- ensuring that equipment would be parked overnight and refueling would occur at least 100 feet away from waterbodies and wetlands; and
- implementing Columbia's SPRP if a spill or leak occurred during construction.

Based on Columbia's commitment to use BMPs noted above that would minimize and/or avoid impacts on source water protection areas, their distance from Project activities, and the fact that Project-related activities are not regulated or prohibited within these areas, we do not anticipate any impacts on the source water protection areas to occur as the result of the proposed Project.

Columbia expects to require blasting to install the pipeline in areas where dense bedrock prevents successful use of conventional excavation methods. Blasting could decrease well yields or water quality if conducted near an active well. As previously discussed, there are private water supply wells within 150 feet of the Project area. Columbia would monitor ground vibrations at the nearest water well or structure within 150 feet of blasting activities. A registered, licensed blaster would conduct all blasting activities and the blaster would use perchlorate-free explosives and blasting materials. Blasting inspectors would be present to monitor all blasting activities.

With approval from individual landowners, and in accordance with easement agreements, Columbia would conduct pre- and post-construction monitoring of water wells and springs within 150 feet of construction (including blasting) used for domestic drinking water or livestock. Columbia would conduct yield (quantity) and water quality testing of water supply wells and springs for pH, total dissolved solids, turbidity, alkalinity, chloride, nitrates, total coliform bacteria, *E. coli* bacteria, arsenic, trace metals (e.g., barium, calcium, iron, manganese, sodium), and hydrocarbons (e.g., methane, ethane, propane). Should construction-related activities damage a monitored water supply system, Columbia would provide a temporary source of water until the water system has been returned to its prior yield and water quality, a comparable replacement had been installed, or the landowner had been compensated for the damages.

Based on Columbia's implementation of its proposed mitigation, SPRP, ECS, and *Blasting Plan*, we conclude that impacts on groundwater would be minor, short-term, and not significant.

2.2 Surface Water Resources

Existing Surface Water Resources

The proposed Project would cross 17 HUC-12 watersheds. Watersheds are also discussed in section B.10.

Based on review of USGS mapping and Columbia's field investigations, there are 578 waterbodies within the proposed Project's overall footprint. However, construction of the pipeline and aboveground facilities would only cross 335 waterbodies, including the pipeline right-of-way, access roads, cathodic protection areas, and aboveground facilities at the Pyro Road point of delivery and the John's Creek point of receipt (see tables B.2-3

and B.2-4). Appendix B.2-2 provides detailed information for the waterbodies within the Project's footprint.

TABLE B.2-3
Summary of Waterbodies Crossed by Construction of Project Facilities (FERC Classification)

Project Component	FERC Classification a/			Total
	Minor	Intermediate	Major	
BXP Replacement b/				
Pipeline Right-of-Way	237	18	0	255
Permanent Access Roads	18	2	0	20
Cathodic Protection	10	0	0	10
Aboveground Facilities	0	0	0	0
BXP Replacement Subtotal	*265*	*20*	*0*	*285*
BXP Abandonment b/				
Pipeline Right-of-Way	43	5	0	51
Permanent Access Roads	10	1	0	11
Aboveground Facilities	2	0	0	0
BXP Abandonment Subtotal	*55*	*6*	*0*	*62*
Project Total c/	**310**	**25**	**0**	**335**

a/ Minor: Less than or equal to 10 feet wide at water's edge
Intermediate: Greater than 10 feet but less than or equal to 100 feet wide at water's edge
Major: Greater than 100 feet at water's edge

b/ Certain permanent facilities, such as access roads, would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these permanent facilities are included with each applicable Project component.

c/ The Project Total represents the crossings associated with the overall Project-wide disturbance area without double counting crossings associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

TABLE B.2-4
Summary of Waterbodies Crossed by Construction of Project Facilities (Flow Regime)

Project Component	Flow Regime			Total
	Ephemeral	Intermittent	Perennial	
BXP Replacement a/				
Pipeline Right-of-Way	92	71	92	255
Permanent Access Roads	9	5	6	20
Cathodic Protection	4	3	3	10
Aboveground Facilities	0	0	0	0
BXP Replacement Subtotal	*105*	*79*	*101*	*285*
BXP Abandonment a/				
Pipeline Right-of-Way	14	11	23	48
Permanent Access Roads	7	2	2	11
Aboveground Facilities	1	0	1	2
BXP Abandonment Subtotal	*22*	*13*	*26*	*61*
Project Total b/	**120**	**90**	**125**	**335**

a/ Certain permanent facilities, such as access roads would be used for activities associated with both BXP Replacement components and BXP Abandonment components. In such cases and for the purposes of this table, these permanent facilities are included with each applicable Project component.

b/ The Project Total represents the crossings associated with the overall Project-wide disturbance area without double counting crossings associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

A total of 232 waterbodies are within the proposed Project footprint, such as temporary workspaces, temporary access roads, staging areas, contractor yards, or aboveground facilities, but would not be crossed by the pipeline. Columbia could temporarily bridge waterbodies within the workspace, or crossed by a temporary access road for equipment crossing. Following construction, Columbia would remove the equipment bridges and restore the waterbody according to Columbia's ECS.

Sensitive Waterbody Crossings

The R-801 pipeline would cross three waterbodies (an unnamed tributary to Symmes Creek [MP 21.8], Black Fork Creek [MP 29.8]), and Cambria (Lefthand Fork) Creek [MP 30.1] that the FWS and the ODNR consider potential habitat for threatened or endangered species. These habitats and species are discussed further in section B.4.1.

The Project would not cross any Section 10 Navigable Waters (COE, 2018), National Wild and Scenic Rivers (National Park Service [NPS], 2018a), Nationwide Rivers Inventory rivers (NPS, 2018b), or Ohio Scenic Rivers (ODNR, 2018d). The Project would

cross 10 streams identified as state resource waters, which are considered by the state to have "general high quality," and 3 of these streams would be crossed more than once for a total of 13 crossings (see table B.2-5). Federal and state agencies have not designated any of these streams as a superior high quality water, outstanding state water, or outstanding national resource water (OEPA, 2018b).

TABLE B.2-5
State Resource Waters Crossed or within the Project Footprint a/

Nearest MP	Facility	Feature ID	Waterbody Name	FERC Classification	Pipeline Crossing Length (feet)	Proposed Crossing Method	Located on WNF
2.8	Pipeline Centerline	S-583	Little Raccoon Creek	Intermediate	44	Dam-and-Pump	No
29.8	Pipeline Centerline	S-793	Black Fork	Intermediate	38	Dam-and-Pump	No
30.1	Pipeline Centerline	S-344	Cambria (Lefthand Fork) Creek	Intermediate	11	Dam-and-Pump	No
33.3	Pipeline Centerline	S-886	Dirtyface Creek	Minor	12	Dam-and-Pump	Yes
36.8	Pipeline Centerline	S-135	Caulley (Coulley Fork) Creek	Minor	8	Dam-and-Pump	No
38.1	Pipeline Centerline	S-1069	Buffalo Creek	Intermediate	36	Dam-and-Pump	No
38.7	Permanent Right-of-Way	S-816	Buffalo Creek	Intermediate	23	Dam-and-Pump	No
40.8	Pipeline Centerline	S-614	Brushy Buckeye Creek	Intermediate	22	Dam-and-Pump	No
41.0	Pipeline Centerline	S-615	Buckeye Creek	Intermediate	34	Flume Crossing	No
43.2	Pipeline Centerline	S-825	Johns Creek	Intermediate	9	Dam-and-Pump	No
47.4	Pipeline Centerline	S-282	Elkins Creek	Minor	5	Dam-and-Pump	Yes
A38.3	Travel Way	S-615	Buckeye Creek	Intermediate	n/a	Equipment Crossing	No
A44.0	Road/ Exposure Site	S-282	Elkins Creek	Minor	21	Open-Cut	Yes

a/ All state resource waters listed in this table are classified as perennial and warmwater.

Abbreviations:

n/a not applicable

Contaminated Surface Water and Sediments

The Ohio 303(d) List also provides impaired HUC-12 watersheds, which do not meet state water quality standards and are noted as having impaired waters. The Project would cross 10 Ohio 303(d) List-impaired watersheds. Only one of these impaired watersheds, Headwaters Little Salt Creek (HUC 050600020801), has a completed total maximum daily load in place for impairments to aquatic life. Sources of impairment for the impaired watersheds include, but are not limited to, mining, agriculture, cattle access, and loss of riparian habitat.

Construction of the Project would require 24 crossings of impaired waterbodies as listed in appendix B.2-3 (OEPA, 2018c). A state's 303(d) List identifies all waters within that state where required pollution controls are not sufficient to attain or maintain applicable water quality standards and establishes priorities for the development of total maximum daily loads based on several factors, including the extent of pollution and the waterbodies' beneficial use(s) (OEPA, 2018c). The Project would cross impaired waterbodies listed for the following impaired beneficial uses: aquatic life, fish tissue, and recreation. Impairment causes included siltation, sedimentation, thermal modifications, various metals, nutrients, pH, and direct habitat alterations.

Impaired waterbodies and watersheds crossed by the Project could be a source of contaminated sediments. Columbia is coordinating with federal and state agencies regarding the potential to encounter contaminated sediments. Columbia would develop mitigation measures in consultation with the agencies if any contaminated sediments were located. Section B.1.2 provides a discussion of contaminated soils potentially affected by the Project.

Wayne National Forest

Columbia would cross or use workspaces containing 51 waterbodies within WNF lands (see tables B.2-6 and B.2-7). Appendix B.2-2 provides detailed information for each waterbody to be crossed, including those within the WNF.

TABLE B.2-6

Summary of Waterbodies Crossed by Construction of Project Facilities on WNF Lands (FERC Classification)

Project Component	FERC Classification a/			Total
	Minor	Intermediate	Major	
BXP Replacement c/				
Pipeline Right-of-Way	35	1	0	36
Permanent Access Roads	2	0	0	2
Cathodic Protection	4	0	0	4
Aboveground Facilities	0	0	0	0
BXP Replacement Subtotal	*41*	*1*	*0*	*42*
BXP Abandonment b/, c/				
Pipeline Right-of-Way	9	0	0	9
Permanent Access Roads	2	0	0	2
Aboveground Facilities	0	0	0	0
BXP Abandonment Subtotal	*11*	*0*	*0*	*11*
Project Total c/	**50**	**1**	**0**	**51**

a/ Minor: Less than or equal to 10 feet wide at water's edge
Intermediate: Greater than 10 feet but less than or equal to 100 feet wide at water's edge
Major: Greater than 100 feet at water's edge

b/ Certain permanent facilities, such as access roads, would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these permanent facilities are included with each applicable Project component.

c/ The Project Total represents the crossings associated with the overall Project-wide disturbance area without double counting crossings associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

TABLE B.2-7
Summary of Waterbodies Crossed by Construction of Project Facilities on WNF Lands (Flow Regime)

Project Component	Flow Regime			Total
	Ephemeral	Intermittent	Perennial	
BXP Replacement a/				
Pipeline Right-of-Way	20	5	11	36
Permanent Access Roads	1	0	1	2
Cathodic Protection	0	2	2	4
Aboveground Facilities	0	0	0	0
BXP Replacement Subtotal	*21*	*7*	*14*	*42*
BXP Abandonment a/				
Pipeline Right-of-Way	5	2	2	9
Permanent Access Roads	1	0	1	2
Aboveground Facilities	0	0	0	0
BXP Abandonment Subtotal	*6*	*2*	*3*	*11*
Project Total b/	**26**	**9**	**16**	**51**

a/ Certain permanent facilities, such as access roads, would be used for activities associated with both BXP Replacement components and BXP Abandonment components. In such cases and for the purposes of this table, these permanent facilities are included with each applicable Project component.

b/ The Project Total represents the crossings associated with the overall Project-wide disturbance area without double counting crossings associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

General Impacts and Mitigation

Columbia has routed the replacement pipeline portion of the Project to avoid and minimize the number of stream crossings to the extent practicable given topography and rural development along the route. Construction of the Project would result in minor, temporary impacts on surface waterbodies crossed. Clearing and grading of stream banks, in-stream trenching, trench dewatering, and backfilling could each cause temporary, local modifications of aquatic habitat involving sedimentation, increased turbidity, and decreased dissolved oxygen concentrations; however, in almost all cases, these impacts would be limited to the period of in-stream construction. Columbia proposes to use various waterbody-crossing techniques including wet open-cut, dry-crossing (i.e., dam-and-pump; flume), conventional bore, and HDD.

The Project would cross the majority (about 78 percent) of the 335 waterbodies in the Project area using the wet open-cut method. However, Columbia would use trenchless methods for 11 of the pipeline installation crossings (HDD installation techniques for 4 of the crossings, conventional bore for 7 crossings) due to road and stream crossing at the

same location. The trenchless crossings would not involve work within the stream channel. Columbia proposed to cross 44 perennial waterbodies (35.2 percent of all perennial waterbody crossings) via the dam-and-pump dry-crossing method along with one proposed flume crossing; and 6 of the perennial waterbodies (4.7 percent) would be crossed by trenchless methods. Permanent bridges or culverts would affect 20 waterbodies for permanent access roads and installation of cathodic protection would directly affect 10 waterbodies. Additionally, construction of the BXP Abandonment component would cross seven more waterbodies via the dam-and-pump dry-crossing method. The Project would not cross any major waterbodies.

For waterbodies proposed as a dam-and-pump crossing method, if there was no perceptible flow in the waterbody channel at the time of crossing (and if flow is not expected to return during the expected construction window based on anticipated weather conditions), Columbia would use a standard upland-type open-cut crossing method. Should perceptible flow occur unexpectedly during construction, Columbia would revert to the dry-crossing dam-and-pump method for that waterbody.

Columbia would install a permanent access road, including a permanent bridge crossing Ice Creek, near MP 55.1 to access MLV 4.

The proposed crossing method for each waterbody is provided in appendix B.2-2. A description of each crossing method can be found in section A.7. Construction would follow BMPs as described in Columbia's ECS, and Columbia would maintain stream flow where present throughout construction. Waterbody-crossing construction BMPs include:

- limiting equipment crossings prior to bridge construction;
- constructing temporary bridges for use by heavy equipment prior to grading activities;
- limiting grading of stream banks to the extent possible;
- restricting refueling and fuel storage near waterbodies and wetlands;
- having equipment, such as additional back-up pumps, available during the dry method crossings;
- stabilizing waterbody banks within 24 hours of finishing the crossing; and
- restoring stream banks following construction to their original contours or to a stable angle.

Construction of the proposed pipeline has the potential to result in temporary impacts on water quality, such as increased sedimentation and turbidity. The extent of the impact would depend on sediment loads, stream velocity, ambient turbidity, bank composition, and sediment particle size. In-stream construction could cause the dislodging and transport of channel bed sediments and the alteration of stream contours. Changes in

the stream bottom contours could alter stream dynamics and increase downstream erosion or deposition. Turbidity resulting from the resuspension of sediments due to in-stream construction and erosion of cleared right-of-way areas could reduce light penetration and photosynthetic oxygen production. In-stream disturbance could also introduce chemical and nutrient pollutants from sediments into the water column. Resuspension of deposited organic material and inorganic sediments could cause an increase in biological and chemical use of oxygen, potentially resulting in a decrease of dissolved oxygen concentrations in the affected area.

In order to limit the impacts from sedimentation and turbidity increases during in-stream construction, Columbia would use measures outlined in its ECS in accordance with FERC's Plan and Procedures to limit the timeframe for completion of waterbody crossings. In-stream construction for wet open-cut crossings in minor and intermediate waterbodies would be limited to 24 and 48 hours, respectively. These measures would expedite the waterbody crossings and restoration and limit the disturbance to a short and temporary timeframe; thereby, limiting the sedimentation and turbidity downstream.

The potential for sedimentation and turbidity would be reduced in the waterbodies that Columbia would cross via dry-crossing methods such as dam-and-pump or flume. Because the in-stream work area would be isolated and dewatered, trenching, backfill, and stream bottom restoration would be accomplished under dry conditions. Sedimentation or elevated turbidity levels would be limited to the period of dam installation and water re-introduction into the work area. This process would minimize impacts in both duration and extent compared to wet open-cut crossings.

Surface water impacts and stream disturbance would be avoided altogether for the waterbodies crossed by a successful HDD or conventional bore. These methods tunnel beneath the stream leaving the streambed and banks undisturbed. During construction, the inadvertent release of drilling mud during an HDD could affect surface water quality. Potential impacts include increased erosion, sedimentation, and turbidity. During construction, Columbia would minimize or avoid impacts by implementation of the practices outlined in its ECS and *HDD Contingency Plan.* These practices include monitoring drilling fluid levels, regular monitoring of the construction right-of-way during the HDD including aerial, all-terrain vehicle, or boat inspections if warranted, with landowner permission, monitoring adjacent parcels if a loss of fluids was suspected, using special techniques to thicken the drilling fluid, and reducing drilling fluid pressures in order to limit the release of drilling mud. Additionally, Columbia would comply with all applicable federal, state, and local permitting requirements. Riparian areas between HDD entry and exit points would not be cleared during construction or mowed during operations. Details regarding the proposed HDDs are provided in sections A.7 and B.1.

Potential impacts from the conventional bore underneath waterbodies include the requirement for additional workspaces for spoil, equipment storage, and dewatering of bore pits; removal of riparian vegetation and excavation within the riparian zone for the required

bore pits; potential erosion from the discharge of water pumped from the bore pits; and reduction in water levels within the waterbody due to the continuous pumping of groundwater from the bore pits. Releases of chemical and nutrient pollutants from excavated sediments are also possible. Columbia would implement procedures outlined in its ECS, including the installation of erosion controls, to limit the effects of clearing and grading, in-stream trenching, trench dewatering, and backfilling operations on surface water resources. Construction activities could also result in spills of fuels or other contaminants; however, Columbia's adherence and implementation of its SPRP would reduce the potential for inadvertent releases or spills to enter waterbodies within or near Project construction areas.

Dewatering of the pipeline trench may require pumping of groundwater in areas where there is a high water table. During construction, Columbia would discharge water removed from excavations by directing it to upland vegetated land surfaces (where available) to control erosion and runoff. If adequate vegetation were absent, water would be filtered through appropriate dewatering structures.

Construction could result in increased stream bank erosion due to clearing and grading of vegetation as well as compaction of soils from heavy equipment. Stream bank erosion could cause a temporary increase of in-stream turbidity and sedimentation. Columbia has committed to using bridges for construction equipment to cross all waterbodies, including minor waterbodies. These equipment bridges would be removed as part of the restoration process. The bridges would be constructed of timber mats, portable pre-fabricated bridges, railroad car bridges, or clean rock fill and culverts, and in accordance with Columbia's ECS to minimize streambed disturbance and downstream sedimentation. There are 232 waterbodies within the proposed Project workspace footprint, but these waterbodies would not be crossed by the pipeline trench (see appendix B.2-2). To protect these waterbodies, Columbia would use measures outlined in its ECS, including the use of temporary equipment bridges. Columbia's proposed ECS measures are in accordance with FERC's Plan and Procedures to avoid and minimize any potential impacts on these resources.

The FERC Procedures stipulate that all extra workspaces should be at least 50 feet from waterbodies and wetlands. A total of 310 ATWS (273 for the R-801 pipeline and 37 for the BXP Abandonment) are proposed within 50 feet of a waterbody and/or wetland for the Project. However, Columbia has identified certain areas where site-specific conditions do not allow for a 50-foot setback. Appendix A-3 identifies these locations and includes justifications from Columbia for why the extra workspaces are needed in those locations, primarily due to spoil storage needs and site-specific constraints. Based on our review, we concur that all of Columbia's requests are justified.

Columbia would minimize sedimentation during construction across waterbodies by placing trench spoil at least 10 feet from the top of the stream bank and installing silt fences and/or straw bales around the spoil piles to prevent spoil from entering into the

waterbody. After installation of the pipe, Columbia would replace the excavated spoil in the trench and restore the streambed and banks as close as practicable to their pre-construction contours. Columbia would implement additional measures, such as the use of erosion control blankets, as necessary, to stabilize the banks of the waterbodies. During final restoration, Columbia would seed stream banks and riparian areas in accordance with applicable agency requirements and its ECS.

Site-Specific Impacts and Mitigation

Sensitive Waterbody Crossings

Columbia would use dry-crossing methods for all 303(d) impaired and sensitive waterbodies identified along theR-801 pipeline route. Sensitive waterbodies include streams with known threatened or endangered species, state resource waters, and impaired waterbodies.

The pipeline installed within waterbodies would be epoxy coated and routinely inspected for corrosion. It is not anticipated that pipeline installed underneath waterbodies would contribute to the impairment of streams for metals, pH, salinity, total dissolved solids, minerals, and nutrients. The Project could contribute to thermal modification impairments such as through removal of trees that provide shade for waterbodies; however, any impacts would be localized, riparian areas would be revegetated with native species, and a riparian strip at least 25 feet wide would be re-established (except for a 10-foot-wide corridor and selected tree removal to facilitate inspections and ensure pipeline integrity). The USFS would require additional buffers as described below. Columbia would limit contributing to impairments due to habitat modification by using dry-crossing methods, restoring stream bottoms, reducing the construction right-of-way at waterbody crossings, and returning streambed and banks to pre-construction contours.

Given Columbia's SPRP, implementation of its ECS, and adherence to the FERC Plan and Procedures, we conclude that impacts on sensitive waterbodies would be temporary and not significant.

Blasting

Blasting within waterbodies could be necessary to construct the R-801 pipeline in areas where bedrock is encountered at depths that would interfere with conventional excavation or rock-ripping methods. Columbia may pre-blast waterbodies prior to the actual crossing, but if the period between pre-blasting and pipeline installation exceeds 10 days, Columbia would perform temporary bank restoration to reduce erosion and sedimentation. In-stream blasting has the potential to displace, injure, or kill aquatic organisms as discussed in section B.3, introduce fly rock, or cause fissures in the stream bottom. Pre-blast drilling of the bedrock (e.g., shot holes) in streams could cause short-term impacts including the deposition of fine cuttings in the stream bed, displacement of

fish and other aquatic organisms; disturbance of the bottom substrate, as well as a decrease in water quality downstream due to sedimentation, turbidity, and altering flow regimes.

The need for blasting within waterbodies is anticipated because about 70 percent (46.3 miles) of the R-801 pipeline route crosses areas that have a depth to bedrock of less than 60 inches (see section B.1.1). Waterbody crossings requiring blasting would be identified at the time of construction based on site-specific conditions and the ability to excavate the trench using mechanical means.

Columbia would minimize or avoid impacts on surface water by implementation of the construction practices outlined in its ECS, *Blasting Plan*, and SPRP; and Columbia would comply with all applicable federal, state, and local laws and regulations. Columbia would conduct as much work as possible from equipment bridges and maintain stream flow through the site during blasting. Blasting mats would also be used to reduce the amount of loose rock that might enter a waterbody, and the smallest appropriate explosive charges would be used to limit impacts on adjacent areas. Columbia would also remove any rock 4 inches or greater in size or that impedes stream flow. Columbia would not conduct blasting within waterbodies during fishery restriction periods. Given Columbia's use of these measures, we conclude that potential impacts associated with blasting would be adequately minimized and water quality would not be significantly impacted by blasting.

Hydrostatic Testing and Water Usage

Columbia would hydrostatically test the pipeline and piping at aboveground facilities to verify integrity in accordance with USDOT requirements. The testing would take place as construction spreads were completed. Hydrostatic test water would be appropriated from a proposed new groundwater well at MP 24.6, local municipalities, Little Raccoon Creek, and the Ohio River (see table B.2-8; appendix B.2-4). Surface water withdrawal from the Ohio River would require a Section 10 Navigable Waters permit from the COE. Columbia would contact the COE and OEPA to ensure proper permitting is secured prior to withdrawal of water from the Ohio River.

TABLE B.2-8
Proposed Water Appropriation and Amounts for the Buckeye XPress Project

Water Source	Use/Location (MP/Spread)	Amount (gallons)
Little Raccoon Creek (MP 2.7)	Hydrostatic Testing/MP 0.0-24.4 (Spread 1)	1,583,285
Groundwater Well at MP 24.6	Hydrostatic Testing/ MP 24.4-49.4 (Spread 2)	2,877,586
Ohio River at River Mile 313.9	Hydrostatic Testing/MP 49.4-66.2 (Spread 3)	1,197,600
Municipal Supply	Aboveground facilities	119,832
Municipal Supply	Abandonment Segments	6,998
Municipal Supply	HDD (Mud mixture)	374,168
Groundwater Well at MP 24.6 or Municipal Supply	Dust Suppression	1,980,000
Project Total		**8,139,469**

Water for hydrostatic testing of Spread 2 would be pumped from the proposed pond to the test section and then discharged back to the pond upon the completion of testing; thereby keeping the water within the same watershed and making the activity a non-consumptive use of the water.

Columbia proposes to use surface water withdrawn from Little Raccoon Creek for hydrostatic testing on the north end of the BXP Replacement in Spread 1 and the Ohio River at River Mile 313.9 for testing on the southern end of the BXP Replacement in Spread 3. Columbia would maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

Columbia would hold hydrostatic test water obtained from municipal sources or the Oak Hill Pond in tanks until ready for use for HDD drilling operations and/or dust suppression. The tanks would be within approved construction work areas. Hydrostatic test water obtained from municipal sources would either be discharged into a well-vegetated upland area at a regulated rate, through a sediment trap with energy dissipation devices over land, or into the temporary pond at MP 24.6. Columbia would discharge all hydrostatic test water according to the OEPA's statewide general permit, "National Pollutant Discharge Elimination System General Permit for Hydrostatic Test Water Discharge" (OEPA, 2018d).

The pipeline and facilities would be constructed of new steel pipe that is free of chemicals or lubricants. Columbia would not add any biocide or use chemically treated water to hydrostatically test the pipeline, nor does it anticipate the use of chemicals to dry the pipeline following hydrostatic testing activities. Columbia may add antifreeze to the

water held in tanks, if freezing temperatures are forecasted during hydrostatic testing. Upon the completion of hydrostatic testing, the water containing antifreeze would be collected in the tanks and disposed of at an approved facility.

Columbia estimates that 364,168 gallons of water would be required to conduct the HDD installations for the BXP Replacement. This water would be obtained from municipal water supplies. The water would be used to mix the drilling mud for the HDD operations and would be disposed of at an approved landfill. Columbia estimates that it would obtain 22,000 gallons of water per day over a period of about 3 months from the proposed pond for dust control during construction.

These measures described above would minimize impacts from hydrostatic test water withdrawals and discharges and water usage. Given Columbia's use of these measures, we conclude that potential impacts associated with hydrostatic testing and water usage would be adequately minimized and would not be significant.

Wayne National Forest

The BXP Replacement would affect 42 waterbodies across 6 HUC-12 watersheds within the WNF (see appendix B.2-2). Columbia would cross an additional nine waterbodies by the BXP Abandonment (see tables B.2-6 and B.2-7). Three sensitive waterbodies would be affected by the Project within the WNF (see table B.2-5). Impact descriptions, minimization, and mitigation measures would generally be the same for waterbodies within the WNF as described above for the Project overall.

The USFS indicated that the riparian areas on WNF lands would be re-established up to the filterstrip (i.e., buffer strip) width as specified by Forest Plan guideline GFW-ARR-5, where ephemeral waterbodies are afforded 50-foot-wide filterstrips, intermittent waterbodies are afforded 75-foot-wide filterstrips, and perennial waterbodies would have 100-foot-wide filterstrips.

Columbia would minimize impacts on surface water within the WNF by implementation of the construction practices outlined in its ECS, *Blasting Plan*, and SPRP. Based on the use of these measures we conclude that impacts on surface waters within the WNF would be adequately minimized. In addition, Columbia continues to work with the USFS to develop an Operating Plan and comply with requirements outlined by the USFS. The USFS and Columbia are continuing to coordinate regarding proposed construction activities, such as additional potential protection and mitigation measures for waterbodies affected within the WNF. In its filing dated April 12, 2019, Columbia committed to completing pipeline installation at all perennial waterbodies within the WNF affected by the R-801 pipeline via dry-crossing methods. On April 25, 2019, Columbia filed a commitment to complete in-stream work at both perennial waterbodies affected by R-501 abandonment exposure sites within the WNF via dry-crossing methods. Columbia would

be required to adopt USFS-mandated mitigation measures on NFS lands as specified in the final COM Plan, which could further reduce impacts on the WNF.

Conclusions Regarding Impacts on Surface Water Resources

Impacts on surface water resources from construction and operation of the Project would be temporary, and Columbia would limit impacts on water resources where practicable by implementing its ECS, *HDD Contingency Plan*, *Blasting Plan*, SPRP, and proposed construction and mitigation measures. Therefore, we conclude that impacts on surface water resources from the Project would not be significant.

2.3 Wetlands

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of wetland vegetation adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation (COE, 1987). Wetlands can be a source of substantial biodiversity and serve a variety of functions that include providing wildlife habitat, recreational opportunities, flood control, and naturally improving water quality.

Columbia performed wetland surveys and associated delineations for all pipeline facilities, staging areas, aboveground facilities, and access roads in 2017 and 2018 except for one parcel, which was evaluated using desktop data and observations from adjacent parcels. There are no wetlands within the site of the existing Ceredo CS in West Virginia where station modifications are proposed by Columbia, so this station is not discussed further in this section and it would not be subject to COE wetlands permitting requirements.

Existing Wetland Resources

Columbia conducted all wetland delineations in accordance with the requirements of the *Corps of Engineers Wetland Delineation Manual* (COE, 1987) and applicable COE regional supplements (Eastern Mountain Piedmont Regional Supplement). Wetland types were assigned using the National Wetland Inventory's (NWI) classification system (Cowardin et al., 1979). Palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and palustrine unconsolidated bottom (PUB) wetland associations were documented in the Project area. Wetlands may also be classified as a combination of types (e.g., PFO/PEM and PFO/PSS).

PEM wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Representative species in the PEM wetlands surveyed include rice cutgrass, fowl manna grass, soft rush, woolgrass, and shallow sedge.

PSS wetlands contain emergent woody vegetation less than 20 feet tall. Representative species in the PSS wetlands surveyed include dogwoods, buttonbush, black willow, swamp rose, and common elderberry.

PFO wetlands are dominated by hydrophytic tree species at least 20 feet tall. Dominant tree species in the PFO wetlands surveyed include green ash, red maple, sweetgum, blackgum, and river birch.

PUB wetland associations include wetlands with a vegetation cover of less than 30 percent and at least 25 percent cover of substrate particles smaller than stones (Cowardin et al., 1979). Representative species in the PUB wetland associations surveyed includes various species of grasses, sedges, willows, maples, and oaks. The OEPA's Ohio Rapid Assessment Method for Wetlands further classifies wetlands. Using this method the Project would cross Category 1, 2, and 3 wetlands. The state of Ohio defines Category 1 wetlands as wetlands that "...support minimal wildlife habitat, and minimal hydrological and recreational functions," and as wetlands that "...do not provide critical habitat for threatened or endangered species or contain rare, threatened or endangered species." Category 2 wetlands are defined as wetlands that "...support moderate wildlife habitat, or hydrological or recreational functions," and as wetlands that are "...dominated by native species but generally without the presence of, or habitat for, rare, threatened or endangered species; and wetlands that are degraded but have a reasonable potential for reestablishing lost wetland functions" (OEPA, 2001). Category 3 wetlands can support habitats for threatened or endangered species, are scarce regionally or within Ohio, and have "superior habitat, or superior hydrological or recreational functions."

The proposed Project would not cross any NRCS-managed Wetland Reserve Program lands.

General Impacts and Mitigation

Columbia developed the proposed route with the intention of avoiding wetlands where possible. In addition, Columbia would use the HDD method to cross six wetlands in seven locations (MPs 12.8, 12.9, 17.8, 20.2, 24.8, 24.9, and 25.0), thereby avoiding surface impacts on the wetland with a successful HDD. Columbia would not disturb vegetation between the HDD entry and exit workspaces except for the proposed ATWS near the entry for the Highway 35 HDD (MP 18.2) for the purpose of HDD spoil storage. Guide wires for the HDD would be installed by hand without the need for tree clearing. Columbia would monitor for, and respond to if necessary, an IR of HDD drilling fluids in a manner similar to that described above for surface water. If the HDD method is not successful and a different method is necessary (i.e., wet open-cut method) to complete the crossings, Columbia would be required to contact the COE and OEPA to ensure proper permitting is secured and request a variance from FERC prior to conducting work within the wetlands associated with the proposed HDD trenchless method.

Construction of the Project would result in crossing disturbance (i.e., grading or trenching) of 4.5 acres for the BXP Replacement portion of the Project and 1.5 acres for the BXP Abandonment component (see table B.2-9), resulting in a Project total disturbance of about 6 acres.

TABLE B.2-9

Summary of Wetland Resources Crossed by Construction of Project Facilities a/, b/, c/

Wetland Type	Number of Wetlands Impacted	Pipeline Crossing Length (feet) d/	Acreage Affected During Construction	Acreage Affected During Operation		
				Permanent Fill e/	10-foot Corridor f/	30-foot Corridor g/
BXP Replacement h/						
PEM	75	2,524	2.67	0.01	-	-
PSS	9	1,012	0.38	0	0.06	0.20
PFO	17	2,536	1.44	0	0.28	0.86
PUB	3	5	0.02	0	-	-
BXP Replacement Subtotal	*104*	*6,077*	*4.50*	*0.01*	*0.34*	*1.06*
BXP Abandonment h/						
PEM	30	962	1.37	0.01	-	-
PSS	2	26	0.13	0	-	-
BXP Abandonment Subtotal	*32*	*988*	*1.50*	*0.01*	-	-
Project Total i/	**136**	**7,065**	**6.01**	**0.01**	**0.34**	**1.06**

a/ Acreages presented in this table were calculated using geographic information system measurements of delineated and NWI wetland polygons and have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.

b/ Land affected during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Land affected during permanent (operation) use only.

d/ Crossing lengths are provided for pipeline crossings only and do not include access roads or non-linear workspaces.

e/ Placement of fill material including geotextile fabric, gravel, and culvert for permanent access roads.

f/ Columbia would maintain a 10-foot-wide strip centered over the pipeline in an herbaceous state to facilitate periodic corrosion and leak surveys. Operational impacts in this column represent the 10-foot-wide area in PFO and PSS wetlands that would be converted to non-forested or non-woody wetland types.

g/ Columbia would selectively cut trees within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating. Operational impacts in this column represent the 30-foot-wide area in PFO and PSS wetlands where trees could be selectively cut.

h/ Certain permanent facilities, such as access roads, would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these permanent facilities are included with each applicable Project component.

i/ The Project Total represents the proposed impact associated with the overall Project-wide disturbance area without double counting impacts associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

In addition, 7.88 acres and 5.59 acres of wetlands for the BXP Replacement and BXP Abandonment, respectively, would be within temporary workspaces, staging areas, contractor yards, or temporary access roads (see table B.2-10). However, due to overlapping effects between the two Project components, these impacts would total 9.79 acres. These areas would not be graded or trenched, but could be subject to vegetation clearing for installation of timber mats during construction as needed to allow for vehicle access. Details for each of the Project's wetland crossings are provided in appendix B.2-5.

TABLE B.2-10
Summary of Wetland Resources to be Matted a/, b/, c/

Wetland Type	Number of Wetlands Impacted	Acreage Affected During Construction	Acreage Affected During Operation
BXP Replacement d/			
PEM	121	6.28	-
PSS	12	0.25	-
PFO	24	1.21	-
PUB	8	0.14	-
BXP Replacement Subtotal	*165*	*7.88*	-
BXP Abandonment d/			
PEM	74	5.48	-
PSS	1	0.06	-
PFO	1	0.03	-
PUB	2	0.02	-
BXP Abandonment Subtotal	*78*	*5.59*	-
Project Total e/	**210**	**9.79**	**-**

a/ Acreages presented in this table were calculated using geographic information system measurements of delineated and NWI wetland polygons and have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.

b/ Land affected during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Land affected during permanent (operation) use only.

d/ Certain work areas (e.g., aboveground facilities, temporary workspace, staging areas, contractor yards, access roads) would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these work areas are included with each applicable Project component.

e/ The Project Total represents the proposed impact associated with the overall Project-wide disturbance area without double counting impacts associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

A summary of construction disturbance associated with pipeline crossing by wetland vegetation type and Project component is also presented in table B.2-9. Approximately 0.07 acre of PSS and 1.44 acres of PFO would be permanently converted to a PEM state in order to maintain the right-of-way. In addition, PEM wetlands would comprise most of the above-mentioned 9.79 acres of wetlands subject to vegetation clearing for temporary workspaces, staging areas, contractor yards, or temporary access roads, but these areas would not be affected by actual pipeline crossings and would be restored immediately following construction (see table B.2-10).

The proposed Project's impacts upon Ohio-designated Category 3 wetlands are summarized in table B.2-11. As shown in that table, the majority of impacts on Category 3 wetlands would be associated with the BXP Replacement component (83 percent) and would apply to the PFO wetland vegetation type (51 percent).

Site-Specific Impacts and Mitigation

BXP Abandonment activities at wetlands would generally entail work at areas where existing pipe would be removed or cut, sealed, and filled with grout at road and railroad crossings.

Columbia would minimize impacts on wetlands by implementing the measures identified in its ECS, which include:

- limiting the operation of construction equipment within wetlands to equipment essential for clearing, excavation, pipe installation, backfilling, and restoration;
- reducing the construction right-of-way width to 75 feet except as due to site-specific constraints;
- minimizing the length of time that topsoil would be segregated and the trench would be open;
- installing trench breakers at the boundaries of wetlands to prevent draining of a wetland and maintain original wetland hydrology;
- prohibiting storage of hazardous materials, chemicals, fuels, and lubricating oils within a wetland or within 100 feet of a wetland boundary, where feasible;
- limiting overnight equipment parking and refueling within 100 feet of a wetland;
- returning wetlands to pre-existing contours; and
- developing a wetland restoration plan in coordination with federal and state agencies, including provisions for limiting the spread of invasive species.

TABLE B.2-11
Summary of Category 3 Wetland Crossings a/, b/, c/

Wetland Type	Number of Wetlands Impacted	Pipeline Crossing Length (feet) d/	Acreage Affected During Construction	Acreage Affected During Operation		
				Permanent Fill	10-foot Corridor e/	30-foot Corridor f/
BXP Replacement g/						
PEM	5	666	0.54	-	-	-
PSS	2	685	0.07	-	0.01	0.04
PFO	6	2,192	0.95	-	0.19	0.58
BXP Replacement Subtotal	*13*	*3,543*	*1.56*	-	*0.21*	*0.61*
BXP Abandonment g/						
PEM	2	171	0.27	-	-	-
PSS	1	0	0.05	-	-	-
PFO	0	0	<0.00	-	-	-
BXP Abandonment Subtotal	*3*	*171*	*0.32*	-	-	-
Project Total h/	**16**	**3,714**	**1.88**	**-**	**0.21**	**0.61**

a/ Acreages presented in this table were calculated using geographic information system measurements of delineated and National Wetlands Inventory wetland polygons and have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.

b/ Land affected during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Land affected during permanent (operation) use only.

d/ Crossing lengths are provided for pipeline crossings only and do not include access roads or non-linear workspaces.

e/ Columbia would maintain a 10-foot-wide strip centered over the pipeline in an herbaceous state to facilitate periodic corrosion and leak surveys. Operational impacts in this column represent the 10-foot-wide area in PFO and PSS wetlands that would be converted to non-forested or non-woody wetland types.

f/ Columbia would selectively cut trees within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating. Operational impacts in this column represent the 30-foot-wide area in PFO and PSS wetlands where trees may be selectively cut.

g/ Certain permanent facilities, such as access roads, would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these permanent facilities are included with each applicable Project component.

h/ The Project Total represents the proposed impact associated with the overall Project-wide disturbance area without double counting impacts associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

During clearing, Columbia would install temporary erosion control measures to prevent sedimentation into wetlands. To avoid excessive disturbance to wetland soils and the native rootstock, Columbia also would cut vegetation to just above ground level and grind stumps to ground level in order to leave existing root systems in place. Columbia would limit stump removal, grading, and excavation within wetland areas to the area immediately over the trench line unless grading or stump removal would be required to provide safe working conditions. All cut trees, branches, and stumps would be removed immediately from the wetland and stockpiled in an upland portion of the right-of-way for appropriate disposal.

In unsaturated wetlands at the time of construction, Columbia would remove up to 12 inches of topsoil from the trenchline and store it separately from subsoil. Topsoil would not be stripped in saturated wetlands. In saturated wetlands, Columbia would use equipment supported by timber mats to stabilize the work surfaces and avoid rutting. After construction, mats would be removed and the contours returned as close to pre-existing condition as possible. Non-forested wetlands within, and all wetlands outside of the operational rights-of-way affected by construction, would be allowed to revegetate naturally to maturity, or as required by applicable permits or agency conditions.

Operations of the BXP Replacement component would affect 1.1 acres of wetlands where a 30-foot-wide corridor centered on the pipeline would be subject to selective tree removal. Within those 1.1 acres, a subset of 0.3 acre would be maintained in an herbaceous state in a 10-foot-wide corridor centered over the pipeline. Wetlands would not be affected during operations for the BXP Abandonment component. As noted in table B.2-9, Columbia indicated 0.1 acre of permanent fill would be required in wetlands at existing access roads PAR-JA-000.8-R (near MP 21.8 with road widening, blading, and placement of geotextile fabric and gravel) and PAR-LA-004-B (near MP A52.9 with culvert installation, road widening, blading, and placement of geotextile fabric and gravel) in association with installation of culverts or bridges.

Construction for the BXP Replacement would result in short-term, long-term, and permanent impacts on wetlands. Excavation of the pipeline trenches during open-cut construction, installation of the pipe, and backfill of the trenches could affect the rate and direction of water movement within wetlands. This could adversely affect wetland hydrology and revegetation by creating soil conditions that may not support wetland communities and hydrophytic vegetation at pre-construction levels. Failure to properly segregate soils during construction could result in mixed soil layers, which could alter biological components of the wetland and affect the reestablishment of native wetland vegetation. Temporary stockpiling of soil and movement of heavy construction machinery across wetlands could lead to inadvertent compaction and furrowing of soils, which would alter natural hydrologic patterns, inhibit seed germination, and increase seedling mortality. Altered surface drainage patterns, storm water runoff, runoff from the trenches, and accidental spills, could also negatively affect water quality within the wetland.

Following construction, the wetland vegetation community would transition back into a function similar to that of the wetland prior to construction, except where former PFO wetlands occurred within the above-mentioned 30-foot-wide and 10-foot-wide maintained corridors. In PEM wetlands, the impact of construction would be relatively minor and temporary, as the herbaceous vegetation would regenerate quickly (generally within 1 to 2 years). Impacts on PSS wetlands would also be minor, but short-term, as these wetlands would take 2 to 4 years to revegetate and to reach functionality similar to pre-construction conditions. Long-term impacts would occur on PFO wetlands in temporary workspaces (30 years or longer) due to the longer regeneration period of forested vegetation types.

During operation of the Project, routine maintenance of a 10-foot-wide strip centered over the pipeline would result in a permanent conversion from PFO wetland to PEM wetland within this strip. Additionally, Columbia would selectively cut and remove trees within 15 feet of either side of the pipeline with roots that may compromise the pipeline's integrity, thereby converting PFO wetland to PSS wetland. While the conversion of PFO and PSS wetlands into PSS or PEM wetlands would not constitute a loss of total wetland area, it would represent a permanent conversion of wetland function and vegetation type. Vegetation maintenance activities during operation of the pipeline would permanently convert 1.44 acres of PFO wetlands to PSS or PEM wetlands. In wetland areas affected by matting and/or temporary workspaces, staging areas, contractor yards, or temporary access roads (but not by an actual pipeline crossing), PEM, and PSS vegetation would quickly re-establish, but the timeframe for PFO (1.24 acres) regeneration would be long-term.

Following restoration, Columbia would monitor disturbed wetlands and record the success of wetland revegetation annually for 3 years in accordance with its ECS. At the end of 3 years, Columbia would file a report with the Commission identifying the status of the wetland revegetation efforts. FERC does not consider wetland revegetation to be successful until the native vegetation cover reaches at least 80 percent of either the cover type documented for the wetland prior to construction or the cover in adjacent, undisturbed wetlands. If wetland vegetation did not meet the success criteria at the end of 3 years, Columbia would consult with a professional wetland ecologist to develop and implement a remedial revegetation plan to actively revegetate the wetland and continue efforts until the wetland revegetation was successful.

Columbia would consult with the COE and OEPA regarding compensatory mitigation for unavoidable impacts on wetlands. Compensatory mitigation would take the form of buying credits at a mitigation bank within the affected HUC-8 watershed (Lower Scioto, Raccoon-Symmes, Little Scioto-Tygarts watersheds) if possible as the first option, or alternately the payment of in-lieu fees or development of a permittee (i.e., Columbia)-responsible mitigation site. Based on availability, Columbia stated that it would pursue mitigation credits at the Red Stone Farm Wetland Mitigation Bank and an in-lieu fee

program with The Nature Conservancy to address impacts on Category 1 and 2 wetlands. Columbia also committed to ongoing coordination with the OEPA regarding mitigation for impacts on designated Category 3 wetlands. Because no credits are available for Category 3 wetlands in the three watersheds, Columbia would pursue permittee-responsible mitigation in association with entities such as Appalachian Ohio Alliance, The Nature Conservancy, and/or Arc of Appalachia. The COE and OEPA would determine compensatory mitigation for impacts on wetlands based on factors such as wetland vegetation type, OEPA category, and temporary versus permanent wetland type conversion.

We received comments from OEPA regarding effects to wetlands at a parcel owned by the Ohio Valley Conservation Coalition (OVCC) near MP 29.7. We discuss alternatives and recommend mitigation (i.e., tree planting) for the parcel in section C.3.2.

Wayne National Forest

The Project would affect five wetland-crossing locations for the R-801 pipeline and one additional for a road site for the BXP Abandonment component on the WNF (see table B.2-12). The BXP Replacement segment would result in 0.15 acre of temporary impact due to construction (including 0.09 acre of PFO) and 0.1 acre of permanent vegetation conversion of PFO wetland to PEM or PSS wetland. Wetland-specific details for the WNF are listed in appendix B.2-5.

Impact descriptions, as well as impact minimization and mitigation measures, generally would be the same for wetlands within the WNF as described above for the Project. Columbia would ensure that any herbicides used to control exotic plant species within wetlands in the WNF would be pre-approved by the USDA. The USFS and Columbia are continuing to coordinate regarding proposed construction activities, such as wetland crossings including the suitability of open-cut crossing methods, and potential mitigation measures. Columbia would be required to adopt USFS-mandated mitigation measures on NFS lands as specified in the final COM Plan.

Conclusion for Wetland Resources

With the implementation of Columbia's proposed construction, restoration, and mitigation measures, FERC Procedures, and Columbia's ECS, we conclude that adverse impacts on wetlands resulting from the proposed Project would be adequately minimized and mitigated and would not be significant. In addition, Columbia would conduct compensatory mitigation to comply with Section 404 of the CWA to further minimize Project impacts on wetlands.

TABLE B.2-12
Summary of Wetland Resources Crossed by the Project on WNF Lands a/, b/, c/

Wetland Type d/	Number of Wetlands Impacted	Pipeline Crossing Length (feet) e/	Acreage Affected During Construction	Acreage Affected During Operation		
				Permanent Dredge/ Fill	10-foot Corridor f/	30-foot Corridor g/
BXP Replacement h/						
PEM	4	28	0.04	0	-	-
PFO	1	75	0.09	0	0.02	0.06
BXP Replacement Subtotal	*5*	*103*	*0.13*	*0*	*0.02*	*0.06*
BXP Abandonment h/						
PEM	1	0	0.02	0	-	-
BXP Abandonment Subtotal	*1*	*0*	*0.02*	*0*	-	-
Project Total i/	**6**	**103**	**0.15**	**0**	**0.02**	**0.06**

a/ Acreages presented in this table were calculated using geographic information system measurements of delineated and National Wetlands Inventory wetland polygons and have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.

b/ Land affected during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Land affected during permanent (operation) use only.

d/ Cowardin wetland types: PUB – palustrine unconsolidated bottom; PEM – palustrine emergent; PSS – palustrine scrub-shrub; PFO – palustrine forested

e/ Crossing lengths are provided for pipeline crossings only and do not include access roads or non-linear workspaces.

f/ Columbia would maintain a 10-foot-wide strip centered over the pipeline in an herbaceous state to facilitate periodic corrosion and leak surveys. Operational impacts in this column represent the 10-foot-wide area in PFO and PSS wetlands that would be converted to non-forested or non-woody wetland types.

g/ Columbia would selectively cut trees within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating. Operational impacts in this column represent the 30-foot-wide area in PFO and PSS wetlands where trees may be selectively cut.

h/ Certain permanent facilities, such as access roads, would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these permanent facilities are included with each applicable Project component.

i/ The Project Total represents the proposed impact associated with the overall Project-wide disturbance area without double counting impacts associated with overlapping work areas between BXP Replacement and BXP Abandonment components.

3. Vegetation, Fisheries, and Wildlife

3.1 Vegetation

Existing Vegetation Resources

Construction and operation of the Project would affect four general vegetation cover types: forested upland, open upland, forested wetland, and open wetland. Our discussion of specific wetland types and impacts is in section B.2.3. Developed and agricultural lands are included in open upland vegetation impacts described herein.

The Project would cross 43.2 miles of forested upland. Forested upland habitats are generally characterized by central hardwood forest dominated by oak and hickory species such as white and black oak and shagbark and bitternut hickory and transition hardwood forests that include American beech and sugar maple (EPA, 2017a; Widmann et al., 2009). Historically, forested land within the northern portions of the Project area was generally fragmented or converted to developed and/or agricultural land (Widmann et al., 2009). Conversely, the southern portions of the Project area are characterized by relatively more even forest coverage with less development and agricultural usage.

The Project would cross 22.0 miles of open upland. Open upland habitats are generally characterized by grasses and herbs such as timothy, orchard grass, goldenrods and asters, shrubs including hawthorns, honeysuckles, and flowering dogwood, and early successional tree species such as black locust and red maple (FERC, 2014).

Interior Forest

Interior forest is defined as forested areas greater than 300 feet from the influence of forest edges or open habitat (Jones et al., 2001). For a variety of wildlife and plant species, interior forest provides habitat such as food resources, brooding habitat for wildlife, and protection from disturbance and predation. Interior forest has a higher habitat value for some wildlife species, and is generally considered rarer than forest edges which have lower habitat value for many species and can be created immediately with disturbance (Landowner Resource Center, 2000; Sprague et al., 2006).

Vegetation Communities of Special Concern

The vegetation communities of special concern that would be crossed by the Project are entirely within the WNF and are discussed below. The Project would not cross any old-growth forests, remnant prairie, or state specimen trees (ODNR, 2017f; Reardon, 2017). In its application to the FERC, Columbia noted a route variation for the proposed alignment of the R-801 pipeline near MP 10.0 to avoid Ohio's largest documented tree.

Wayne National Forest

The Project would cross 12.6 miles of NFS lands of the WNF across four management areas (MA). The MAs are blocks of land on which specific management activities and vegetation emphases are applied by the USFS (USDA, 2006). Special Area MAs are representative of unique geological, ecological, cultural, or other scientific values, are appropriate for scientific research, and/or have potential to be a regional or national historic landmark based on natural or cultural values. The four MA blocks that would be crossed by the Project include Bluegrass Ridge Special Area, Forest and Shrubland Mosaic, Future Old Forest, and Historic Forest (see table B.3-1). The MA blocks are described as follows in the USFS Land and Resource Management Plan for the WNF (USDA, 2006):

- Bluegrass Ridge Special Area – The Bluegrass Ridge Special Area is significant for containing high-quality oak barrens, which support a population of globally rare juniper sedge (*Carex juniperorum*), the state endangered Virginia ground cherry (*Physalis virginiana*), and viable populations of the state-rare Cumberland sedge (*Carex cumberlandensis*), and state threatened Carolina thistle (*Cirsium carolinianum*).
- Forest and Shrubland Mosaic Management Area – This MA contains early successional habitat patches interspersed throughout forested landscape. The area also contains forest communities over 100 years old and permanent herbaceous forest openings. As shrub and seedling/sapling forest habitats grow into stands of pole-sized trees, the WNF creates new shrub and seedling/sapling forest habitat through even-aged timber harvest. The species present primarily include oak and hickory on drier hillsides and uplands, yellow poplar, beech, maples, and oaks, on moist slopes and bottomlands. Native pine communities are also present in some portions of the area. Roads are present on the perimeter and within the area to provide access for recreation and resource management activities.
- Future Old Forest Management Area – This MA contains mostly old forest that changes only as a result of natural disturbances and natural succession. The area primarily comprises extensive stands of central hardwoods of mixed sizes ranging from numerous large, old trees, to mid-size trees, to dying trees and snags. Woody debris from fallen trees is evident on the forest floor and in streams that flow through the area. Tree density is generally high but variable and the forest canopy is generally closed. Species present include oaks, hickories, maple, and beech. As the successional process advances, the proportion of maple and beech will increase and the amount of oaks and hickories will decrease. Utility corridors occur here only when locating them elsewhere would not be in the public interest.

- Historic Forest Management Area – The purpose of this MA is to restore and maintain the oak-hickory forest ecosystem through a combination of mostly uneven-aged timber harvest and frequent prescribed fires. Large, widely spaced trees dominate the landscape of primarily oak and hickory trees of varied ages and sizes on ridges and drier sites and oaks, maples, beech, and yellow poplar on wetter northern slopes. Roads are present in the area to provide access to many areas of the forest for silvicultural treatment.

TABLE B.3-1
Vegetation Resources of Special Concern Crossed by the Buckeye XPress Project Within the Wayne National Forest

Resource Name	Begin Milepost	End Milepost	Crossing Length (feet) a/, b/, c/
BXP Replacement			
WNF Bluegrass Ridge Special Area MA	47.3	48.4	5,663
WNF Forest and Shrubland Mosaic MA	31.3	32.5	6,436
	38.7	38.7	135
	38.8	39.5	3,819
	40.4	40.6	922
	41.3	41.4	208
	41.6	42.2	3,063
	43.7	44.7	4,963
	45.6	47	7,267
	48.4	49.4	5,202
WNF Future Old Forest MA	49.4	50.3	4,623
	50.4	50.5	668
WNF Historic Forest MA	33	33.8	4,221
	34.2	35	4,601
	35.3	36.7	7,014
	36.8	36.9	397
	37.1	38.5	7,566
BXP Abandonment			
WNF Bluegrass Ridge Special Area MA	A44.0	A44.0	155
	A44.5	A44.7	923

TABLE B.3-1
Vegetation Resources of Special Concern Crossed by the Buckeye XPress Project Within the Wayne National Forest

Resource Name	Begin Milepost	End Milepost	Crossing Length (feet) a/, b/, c/
WNF Forest and Shrubland Mosaic MA	A29.9	A30.3	2,136
	A38.6	A38.7	258
	A39.3	A39.4	622
	A40.9	A41.1	1,339
	A41.1	A41.2	120
	A45.5	A45.5	145
WNF Future Old Forest MA	A45.5	A45.6	146
	A45.6	A45.6	142
	A45.7	A46.0	1,465
WNF Historic Forest MA	A31.2	A31.2	103
	A31.2	A31.2	116
	A31.9	A32.1	825
	A32.1	A32.1	138
	A33.1	A33.9	4,002
	A34.8	A34.9	131
	A34.9	A34.9	256
	A35.5	A35.7	556

a/ Crossing lengths only include NFS WNF lands.

b/ WNF MAs crossed by Abandonment Project components represent work sites within the existing maintained pipeline right-of-way.

c/ Due to the proximity of the Replacement Project components to the Abandonment Project components, vegetation MAs crossed by the Replacement Project components may also be crossed by Abandonment Project components. In such cases, the crossings are included for both the Replacement and Abandonment Project components within this table.

Impacts and Mitigation

General and Community-Specific Impacts on Vegetation

The proposed Project would affect 1,401.6 acres of vegetation through installation of the R-801 pipeline and 405.4 acres through abandonment of the R-500 and R-501 pipelines. Some components of the Project construction would be used for both the installation and abandonment portions of the Project (e.g., contractor yards, temporary workspaces, or access roads); the acreage subtotals provided here for the two portions of

the Project both include the acreages of the shared components, thereby double counting the shared acreages. The combined acreage of affected vegetation during construction of the Project would total 1,527.7 acres. The combined acreage affected for the operational life of the Project would total 486.5 acres. Table B.3-2 summarizes the temporary construction and permanent operation impacts of the Project on each vegetation community type. We included a recommendation in section A that would restrict the new permanent right-of-way for the R-801 pipeline to 25 feet in width where the new easement would be immediately adjacent to Columbia's existing right-of-way. If adopted by the Commission, this recommendation would reduce the total operational footprint of the Project's Replacement component by approximately 98 acres.

Prior to construction, Columbia would clear the pipeline right-of-way and workspaces of vegetation to the minimum extent necessary to allow for safe working conditions. Where possible (e.g., in temporary workspaces), tree stumps and roots would be left in place to facilitate natural revegetation. Cleared timber and vegetation would be cut into lengths, or chipped and removed for off-site disposal, as approved by landowners and state and/or local agencies. Columbia would follow its ECS to install erosion and sedimentation controls following soil disturbance.

During operation, maintenance of the permanent pipeline right-of-way would be necessary to allow for visibility and access for pipeline monitoring and maintenance activities. In upland areas, the permanent right-of-way would be 50 feet wide. Columbia would mow the entire upland right-of-way every 3 years, and mow a 10-foot-wide corridor centered on the pipeline at a frequency necessary to allow for periodic pipeline surveys.

TABLE B.3-2
Vegetation Communities Affected by the Buckeye XPress Project (in acres) a/, b/, c/

Project Component	Forest		Open Land		Wetland d/, e/		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
BXP Replacement f/								
Pipeline Facilities								
Right-of-Way	674.0	256.9	294.8	138.4	7.4	4.6	976.2	399.9
ATWS	45.1	0.0	61.2	0.0	0.2	0.0	106.5	0.0
Staging Areas/ Contractor Yards	1.8	0.0	215.4	0.0	3.0	0.0	220.2	0.0
Access Roads	15.9	6.8	28.1	11.7	0.1	<0.1	44.1	18.5
Cathodic Protection	1.5	1.5	19.6	19.6	<0.1	0.1	21.1	21.2
Oak Hill Pond	0.0	0.0	10.3	10.3	0.0	0.0	10.3	10.3
Subtotal	*738.4*	*265.2*	*629.4*	*180.0*	*10.7*	*4.6*	*1,378.5*	*449.8*
Aboveground Facilities								
McArthur RS	0.3	0.3	4.1	4.1	0.0	0.0	4.4	4.4
MLV #1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1
Jackson RS	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5
Oak Hill CS/VS (MLV#2)	0.0	0.0	1.9	1.9	0.0	0.0	1.9	1.9
MLV #3	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1
Symmes VS	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5
MLV #4	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.2
R-701 MLV Setting	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1
South Point RS	0.2	0.2	2.4	2.4	0.0	0.0	2.6	2.6
Burlington RS	0.0	0.0	1.0	1.0	0.0	0.0	1.0	1.0
Ceredo CS	0.0	0.0	11.8	11.8	0.0	0.0	11.8	11.8
Subtotal	*0.5*	*0.5*	*22.7*	*22.7*	*0.0*	*0.0*	*23.2*	*23.2*

TABLE B.3-2
Vegetation Communities Affected by the Buckeye XPress Project (in acres) a/, b/, c/

Project Component	Forest		Open Land		Wetland d/, e/		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
BXP Replacement Subtotal	***738.8***	***265.7***	***652.1***	***202.8***	***10.7***	***4.6***	***1,401.6***	***473.1***
BXP Abandonment f/								
Pipeline Facilities								
R-501 Right-of-Way	0.7	0.1	121.0	0.0	2.9	0.0	124.6	0.1
R-500 Right-of-Way	0.0	0.0	1.0	0.0	<0.1	0.0	1.0	0.0
Wellston Lateral	0.5	0.5	0.5	0.5	0.1	<0.1	1.1	1.0
R-530 Right-of-Way	0.1	0.0	0.7	0.0	0.0	0.0	0.8	0.0
ATWS	0.9	0.0	6.4	0.0	0.0	0.0	7.3	0.0
Staging Areas/ Contractor Yards	1.9	0.0	213.7	0.0	3.0	0.0	218.6	0.0
Access Roads	10.8	5.0	19.1	8.0	<0.1	<0.1	29.9	13.0
Oak Hill Pond	0.0	0.0	10.3	10.3	0.0	0.0	10.3	10.3
Subtotal	*15.0*	*5.5*	*372.8*	*18.9*	*6.1*	*<0.1*	*393.9*	*24.4*
Aboveground Facilities								
McArthur RS	0.3	0.3	4.1	4.1	0.0	0.0	4.4	4.4
Hamden RS	0.0	0.0	0.4	0.4	0.0	0.0	0.4	0.4
Wellston RS	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.2
Jackson RS	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5
Pyro Road Point of Delivery (RS- 1332)	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5
Oak Hill VS	0.0	0.0	0.3	0.3	0.0	0.0	0.3	0.3
Oak Hill RS	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.2
Kokeen RS	0.0	0.0	0.4	0.4	0.4	0.4	0.8	0.8
Symmes VS	0.0	0.0	0.5	0.5	0.0	0.0	0.5	0.5

TABLE B.3-2
Vegetation Communities Affected by the Buckeye XPress Project (in acres) a/, b/, c/

Project Component	Forest		Open Land		Wetland d/, e/		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
John's Creek Point of Receipt	0.0	0.0	0.4	0.4	0.0	0.0	0.4	0.4
Markin Fork VS	<0.1	<0.1	0.4	0.4	0.0	0.0	0.4	0.4
Kitts Hill RS	<0.1	<0.1	0.1	0.1	0.0	0.0	0.1	0.1
Neds Fork VS	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1
MLV #4	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.2
Sunrise RS (RS-2497)	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1
South Point RS	0.0	0.0	1.2	1.2	0.0	0.0	1.2	1.2
Burlington RS	0.0	0.0	1.4	1.4	0.0	0.0	1.4	1.4
Subtotal	*0.3*	*0.3*	*11.1*	*11.1*	*0.4*	*0.4*	*11.8*	*11.8*
BXP Abandonment Subtotal	***15.3***	***5.8***	***383.7***	***29.9***	***6.4***	***0.4***	***405.4***	***36.1***
Project Total g/, h/	**740.7**	**266.7**	**773.0**	**214.9**	**14.1**	**5.0**	**1,527.8**	**486.6**

TABLE B.3-2

Vegetation Communities Affected by the Buckeye XPress Project (in acres) a/, b/, c/

Project Component	Forest		Open Land		Wetland d/, e/		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.

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/ Land affected during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ The acreages in this table do not include the Open Water land use classification. The acreages of Open Water that would be affected by the Project total 4.0 acres for construction of the BXP Replacement and 1.6 acres for operations of the BXP Replacement, 0.8 acres for construction related to the BXP Abandonment and 0.1 acre for operation of the BXP Abandonment; the Project total (see footnote g/) for Open Water would equal 4.7 acres for construction activities and 1.7 acres for operation.

d/ The construction impact acreages shown in this table do not account for those wetland areas that would be avoided through the use of HDD to install the pipeline, but they do include the impacts associated with the use of temporary matting (e.g., timber mats, board mats) to facilitate vehicle and equipment access across wetland areas. As such, the construction wetland impact acreages presented in this table are higher than those provided in section B.2.3.

e/ Operational impacts on wetlands will be associated with permanent fill and the conversion of forested and scrub-shrub wetlands to non-forested or non-woody wetland types over a portion of the maintained permanent pipeline right-of-way. The operational impact acreages shown in this table represent the acres of wetland that fall within the 50-foot wide permanent right-of-way or within a permanent access road where permanent fill would occur. As such, the operational wetland impact acreages presented in this table are higher than those provided in section B.2.3

f/ Certain work areas (e.g., aboveground facilities, temporary workspace, staging areas, contractor yards, access roads) would be used for activities associated with both Replacement and Abandonment components of the Project. In such cases and for the purposes of this table, these work areas are included with each applicable Project component.

g/ The Project Total represents the impact associated with the overall Project-wide disturbance area without double counting impacts associated with overlapping work areas between Project Replacement and Project Abandonment components.

h/ The USFS is considering alternatives to the proposed abandonment in place of the R-501 pipeline that would consist of physically removing the abandoned pipeline from WNF lands in whole or in part. Implementing either of these alternatives (discussed as WNF Removal Alternatives 1 and 2 in section C.4 of this EA) would substantially change the total affected acreages listed within this section. The total acreages associated with implementing these alternatives are reported in section C.4.

Abbreviations:

Const. Construction

Oper. Operation

During construction and operation of the Project, Columbia would use existing access roads to the maximum extent possible to minimize effects on vegetation. However, 81 new or existing access roads are proposed to support installation of the R-801 pipeline and abandonment of the R-500 and R-501 pipelines. Thirty-six of the access roads would continue to be used during operation, though 30 of the 36 currently exist or exist in part. The construction of temporary and permanent access roads would affect 28.1 acres of open upland[14] vegetation and 15.9 acres of forested vegetation through installation of the R-801 pipeline and 19.1 acres of open upland vegetation and 10.8 acres of forested vegetation through abandonment of the R-500 and R-501 pipelines.[15] Columbia would place the majority of staging areas in open uplands; however, staging areas would temporarily affect 1.8 acres and 1.9 acres of forested uplands through installation of the R-801 pipeline and abandonment of the R-500 and R-501 pipelines, respectively. Aboveground facilities associated with the Project would be primarily constructed in non-forested open land, with 0.5 acre of forested land impacted for construction of facilities. Columbia would return areas within temporary workspaces (including staging areas and contractor yards) and temporary access roads to pre-Project conditions after construction.

Impacts on forested upland vegetation by construction in the temporary workspace of the Project would be long-term. Regrowth of trees to mature, pre-construction condition would take 20 to 30 years for many species, such as Virginia pine. Hardwood species, such as oaks, could take more than 50 years to reach maturity. Approximately 266.7 acres of forested upland vegetation would be permanently converted into an herbaceous state and maintained as such as part of the right-of-way, as access roads, or as industrial land surrounding aboveground facilities throughout the operational life of the Project.

Impacts on vegetation in open lands by construction of the pipeline would be short-term and temporary, because these areas would return to their herbaceous or scrub-shrub vegetation cover within 1 to 2 years post-construction. In order to facilitate revegetation, Columbia would reseed temporary workspaces using seed mixes and procedures described in its ECS or as directed by the land managing agency. Several commenters including EPA requested that Columbia consider seeding with pollinator-friendly species. However, Columbia indicated that standard maintenance of the permanent right-of-way such as periodic mowing, would disturb pollinator species. Columbia would be required by the FERC Plan at section V.D.3 to seed areas in accordance with written recommendations provided by land managing agencies or landowners, and would be required to include pollinator-friendly species if requested by those entities.

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[14] As noted above, open upland habitat comprises open land, developed, and agricultural habitats.

[15] As noted above, acreages reported for installation of the R-801 pipeline and abandonment of the R-500 and R-501 pipelines may include tracts of land used for both components of the Project. The acreages provided here include the shared tracts in both totals; therefore, summing the totals from both components of the Project into a single value would result in a double counting of the shared acreages.

Interior Forest

The term "edge effect" is commonly used in conjunction with the boundary between natural habitats, such as interior forest, and disturbed or developed land, such as pipeline corridors. Where land adjacent to a forest has been cleared, creating an open/forest boundary, sunlight and wind penetrate to a greater extent, which may result in tree destabilization from increased wind shear, drying out of the interior of the forest close to the edge, and changing air temperature, soil moisture, and light intensity; all of which can in turn encourage growth of opportunistic species that may displace, prey on, or parasitize species more acclimated to non-edge habitat (Murcia, 1995). Fragmentation of forested areas results in the loss of high-habitat-value interior forest and the plant and animal species associated with that habitat.

Columbia would collocate the R-801 pipeline with existing utility corridors for about 51 percent of the Project route in part to reduce forest fragmentation to the extent practicable. Construction would result in the direct loss (through clearing) of 90.9 acres of interior forest habitat distributed across 93 blocks of interior forest totaling 22,229.5 acres.[16] Operations would result in the permanent loss of 31.9 acres of interior forest through maintenance of the permanent right-of-way. The Project would result in the loss of eight interior forest blocks through clearing or conversion to edge forest, but these areas would total only 6.4 acres. The clearing, and corresponding creation of edge habitat extending 300 feet to each side of the permanent right-of-way, would convert 544.6 acres of prior interior forest habitat into edge habitat (see table B.3-3).

TABLE B.3-3
Estimated Effects of the Buckeye XPress Project on Interior Forest and Edge Habitat in the Vicinity of the R-801 Pipeline a/, b/, c/

Existing interior forest habitat acreage contiguous with the Project right-of-way	22,230
Interior forest habitat acreage cleared during construction **b/**	91
Former interior forest habitat acreage that would remain permanently cleared during operation	32
Edge habitat acreage created from former interior forest habitat **c/**	545
Remaining interior forest habitat acreage contiguous with the Project right-of-way	21,653

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/ Acreage cleared during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Consists of the conversion of interior forest to edge habitat through clearing of interior forest as well as clearing of edge habitat, thus causing the edge to encroach into interior forest.

[16] The interior forest blocks included in this calculation are those that are contiguous with the proposed R-801 right-of-way and would be impacted by construction; interior forest blocks that are adjacent to the right-of-way but would not be impacted by construction are not included.

Mitigation for Impacts on Vegetation Resources

To minimize direct and indirect impacts on vegetation communities from construction and operation of the Project, Columbia would follow the requirements of its ECS, including:

- minimizing vegetation clearing through collocation with existing rights-of-way to the extent practicable;
- using existing roads for access to the Project when possible;
- installing temporary erosion control measures, such as slope breakers, sediment barriers, and mulch;
- returning cleared areas to their pre-construction contours and replacing conserved topsoil (where applicable) during final grading;
- restoring the cleared areas (seeding,[17] fertilizing, mulching) within 6 days of final grading (weather and soil conditions permitting);
- conducting follow-up inspections and filing reports to the FERC to document the status of revegetation until deemed successful; and
- limiting maintenance of vegetation along the permanent right-of-way to no more than once every 3 years (with the exception of the 10-foot-wide corridor centered over the pipeline that is required to remain in an herbaceous state to allow periodic corrosion and leak surveys).

Columbia would plant seed mixes that are compliant with USDA NRCS guidance (NRCS, 2018a), or as indicated by the WNF, for post-construction regrowth of vegetation intended to minimize erosion and impede the spread of invasive species. Revegetation would be considered successful when native vegetation cover and diversity within the disturbed areas were similar to adjacent, undisturbed lands.

Columbia would minimize the risk of construction activities causing wildfires by abiding by guidelines in its ECS and implementing construction BMPs such as the following:

- requiring all engines in construction areas to be outfitted with spark arrestors;
- only parking vehicles and equipment in areas cleared of vegetation;

[17] The seed mixes used by Columbia as described in its ECS would be compliant with USDA NRCS guidance (NRCS, 2018a) for post-construction regrowth of vegetation intended to minimize erosion and impede the spread of invasive species.

- prohibiting smoking in construction areas (except for within the cab of an enclosed vehicle); and
- requiring construction personnel to maintain fire suppression materials at all construction areas.

Columbia also stated that it does not plan to burn brush, but that if burning were to be conducted, then the construction contractor must develop and follow a fire prevention plan and obtain all applicable permits.

Wayne National Forest

General vegetation community impacts in the WNF as a result of the Project would be similar to those listed for the rest of the Project. Columbia would collocate the R-801 pipeline with existing utility corridors for about 54 percent of the Project route within the WNF in part to minimize impacts on vegetation communities of special concern and reduce forest fragmentation to the extent practicable (see appendix A-4b).

The vegetation communities of special concern that would be crossed by the Project are entirely within the WNF. The Project would cross 12.6 miles of NFS lands of the WNF across four MAs. The installation of the R-801 pipeline would require crossing 6.1 miles of the Forest and Shrubland Mosaic MA, 4.5 miles of the Historic Forest MA, 1.1 miles of the Bluegrass Ridge Special Area, and 1.0 mile of the Future Old Forest MA[18] (see table B.3-1). Portions of MAs crossed by the abandonment of the R-500 and R-501 pipelines would occur at work sites within the existing maintained pipeline rights-of-way. The WNF requested that Columbia adopt a route alternative that would reduce the impacts of the Project on rare plant species and communities, such as oak barrens, within the Bluegrass Ridge Special Area (see Route Alternative 8 in section C). There are potential engineering constraints associated with this alternative. In section C, we recommend that Columbia should develop impact avoidance, minimization, or mitigation measures for the Bluegrass Ridge Special Area in coordination with the USFS.

Construction of the Project would result in the direct loss (through clearing) of 29.6 acres of interior forest habitat distributed across 21 blocks of interior forest habitat totaling 9,887.8 acres[19] within the WNF.[20] Operation of the Project would result in the permanent loss through maintenance of the permanent right-of-way of 10.5 acres of interior forest

[18] Due to rounding, the sum of the mileages of each MA that would be crossed (12.7 miles) do not equal the total provided for the WNF as a whole (12.6 miles).

[19] As noted above, the interior forest blocks included in this calculation are those that are contiguous with the proposed Project right-of-way and would be impacted by construction; interior forest blocks that are adjacent to the right-of-way but would not be impacted by construction are not included.

[20] The 29.6 acres of interior forest noted here is included in the 92.5 acres of interior forest noted in the Interior Forest section above. Likewise, the 187.6 acres of resulting edge habitat are also included in the 544.6 acres noted in the Interior Forest section above.

distributed across 6 of the 21 blocks of existing interior forest habitat. None of the interior forest blocks would be completely cleared. The clearing, and corresponding creation of edge habitat 300 feet to each side of the permanent right-of-way, would convert 187.6 acres of prior interior forest habitat into edge habitat within the WNF (see table B.3-4).

TABLE B.3-4
Estimated Effects of the Buckeye XPress Project on Interior Forest and Edge Habitat in the Vicinity of the R-801 Pipeline in the Wayne National Forest a/, b/, c/

Existing interior forest habitat acreage contiguous with the Project right-of-way	9,888
Interior forest habitat acreage temporarily cleared during construction **b/**	30
Former interior forest habitat acreage that would remain permanently cleared during operation	11
Edge habitat acreage created from former interior forest habitat **c/**	188
Remaining interior forest habitat acreage contiguous with the Project right-of-way	9,689

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/ Acreage cleared during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Consists of the conversion of interior forest to edge habitat through clearing of interior forest as well as clearing of edge habitat, thus causing the edge to encroach into interior forest.

The WNF provided Columbia an approved seed mix and list of herbicides to use for restoration of cleared construction areas and potential treatment of noxious weeds or invasive species within the WNF (USFS, 2017a). The WNF would require Columbia to adhere to USFS Non-Native Invasive Species standard measures to reduce introduction and spread of non-native invasive species. Columbia and the WNF are cooperating to develop a Non-Native Invasive Species (NNIS) Treatment Plan as a component of the final COM Plan. Treatment of NNIS on the WNF within the Project area would be accomplished according to the priorities and criteria outlined in that Treatment Plan, using the methods and herbicides approved by the WNF in the 2007 Non-Native Invasive Plant Control Project Decision Notice (USDA FS, 2007). Treatment of NNIS on the WNF is not a new Project activity for the BXP, as the effects of the activity have already been analyzed and disclosed in the 2007 project EA and Decision Notice, but would rather represent prioritized locations to treat NNIS under the existing Decision Notice.

Columbia has committed to working with the WNF to ascertain the most effective approach to restoring and seeding the construction right-of-way through the WNF. The USFS and Columbia are continuing to coordinate regarding proposed construction activities and potential mitigation measures for vegetation communities; these measures will be specified in the final COM Plan. Columbia would be required to adopt USFS-mandated mitigation measures on NFS lands. These measures would likely be more restrictive/protective than those described for the rest of the Project.

Noxious and Invasive Weeds

The USDA defines noxious weeds as those plants that are injurious to commercial crops, livestock, or natural habitats and typically grow aggressively in the absence of natural controls (USDA, 2013a). Most commonly, they are non-native species that have been introduced from another part of the United States or another continent and may out-compete native species and take over micro-habitats, especially in disturbed areas where native vegetation may have been removed or altered. However, some weeds are native species that exhibit rapid growth and spread, and are also considered invasive. Noxious and invasive plant species can change or degrade natural vegetation communities.

Executive Order (EO) 13112 directs federal agencies to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological, and human health impacts that invasive species can cause. The EO further specifies that federal agencies should not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States, unless it has been determined that the benefits of such actions outweigh the potential harm caused by invasive species, and that all feasible and prudent measures to minimize the risk of harm would be taken in conjunction with the actions.

Thirteen of 21 plants listed as "prohibited noxious weeds" in the Ohio Administrative Code[21] have been documented in at least one of the counties through which the Project would pass (NRCS, 2018b), and 11 of those 13 were observed during field surveys conducted by Columbia. An additional 11 common invasive plant species were also observed during field surveys conducted along the proposed construction right-of-way (see appendix B.3-1).

Removal of existing vegetation and disturbance of soils during construction of the Project could produce conditions conducive to the establishment of invasive weeds, particularly where new corridors are created. Bare soil and newly opened corridors could be susceptible to being colonized by noxious or invasive weeds which, by definition, grow aggressively and spread rapidly. Additionally, construction equipment could inadvertently transport noxious or invasive weeds to areas where species were not previously present or established.

Columbia would follow guidance contained in its *Invasive Species Management Plan* to minimize the spread of noxious weeds and invasive species. Columbia would implement pre- and post-construction measures such as the following:

- treating large patches of existing noxious weeds or invasive species using federal and state agency-approved herbicides prior to land clearing (except for within 100 feet of a waterbody or wetland);

[21] Chapter 901:5-37-01.

- requiring construction vehicles to be cleaned prior to entering and exiting the Project area and following Columbia's ECS to minimize noxious weed or invasive species seed transport across construction spreads and into waterbodies and wetlands;
- minimizing the duration in which bare soil is exposed after land clearing by seeding cleared areas with fast-growing vegetation, such as annual or winter rye, that would stabilize the soil and allow native species to become established;
- using certified weed-free erosion control devices and mulches; and
- conducting post-construction monitoring of revegetation, and documenting occurrences of invasive species in the right-of-way and affected wetlands.

If Columbia were to detect individuals or patches of noxious weeds or invasive species during post-construction monitoring in numbers substantially higher than existing populations off of the right-way (i.e., in areas not disturbed during construction), Columbia would spot-treat the individuals or patches using agency-approved herbicides.

Conclusions Regarding Impacts on Vegetation

Columbia would collocate the R-801 pipeline with existing utility corridors for about 51 percent of the Project route that passes through vegetation communities of special concern and would affect approximately 3 percent of the interior forest habitat contiguous with the Project right-of-way. Based on the types and amounts of vegetation affected by the Project and Columbia's proposed avoidance, minimization, and mitigation measures to limit Project impacts, we conclude that impacts on vegetation from the Project would not be significant.

3.2 Aquatic Resources

All waterbodies that would be crossed by the Project are freshwater and classified by the State of Ohio as warmwater (see appendix B.2-2). Warmwater rivers and streams are generally defined as those capable of supporting a high diversity of fish assemblages, including suckers, sunfishes, and catfishes, that are able to tolerate warm summer water temperatures greater than 68 degrees Fahrenheit (°F) (Winger, 1981).

Recreational fishing occurs in the perennial streams that the Project would cross. Game fish in the Project area include: rock bass, largemouth bass, smallmouth bass, spotted bass, channel catfish, bullhead catfish, and various sunfish and crappie (Greenlee, 2017). However, no waterbodies supporting commercial fisheries would be crossed by the Project (Greenlee, 2017). Additionally, the Project would not cross any waterbodies designated as essential fish habitat (NOAA Fisheries, 2018).

Fisheries of Special Concern

Fisheries of special concern comprise federally or state-listed endangered, threatened, or candidate fish or aquatic species, coldwater fisheries (e.g., salmonids), and fisheries with significant economic value resulting from the presence of fish stocking programs or commercial harvesting. As noted above, the Project would not cross any coldwater streams or waterbodies supporting commercial fisheries. Nor would the Project cross any streams that are a part of fish stocking programs.[22] Potential impacts on threatened and endangered species and Ohio freshwater mussels are discussed in section B.4.

Impacts and Mitigation

Activities associated with installation of the R-801 pipeline and abandonment of the R-500 and R-501 pipelines would require a total of 335 unique waterbody crossings (see section B.2.2). Columbia would cross most waterbodies using wet, open-cut methods, but would cross selected waterbodies using dry methods, such as dam-and-pump or flume, as well as the trenchless HDD and bore methods. Generally, to minimize effects on fisheries and aquatic resources, Columbia would implement the following measures from its ECS:

- install and maintain erosion control devices;
- prevent and respond to equipment fluid spills (in accordance with its SPRP);
- restore streambeds and banks to pre-construction conditions; and
- regulate water discharges to prevent streambed scour.

Construction-related impacts associated with the use of wet, open-cut crossings would be limited primarily to increased turbidity during the crossing and resultant sedimentation. Increases in turbidity could affect aquatic organisms, but impacts would be temporary and limited to the duration of construction activities. Sedimentation would occur when the sediments suspended during Project construction resettle. Sedimentation can cause smothering of aquatic biota and habitat degradation. Mobile organisms would avoid the area during construction and would therefore not be impacted by construction activities. Less-mobile and sessile organisms would not be able to avoid the construction area and could be adversely impacted by changes in water quality.

Columbia stated that it would not be able to adhere to the timing window of April 15 through June 30 recommended by the ODNR, Division of Wildlife (DOW) and

[22] The BXP Replacement would cross tributaries to Lake Rupert between MPs 0.0 and 4.2 and Lake Vesuvius between MPs 49.0 and 51.5. Lake Rupert is stocked with saugeye (*Sander vitreus* x *Canadensis*) and channel catfish, and Lake Vesuvius is stocked with rainbow trout (*Oncorhyunchus mykiss*) and channel catfish (Greenlee, 2017).

therefore requested a waiver from the ODNR to allow Columbia to conduct in-water work during this timeframe. On February 13, 2019, the ODNR granted Columbia a partial waiver for in-water work to complete waterbody crossings of perennial waterbodies during the April 15 through June 30 in-water work-restriction period. The ODNR would require Columbia to use dry-ditch methods (e.g., dam-and-pump) when crossing perennial waterbodies during this period. Columbia has agreed to adhere to this requirement.

In order to reduce the potential effects of waterbody crossings on fishes and other aquatic species, Columbia would use dry-ditch crossing methods to cross all waterbodies containing fisheries of special concern and has agreed to implement impact minimization measures such as maintaining appropriate downstream flow rates for dry-ditch crossings and using intake hoses with appropriately sized mesh to minimize entrainment of fishes or other aquatic species when pumping water around the construction trench. Additionally, Columbia would hire qualified personnel to remove any fish stranded in the dewatered section of the crossing and relocate them downstream of the construction area. Nonetheless, while the dam-and-pump and flume crossing methods would reduce turbidity and downstream sedimentation during construction, minor aquatic habitat alterations could still occur. Temporary impediments, changes to behavior, loss of habitat, and/or the alteration of water quality could increase stress rates, injury, and/or mortality experienced by fishes and other aquatic organisms during construction of the Project.

To minimize the effects of construction on waterbodies and fisheries resulting from vegetation removal along the right-of-way, Columbia would attempt to maintain at least a 15-foot-wide riparian strip between waterbodies and the construction right-of-way if the pipeline were to parallel a waterbody. Columbia would also limit vegetation maintenance immediately adjacent to waterbodies to a 10-foot-wide strip centered over the pipeline with selective tree clearing.

In-stream blasting would be limited to the extent practicable; however, shallow bedrock may require blasting at waterbody crossings if Columbia were to determine that other trenching methods would be unsuccessful. If in-stream blasting was required, Columbia would follow its ECS and *Blasting Plan* and obtain stream-specific written permission from the ODNR-DOW.[23] Rock removal and installation activities would adhere to construction timing windows. Columbia stated that it would temporarily restore waterbody banks if more than 10 days would elapse between blasting and the start of the crossing. Fish and aquatic organisms close to the blast could be injured or killed and substrate could be altered. However, preparation of the trench and test drilling would likely displace most aquatic organisms from the immediate vicinity of the blast. Columbia would use blasting mats (in dry cuts) and controlled blasting techniques to minimize the spread of rock debris. Columbia would remove rock debris greater than 4 inches in diameter from

[23] Per Ohio Revised Code Title 15, Section 1533.58.

waterbodies, re-establish the original stream bed and bank contours, and install permanent erosion and sediment control devices.

Water withdrawals from the Ohio River for hydrostatic testing could affect fisheries by entraining small fish and larvae during withdrawal. A 0.1-inch mesh size screen would be attached to the hydrostatic testing intake hose prior to water withdrawals from surface waterbodies to prevent entrainment of fish, larvae, and other similar-sized aquatic wildlife. Columbia would maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users. Columbia would not add biocides or other chemicals to the water and would discharge the used water back into the Ohio River through a dewatering structure upon completion of the tests in compliance with the OEPA's National Pollutant Discharge Elimination System General Permit for Hydrostatic Test Water Discharge. See section B.2 for further information on hydrostatic testing. To limit the potential impacts of surface water contamination from spills during construction of the Project, Columbia would implement the measures described in its ECS and SPRP during construction (see section B.2).

Wayne National Forest

Activities associated with the Project would require 53 waterbody crossings on WNF lands. These include 4 culvert crossings for access roads, 11 dam-and-pump or flume crossings, and 38 wet, open-cut crossings. All perennial waterbodies within the WNF would be crossed via dam-and-pump or flume methods for both the Replacement and Abandonment Components. The effects on fisheries and aquatic resources would be the same as for those described for the rest of the Project in the prior sections. No fisheries of special concern would be crossed on WNF lands. The USFS and Columbia are continuing to coordinate regarding proposed construction activities, such as wet, open-cut waterbody crossings, and potential mitigation measures as will be specified in the final COM Plan. Columbia would be required to adopt USFS-mandated mitigation measures on NFS lands.

Conclusions Regarding Impacts on Aquatic Resources

Impacts on aquatic resources from construction and operation of the Project would be temporary, and Columbia would limit impacts on aquatic resources where practicable by implementing its ECS. The FERC Procedures at section V.B.1 require Columbia to adhere to state-mandated aquatic construction windows, unless a written waiver is granted. The ODNR has provided such a waiver, with restrictions, that Columbia has agreed to abide by. With implementation of Columbia's ECS and the FERC Procedures, we conclude that impacts on aquatic resources from the Project would not be significant.

3.3 Wildlife Resources

Wildlife habitat types are based on the vegetation types in the Project area and include forested upland, open upland, forested wetland, and open wetland. Vegetation

types are described in detail in sections B.2.3 and B.3.1. Forested upland habitat primarily comprises secondary growth hardwood forest dominated by oak and hickory species which provide food, cover, and nesting habitat for a variety of wildlife species, including mammals such as white-tailed deer, eastern gray squirrel, flying squirrel, eastern chipmunk; birds such as wild turkey, sharp-shinned hawk, red-shouldered hawk, black-capped chickadee, downy woodpecker, and eastern screech owl; and amphibians such as five-lined skink.

Open or early successional uplands consist of scrub-shrub areas, open fields, agricultural land, developed areas, and previously disturbed areas such as maintained rights-of-way. Early successional habitat is primarily comprised of grasses, herbs, and shrubs and, depending on vegetation development, provides food, cover, and nesting habitat for a variety of wildlife species. Species common to early successional uplands include mammals such as eastern cottontail, white-tailed deer, red fox, eastern mole, raccoon, least shrew, and woodchuck; birds such as American crow, house finch, American goldfinch, American kestrel, field sparrow, and barn swallow; amphibians and reptiles such as American toad, eastern fence lizard, and garter snake; and invertebrate pollinator species, including various species of butterflies and bees.

Four different types of wetland habitat occur in the Project area: PEM, PSS, PFO, and PUB (see section B.2.3). PEM wetlands provide habitat for mammals such as beaver, raccoon, common muskrat, and white-tailed deer; reptiles and amphibians such as bullfrog, snapping turtle, and painted turtle; and birds such as herons, wrens, red-winged blackbird, and ducks. PSS wetlands support a variety of birds such as swamp sparrow, gray catbird, and yellow warbler; and reptile and amphibian species such as common watersnake, red-spotted newt, and pickerel frog. PFO wetlands provide food, cover, and nesting habitat for mammals such as raccoon, beaver, and white-tailed deer; reptiles and amphibians such as eastern ribbonsnake, eastern ratsnake, and wood frog; and birds such as great blue heron and wood duck. PUB wetlands provide habitat for mammals such as raccoon, common muskrat, and white-tailed deer; reptiles and amphibians such as bullfrog and snapping turtle; and birds such as herons, wrens, and ducks (ODNR, 2018e).

Sensitive and Managed Wildlife Areas

Sensitive or managed wildlife habitats such as national forests and wildlife refuges, state forests and parks, wildlife management areas, and reserve program lands are generally established to protect lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses. Installation of the R-801 pipeline would cross the Wellston Wildlife Area between MPs 2.7 and 2.9 and the WNF between MPs 31.3 and 50.5. Abandonment of the R-500 and R-501 pipelines would require Project activities on the Wellston Wildlife Area between MPs A2.5 and A2.6, the Stull Wetland between A19.2 and A19.4, and the WNF between MPs A29.9 and A46.0.

Wellston Wildlife Area

The Wellston Wildlife Area is in Vinton County, Ohio in the Clinton and Richland townships. Owned by the ODNR, it spans 1,414 acres and comprises the 325-acre Lake Rupert and its surrounding uplands. Its purposes are to provide a water supply for the city of Wellston and for general public recreation. Wooded upland vegetation covers about 45 percent of the wildlife area; scrub-shrub covers about 25 percent; and open grassland comprises the remaining 30 percent of the upland area. Wildlife within the area includes game species such as white-tailed deer, ruffed grouse, eastern cottontail rabbit, fox squirrels and gray squirrels, and woodchuck. Other species present include resident wood ducks and migrant waterfowl and woodcocks, beaver and other furbearers common to Ohio, and various other small mammals, songbirds, reptiles, and amphibians common to the different habitat types present in the area (ODNR, 2018f). The Project would impact 7.3 acres of open upland, forested upland, wetland, and open water within the Wellston Wildlife Area.

Stull Wetland

Stull Wetland is identified by the ODNR as a high-quality natural area and conservation site under private ownership. It is not currently under any formal protection from the ODNR or otherwise (ODNR, 2017f). Stull Wetland spans 227 acres comprised of submerged and mixed-emergent wetlands, forested upland, and pasture. The Project would cross about 2,690 feet of Stull Wetland between MPs 20.6 to 21.2 for the BXP Replacement and about 1,202 feet near MP A19.2 for the BXP Abandonment. The lake chubsucker, a fish listed as threatened in Ohio, has been documented in an unnamed tributary to Symmes Creek, which flows through Stull Wetland. Replacement construction activities would temporarily affect 7.1 acres of upland and 1.0 acre of emergent wetland habitat. The permanent right-of-way for the BXP Replacement would affect 2.7 acres of upland and 0.4 acre of emergent wetland. Abandonment activities for the Project would require work to be conducted in the unnamed tributary to Symmes Creek 0.7 mile upstream of where the lake chubsucker was documented.

Wayne National Forest

By definition, the entirety of the WNF can be characterized as a sensitive or managed wildlife habitat. The sections of the WNF that Columbia would cross comprise four MAs: Bluegrass Ridge Special Area (17.3 acres), Forest and Shrubland Mosaic, Future Old Forest, and Historic Forest. This portion of the WNF is also identified as an Important Bird Area (IBA). The Project would affect approximately 17.3 acres of the Bluegrass Ridge Special Area, 105.5 acres of the Forest and Shrubland Mosaic MA, 40.1 acres of the Future Old Forest MA, and 127.9 acres of the Historic Forest MA. The vegetation/habitat types that comprise each of the MAs are described in section B.3.1.

Generally, the wildlife species that may be found in the portions of the WNF crossed by the Project are those typical of the upland forest habitat type. More specifically, animal species associated with interior forest and habitat stability (i.e., low rates of natural or human-related disturbances) may be found in the Future Old Forest MA. Such species include the cerulean warbler, Louisiana waterthrush, worm-eating warbler, wood thrush, and black bear. Species that are dependent on large oak and hickory trees, relatively open understory, and near-continuous canopy are present in the Historic Forest MA. The open nature of the forest provides suitable foraging habitat for the Indiana bat and the hard mast produced by the oak and hickories benefits many mammals and birds. Species that thrive in mixed habitats of early successional and herbaceous vegetation interspersed throughout late-successional forested landscape may be found in the Forest and Shrubland Mosaic MA. For example, species that require different types of habitat at different stages of their breeding cycle would include the ovenbird and worm-eating warbler (OSU, 2018). Other species present may also include the ruffed grouse and yellow-breasted chat (USDA, 2006a).

Impacts and Mitigation

Construction and operation of the Project would result in various short-term, long-term, and permanent impacts on wildlife. Impacts would vary depending on the specific habitat requirements of the species in the area and the vegetated land cover crossed by the proposed pipeline right-of-way. Potential short-term impacts on wildlife include the displacement of individuals from construction areas and adjacent habitats and the direct mortality of small, less-mobile mammals, reptiles, and amphibians that are unable to leave the construction area. Long-term impacts would include clearing of forested or early successional habitats within the temporary right-of-way. Permanent impacts would include the conversion of forested habitats to herbaceous/scrub-shrub habitats and forest fragmentation from operation of the permanent right-of-way and installation of aboveground facilities. Altered habitat and periodic disturbance from operational maintenance could also increase wildlife mortality, injury, and stress.

If blasting was required, wildlife close to the blast could be injured or killed; however, the preparation of rock for blasting, such as drilling shot holes and the movement of machinery and people, would likely cause displacement of most wildlife from the immediate vicinity prior to the blast.

Columbia would collocate the R-801 pipeline with existing utility rights-of-way for about 51 percent of the route to reduce effects on wildlife habitat. In total, construction would affect 740.7 acres of forested upland habitat, 773.0 acres of open upland habitat,[24] and 14.1 acres of wetland habitat. During operation, Columbia would maintain 266.7 acres of forested upland habitat, 214.9 acres of open upland habitat, and 5.0 acres of wetland

[24] As noted in section B.3.1, open upland habitat comprises open land, developed, and agricultural habitats.

habitat within the permanent right-of-way in an early successional stage or as access roads or aboveground facilities (see table B.3-2).

Fragmentation of forested areas results in changes in vegetation (e.g., invasion of shrubs along the edge), which may reduce connectivity and curtail movement of species between adjacent forest blocks, increase predation, and nest parasitism, and decrease reproductive success for some species (Rosenberg et al., 1999). Thus, a potential permanent impact on wildlife would be associated with the clearing of forest vegetation for the operational lifetime of the pipeline. Where practicable, Columbia has collocated the proposed pipeline with existing utility rights-of-way which would minimize additional fragmentation. Forest fragmentation and the 'edge effect' are described in section B.3.1.

Construction of the aboveground facilities would have minimal effects on forested or wetland wildlife habitat as the facilities would primarily be constructed on developed lands. However, 0.5 acre of forested upland habitat and 0.4 acre of emergent wetland habitat would be permanently converted to industrial land during operation of the aboveground facilities at the Kokeen RS in an area already encumbered by the existing Columbia R-501, R-601, and R-701 pipelines.

Columbia proposes to use 58 existing or partially existing access roads and 23 newly constructed access roads during construction of the pipeline facilities. Thirty-six permanent access roads, six of which would be newly constructed, would be used for aboveground facility operation. The access roads would permanently affect 6.8 acres of forested upland habitat and 0.1 acre of wetland habitat through installation of the R-801 pipeline and 5.0 acres of forested upland habitat and less than 0.1 acre of wetland habitat through abandonment of the R-500 and R-501 pipelines.[25]

Columbia has proposed a pipeline route that would minimize impacts on wildlife habitat and sensitive or managed areas where practicable and would implement impact minimization measures as described in its ECS and BMPs to avoid or minimize injury or death of wildlife resulting from construction activities. These measures would include the following:

- minimizing the amount of extra workspace needed where practicable;
- placing breaks in windrowed materials (e.g., cleared vegetation, excavated spoils, rocks, or snow) at a minimum of every 200 feet to facilitate wildlife movement across the construction right-of-way;

[25] As noted above, acreages reported for installation of the R-801 pipeline and abandonment of the R-500 and R-501 pipelines may include tracts of land used for both components of the Project. The acreages provided here include the shared tracts in both totals; therefore, summing the totals from both components of the Project into a single value would result in a double counting of the shared acreages.

- stabilizing and revegetating affected lands with seed mixtures planted within 6 days of final grading;
- not conducting vegetation maintenance over the full width of the permanent right-of-way in wetlands and maintaining a riparian strip adjacent to waterbodies;
- restricting maintenance mowing of the permanent right-of-way to August 2 through April 14 to avoid impacts on nesting birds in accordance with Columbia's ECS;
- providing environmental awareness training to all personnel working on the Project;
- implementing a no-harm policy for all wildlife encountered during construction;
- abiding by posted speed limits in the Project area at all times;
- disposing of trash and food debris in secured containers;
- installing escape ramps at 0.25-mile intervals in trench sections that remain open overnight;
- checking trenches, excavations, and uncapped pipe segments for wildlife prior to initiating construction activities;
- checking for wildlife under construction equipment and vehicles that have been stationary for over 1 hour and each morning prior to moving or operating;
- allowing wildlife that has entered the work area to exit the work area of their own accord; and
- prohibiting firearms or pets at all Project work sites.

Sensitive and Managed Wildlife Areas

Wellston Wildlife Area

Construction activities for installation of the R-801 pipeline would cross 0.4 mile of the Wellston Wildlife Area, and activities associated with abandonment of the R-501 pipeline would cross 0.1 mile of the wildlife area. No Project activities would be conducted in Lake Rupert. Columbia would collocate the 0.26-mile extent of the R-801 pipeline that crosses the wildlife area with the existing right-of-way for the R-701 pipeline, thereby decreasing forest fragmentation. Columbia would restrict all activities associated with abandonment of the R-501 pipeline to the existing right-of-way for the R-701 pipeline. Potential impacts on wildlife within the Wellston Wildlife Area would be consistent with those described above for general wildlife resources, and Columbia would implement the

same measures and BMPs to avoid or minimize impacts on wildlife. Neither the ODNR nor the Wellstone Wildlife Area Supervisor proposed restrictions or requirements for Columbia to conduct construction activities within the wildlife area.

Stull Wetland

Project activities for construction of the R-801 pipeline would cross 0.5 mile of primarily upland and emergent wetland habitat within the Stull Wetland complex. Impacts would be in the form of temporary ground disturbance of 7.1 acres of upland habitat and 1.0 acre of emergent wetland habitat. The permanent right-of-way for the R-801 pipeline would affect 0.4 acre of emergent wetland.

Project activities associated with the abandonment of the R-501 pipeline would cross 0.2 mile of pasture land within the property bounds of Stull Wetland. The abandonment activities would primarily occur within the existing right-of-way for the R-501 pipeline. Of a total of 1.4 acres needed for the abandonment activities, 1.2 acres would take place outside of the existing right-of-way. The work area outside of the existing right-of-way would be associated with removing a consumer tap, abandonment activities under an existing road, and an ATWS required for ingress and egress to and from the construction area. The crossing of the unnamed tributary to Symmes Creek, which is documented to contain the state threatened lake chubsucker, would not occur within Stull Wetland. Potential impacts on the lake chubsucker are addressed in section B.4.1. Potential impacts on other wildlife within Stull Wetland would be consistent with those described above for general wildlife resources, and Columbia would implement the same measures and BMPs to avoid or minimize impacts on wildlife.

Wayne National Forest

Although installation of the R-801 pipeline would require the Project to cross the WNF between MPs 31.3 and 50.5, not all of the lands between these two mileposts are owned by the WNF. Installation of the R-801 pipeline would cross 12.6 miles of the WNF. Likewise, abandonment activities would cross 2.6 miles of the WNF between MPs A29.9 and A46.0. The Project would affect approximately 245.8 acres of open upland, forested upland, and wetlands and open water. Columbia would collocate the R-801 pipeline right-of-way with existing Columbia pipeline rights-of-way for 6.8 miles in the WNF. Potential impacts on other wildlife within the WNF would be consistent with those described above for general wildlife resources, and Columbia would implement the same measures and BMPs (including the tree clearing restrictions associated with protection of Indiana and northern long-eared bats detailed in section B.4 and described below) to avoid or minimize impacts on wildlife.

Coordination between the WNF and Columbia is ongoing regarding possible additional restrictions or requirements for Columbia regarding construction activities within the WNF and mitigation measures for sensitive species; these measures will be

included in the final COM Plan. Columbia would be required to adopt USFS-mandated mitigation measures on NFS lands.

Migratory Birds

Migratory birds are protected under the *Migratory Bird Treaty Act of 1918* (16 U.S.C. 703-711). The Act, as amended, prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, or nests unless authorized under a FWS permit. Bald and golden eagles are protected under the *Bald and Golden Eagle Protection Act of 1940* (16 U.S.C. 668-668d). Executive Order 13186 directs executive departments and agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the FWS. 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.

On March 30, 2011, the FWS and the FERC entered into a Memorandum of Understanding that focuses on avoiding and minimizing adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration. This voluntary agreement does not waive legal requirements under the ESA, NGA, *Migratory Bird Treaty Act*, *Bald and Golden Eagle Protection Act,* the *Federal Power Act of 1920*, or any other statutes and does not authorize the take of migratory birds.

The FWS (2008) created the Birds of Conservation Concern (BCC) list with the goal of preventing or removing the need for additional ESA bird listings by implementing proactive management and conservation actions and coordinating consultations in accordance with EO 13186.

A variety of migratory birds and BCC use or could use the habitats affected by the Project. These birds use these habitats for resting (stopover), sheltering, foraging, breeding, and/or nesting. The Project would be in Bird Conservation Region 28 (Appalachian Mountains). As outlined in table B.3-5, suitable habitat exists for 14 BCC species within the Project area. The Project would overlap with the breeding ranges of ten of these species (FWS-IPaC, 2017).

TABLE B.3-5
Birds of Conservation Concern with Potential to Occur in the Buckeye XPress Project Area

Species a/	Breeding Season	Season(s) of Occurrence b/	Habitat Description
Black-billed cuckoo (*Coccyzus erythropthalmus*)	5/15-10/10	Breeding, Migration	Woodlands, especially young forests and thickets
Bobolink (*Dolichonix oryzivorus*)	5/20-7/31	Breeding, Migration	Hayfields, pastures, wet prairies, and the grassy margins of marshes

TABLE B.3-5
Birds of Conservation Concern with Potential to Occur in the Buckeye XPress Project Area

Species a/	Breeding Season	Season(s) of Occurrence b/	Habitat Description
Canada warbler (*Wilsonia canadensis*)	5/20-8/10	Migration	Forested wetlands
Cerulean warbler (*Dendroica cerulea*)	4/20-7/20	Breeding	Mature deciduous forest, especially oak-hickory forests; avoid small patches of forest (e.g., less than 25 acres)
Eastern whip-poor-will (*Caprimulgus vociferous*)	5/1-8/20	Breeding, Migration	Open, deciduous woods interspersed with open fields and brushy areas
Golden-winged warbler (*Vermivora chrysoptera*)	5/1-8/31	Breeding	Brushy habitats in early succession, overgrown pastures, and woodland borders
Henslow's sparrow (*Ammodramus henslowii*)	5/1-8/31	Breeding, Migration	Large contiguous blocks of grassland habitat
Kentucky warbler (*Oporornis formosus*)	4/20-8/20	Breeding	Moist woodlands, including wooded ravines and swamp borders with thick undergrowth
Long-eared owl (*Asio otus*)	Breeds elsewhere	Winter	Nests and roosts in dense woodlands and forages in open habitats
Prairie warbler (*Dendroica discolor*)	5/1-7/31	Breeding, Migration	Scrubby fields, locust groves in reclaimed strip mines, old clear-cuts, and juniper groves
Red-headed woodpecker (*Melanerpes erythrocephalus*)	5/10-9/10	Breeding, Migration, Winter	Open wooded areas with oaks and hickories
Rusty blackbird (*Euphagus carolinus*)	Breeds elsewhere	Migration, Winter	Forested or scrub-shrub wetlands
Wood thrush (*Hylocichla mustelina*)	5/10-8/31	Breeding, Migration	Deciduous woodlands, especially in wet woods
Yellow-bellied sapsucker (*Sphyrapicus varius*)	5/10-7/15	Migration, Winter	Wet deciduous forests or the margins of bogs where yellow birch, beech, and aspen are prevalent

Source: ODNR, 2018a

a/ Source: FWS-IPaC, 2017

b/ Seasons in which species has been documented to occur in the counties crossed by the Project.

Additionally, the Ironton District of the WNF, through which the Project would pass (MPs 31 to 51), is designated as an IBA. The IBA Program is an international initiative developed to identify, protect, and manage critical areas associated with vital bird habitat and associated biodiversity (Audubon, 2018a). The large forest blocks of the WNF-Ironton IBA provide important breeding habitat for many migratory birds such as the Acadian

flycatcher (*Empidonax virescens*), black vulture (*Coragyps atratus*), blue-winged warbler (*Vermivora cyanoptera*), cerulean warbler, Kentucky warbler, Louisiana waterthrush (*Parkesia motacilla*), wood thrush, worm-eating warbler (*Helmitheros vermivorum*), and yellow-breasted chat (*Icteria virens*). The wetlands present in the WNF also provide breeding habitat for heron and waterfowl and waterfowl species (Audubon, 2018b).

The Project would be within the range of the bald eagle (*Haliaeetus leucocephalus*) (FWS, 2018a). Information provided by the ODNR provides documentation from 2011 of a bald eagle nest 0.1 mile west of proposed MP 1.3 (ODNR, 2017f). Likewise, information from the FWS (2017b) notes a bald eagle nest within 0.5 mile of the proposed northernmost point of the Project. Golden eagles are rare in Ohio and are not known to breed in the eastern United States (ODNR, 2018a).

The primary concern for migratory birds is mortality of eggs and/or young, as mature birds could avoid active construction. Tree clearing and ground-disturbing activities could cause disturbance during critical breeding and nesting periods, potentially resulting in the loss of nests, eggs, or young. In addition, forest fragmentation could increase predation, competition, and reduce nesting and mating habitat for migratory birds (Faaborg et al., 1995).

As part of its adherence to the avoidance and minimization measures (AMMs) prescribed in its Multi-Species Habitat Conservation Plan (MSHCP) for protection of Indiana and northern long-eared bats (FWS, 2015; see section B.4), Columbia would refrain from tree felling in suitable summer bat habitat (e.g., forested patches; wooded linear features such as riparian forests, fencerows, and other wooded corridors; interspersed and adjacent emergent wetlands; and tree-lined edges of agricultural fields, old fields, and pastures) between June 1 and August 1 across all lands covered by the MSHCP (91 percent of the proposed route). Tree felling would be further prohibited between April 1 and October 15 at MPs 35 to 51, and from April 1 to May 31 and August 15 to November 14 between MPs 35 and 56.[26] Finally, Columbia would refrain from clearing suitable summer bat habitat between April 1 and October 15 across all lands not covered by the MSHCP (about 9 percent of the proposed route).

Following these restrictions would minimize disturbance in forested areas during about 60 percent of the migratory bird critical nesting period (April 15 through August 1) on lands covered by the MSHCP and avoid disturbance throughout the entire migratory bird critical nesting period on lands not covered by the MSHCP. Migratory birds that nest on the ground or in shrubs in non-forested areas, such as the golden-winged warbler, Henslow's sparrow, and prairie warbler, all of which are BCC, would not necessarily be

[26] MPs 35 through 51 contain known bat maternity colony summer habitat; MPs 35 through 56 are within 10 miles of an Indiana bat hibernaculum; Columbia would be required to refrain from tree felling / vegetation clearing in these areas during the noted date ranges as part of its adherence to the AMMs in its MSHCP (FWS, 2017b).

protected by these tree clearing restrictions. However, Columbia would attempt to conduct pre-construction vegetation clearing outside of the nesting seasons for such species where feasible. In areas where vegetation clearing would be conducted during the migratory bird nesting season due to Project schedule constraints, pre-construction activities along the right-of-way, such as equipment noise and materials staging, may discourage birds from nesting in the right-of-way and prevent them from being harmed during construction. To reduce impacts on ground nesting birds during the operational life of the Project, Columbia would not perform routine vegetation maintenance clearing during the general nesting season, between April 15 and August 1, in accordance with its ECS.

Columbia would follow the FWS (2018a) recommendation to evaluate the Project site and surrounding area to determine whether any eagle nests were present no more than 2 weeks prior to commencing construction activities. Columbia has committed to following guidance provided in the *National Bald Eagle Management Guidelines* (FWS, 2007a) if any active eagle nests were located near the Project construction areas. The guidelines include refraining from tree clearing within 660 feet of an active nest or within any woodlot containing a nest tree. Additionally, construction activities should not occur within 660 feet of an active nest or within direct line-of-site of an active nest between January 15 and July 31. No eagle nests were observed during Project field surveys, but nests have been documented in the past near the Project by ODNR and FWS as described above.

3.4 Conclusions Regarding Impacts on Wildlife Resources

Although individuals of some wildlife species could be affected by construction and operation of the Project, with potentially long-term to permanent direct and indirect effects in areas where interior forest would be removed, the overall Project direct effects would primarily be temporary and minor. Based on the extent of collocation with existing rights-of-way, the presence of similar habitats adjacent to and in the vicinity of construction activities, and Columbia's plan to implement AMMs and actively revegetate the construction right-of-way upon completion of construction, we conclude that construction and operation of the Project would not have population-level impacts or significantly measurable negative impacts on wildlife.

Based on the characteristics and habitat requirements of wildlife and migratory birds known to occur in the proposed Project area, the amount of similar habitat adjacent to and in the vicinity of the Project, and Columbia's adherence to FWS guidelines for bald eagles and implementation of its ECS, we conclude that construction and operation of the Project would not have significant impacts on migratory bird populations or the wildlife of the sensitive and managed wildlife areas.

4. Threatened, Endangered, and Other Special Status Species

Special status species are those species for which federal or state agencies afford an additional level of protection by law, regulation, or policy. Included in this category for this EA are federally listed species that are protected under the ESA, as amended, and those species that are state-listed as threatened, endangered, or other special status. The Commission is required by Section 7(a)(2) of the ESA to ensure that any action authorized, funded, or carried out by the agency would not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the destruction or adverse modification of the designated critical habitat for a federally listed species. As the lead federal agency, the FERC is responsible for the Section 7 consultation process with the FWS. Species proposed for state listing do not currently carry regulatory protection; however, because they may be listed in the future, they are discussed herein.

To comply with the requirements of the ESA, Columbia, as the FERC's non-federal representative, conducted informal coordination with the FWS and the ODNR to determine if any federally or state-listed threatened and endangered species (including federal and state species of concern) or their designated critical habitats occur within the Project area. Columbia conducted habitat assessment surveys, in coordination with the FWS and the ODNR, to identify potential habitats for threatened and endangered species within the Project area. Federally and state-listed species that may occur in the Project area, their preferred habitat, and our determination of effects are provided below. Potential impacts on threatened and endangered species and federal and state species of special concern at the existing Ceredo CS are not expected to occur, because Project activities at this site are limited to the previously disturbed and regularly maintained area within the compressor station fence line that does not contain suitable habitat for listed species.

4.1 Federally Listed Species

Coordination with the FWS and ODNR and subsequent habitat assessment surveys by Columbia indicated that the Project would be in the range of three federally listed species (ODNR, 2017f; FWS, 2018a). These include the Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and running buffalo clover (*Trifolium stoloniferum*). Additionally, although not noted in correspondence from the FWS or ODNR, the Project would also cross the range of four species of federally listed freshwater mussels: the fanshell (*Cyprogenia stegariathe*), sheepnose (*Plethobasus cyphyus*), pink mucket (*Lampsilis abrupta*), and snuffbox (*Epioblasma triquetra*). The Project would not cross any federally designated critical habitat (FWS, 2017a).

Columbia has developed a MSHCP in coordination with the FERC, FWS, NPS, and USFS pursuant to Section 10 of the ESA. The MSHCP and associated documents from the FWS (including consultation concurrence letters, a Biological Opinion on the MSHCP, and a corresponding incidental take permit) serve as the Section 7 ESA consultation for Columbia activities that may occur on lands covered within the MSHCP (FWS, 2015). The

incidental take permit associated with the MSHCP permits take of 10 threatened and endangered species that may result from routine construction, operation, and maintenance activities within 0.5 mile to either side of the centerline of pipelines and associated structures within Columbia's pipeline network. The MSHCP also encompasses an additional 32 species for which take is not explicitly authorized. The MSHCP identifies impact AMMs for all 42 species covered in the plan and prescribes consultation approaches for the species not covered under the incidental take permit.

The MSHCP covers all but 135.1 acres (about 9 percent) of the Project (see table B.4-1). Of the federally listed species that could be affected by the Project, the incidental take permit associated with the MSHCP allows take of the Indiana bat, northern long-eared bat, fanshell mussel, and sheepnose mussel on lands covered by the MSHCP. Section 7 consultation for take of these species would be considered completed for the Project assuming Columbia were to implement all applicable AMMs for the species. Additional consultation would be required if impacts on these species would occur on the 135.1 acres of the Project that were not covered by the MSHCP. Likewise, Section 7 consultation would be required if the Project would impact pink mucket, snuffbox, or running buffalo clover populations or individuals.

Summaries of how the species would be covered by the MSHCP and determinations of effects for each of the species are provided below and in appendix B.4-1.

TABLE B.4-1
Proposed Project Work Areas Located Outside of MSHCP-Covered Lands

Nearest Milepost/Facility		Land Affected During Construction (acres) a/, b/	Land Affected During Operation (acres) a/, c/
Begin Milepost	**End Milepost**		
Pipeline Facilities			
12.4	13.1	12.2	4.0
58.1	58.7	8.8	3.2
60.4	61.0	10.8	3.6
61.5	62.1	9.6	3.9
Staging Areas/Contractor Yards d/			
16.4 (offline)	CY-001-B	16.6	0
16.4 (offline)	CY-001A-B	8.1	0
27.1 (offline)	CY-006-B	21.9	0
39.3 (offline)	SA-025-B	11.5	0
61.0	SA-046-B	1.5	0
62.4 (offline)	CY-004-B	30.0	0
63.4 (offline)	CY-005-B	1.7	0
Access Roads			
13.0	TAR-JA-007-R	1.2	0
16.5	TAR-JA-011.8-B	0.3	0
27.1	TAR-JA-019.5-B	0.2	0
43.7	TAR-LA-004-B	0.2	0
61.6	TAR-LA-014-R	<0.1	0
62.4	TAR-LA-015-B	0.5	0

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/ Land affected during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Land affected during permanent (operation) use only.

d/ Offline indicates that the facility would be more than 500 feet from the pipeline centerline. Milepost numbering is provided as a reference point.

Abbreviations

CY Contractor Yard
SA Staging Area
TAR Temporary Access Road

Mammals

Indiana Bat

The full extent of the Project is within the range of the endangered Indiana bat, which is a species included in Columbia's MSHCP. According to the ODNR, Indiana bat maternity roosts have been documented in Lawrence County, Ohio, in the vicinity of the proposed R-801 route between MPs 35 and 51, and the portion of the route between MPs 35 and 56 is within 10 miles of an Indiana bat hibernaculum (ODNR, 2017f). Columbia would assume presence of the Indiana bat throughout the Project area and implement the AMMs required in the MSHCP on MSHCP-covered lands, including the following:

- no clearing of known maternity colony summer habitat from April 1 to October 15;
- no clearing of suitable summer habitat[27] from June 1 to August 1;
- no "side-trimming" of suitable summer habitat from April 15 to September 1; and
- no clearing of suitable spring staging and fall swarming habitat[28] within 10 miles of the hibernaculum in Lawrence County from April 1 to May 31 and August 15 to November 14.

On lands not covered by the MSHCP (i.e., those listed in table B.4-1), Columbia would refrain from tree clearing activities between April 1 and October 15 where suitable summer habitat exists and between April 1 and November 14 where the Project route comes within 10 miles of the hibernaculum in Lawrence County.

Columbia conducted winter habitat (portal) surveys in fall 2018 to assess whether additional bat hibernacula may be present in the vicinity of the Project route**.** The results of desktop surveys conducted by Columbia indicate no known karst areas or caves occur within 0.6 mile of the Project route. However, Columbia identified 76 potential open mine portals within 0.6 mile of the Project area. Columbia conducted field surveys of 60 of the 76 potential portals to assess their suitability as winter habitat. None of the 60 potential portals were deemed suitable as potential winter habitat. Columbia was not granted land access to survey the remaining 16 potential portals. However, all of the portals that were

[27] Suitable summer habitat for Indiana bats consists of the variety of forested/wooded habitats where they roost, forage, and travel. This includes forested patches as well as linear features such as fencerows, riparian forests and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees are considered suitable habitat if they are less than 0.25 mile from the next nearest suitable roost tree, woodlot, or wooded fencerow and have a diameter at breast height equal to or greater than 5 inches and exhibit exfoliating bark, crevices, or cracks (NiSource, 2013)

[28] Suitable spring staging and fall swarming habitat are defined the same as suitable summer habitat (NiSource, 2013).

not surveyed are more than 500 feet from the Project route, and the survey report indicated that "based upon our desktop and field efforts it is unlikely that any of these 16 potential mine portals provide suitable winter bat habitat." Columbia states it will continue to attempt to gain access to the remaining 16 possible portals for survey purposes.

Clearing trees and shrubs for installation of the R-801 pipeline would affect Indiana bats by altering summer roosting habitat and spring and fall staging/swarming habitat and potentially harassing bats by flushing them from roost trees during daylight hours and thereby making them susceptible to predators (NiSource, 2013). With implementation of the Indiana bat-related AMMs in the MSHCP, this incidental take on MSHCP-covered lands is already addressed via the MSHCP, and Section 7 consultation for these actions is considered complete. The FWS has concluded that some take would be expected during activities covered in the MSHCP, but the scale of the impacts on summer maternity colonies and spring and fall staging/swarming populations would be minimal, and impacts at the population level are not anticipated (FWS, 2015).

Given Columbia's commitment to adhere to the AMMs for the Indiana bat on lands not covered by the MSHCP consultation process, we conclude that the BXP is ***not likely to adversely affect*** the Indiana bat in those areas. In correspondence dated June 1, 2018, the FWS concurred that implementation of the Indiana bat-related AMMs from the MSHCP, including the tree clearing restrictions noted above, would be sufficient to confirm a determination that the Project is *not likely to adversely affect* the Indiana bat on land not covered by the MSHCP consultation process. (FWS, 2018b).

Northern Long-eared Bat

The threatened northern long-eared bat is also included in Columbia's MSHCP. The full extent of the Project is within the range of this species. According to the WNF (2018a), northern long-eared bat presence has been documented in Lawrence County in the vicinity of the R-801 route between MPs 34 and 49. Columbia would assume presence of the northern long-eared bat throughout the Project area and implement the AMMs required in the MSHCP on MSHCP-covered lands, including refraining from clearing or "side-trimming" known maternity colony or suitable summer habitat from June 1 to August 1.

On lands not covered by the MSHCP, Columbia would refrain from tree clearing activities between April 1 and October 15 where suitable summer habitat exists, and between April 1 and November 14 where the Project route comes within 10 miles of a known or presumed occupied hibernacula. Columbia conducted winter habitat (portal) surveys in fall 2018 to assess whether additional hibernacula may be present in the vicinity of the Project route. The results of the fall 2018 surveys are conveyed in the Indiana bat section.

Clearing trees and shrubs for installation of the R-801 pipeline would affect northern long-eared bats by altering summer roosting habitat and spring and fall staging/swarming

habitat and potentially harassing bats by flushing them from roost trees during daylight hours and thereby making them susceptible to predators (NiSource, 2015). With implementation of the northern long-eared bat-related AMMs in the MSHCP (NiSource, 2015), this incidental take on MSHCP-covered lands has been addressed in the MSHCP, and Section 7 consultation for these actions is considered complete. The FWS has concluded that some take would be expected during activities covered in the MSHCP, but the scale of the impacts on summer maternity colonies and spring and fall staging/swarming populations would be minimal, and impacts at the population level are not anticipated (FWS, 2015).

The final ESA Section 4(d) rule generally allows incidental take of northern long-eared bats in Ohio[29] but prohibits incidental take in the following circumstances:

- actions are prohibited if they cause take of bats within the hibernacula or alter the environment of a hibernacula in a manner that causes incidental take;
- tree removal activities are prohibited at any time of year within 0.25 mile of the entrance/exit of a known, occupied hibernacula; and
- tree removal activities are prohibited from destroying a known, occupied maternity roost tree, or any tree within a 150-foot radius of a maternity roost tree, between June 1 and July 31 (all tree removal activities may resume outside of this date range, including removal of the maternity roost tree).

Given Columbia's commitment to adhere to the AMMs for the northern long-eared bat on lands not covered by the MSHCP consultation process, we conclude that the BXP is ***not likely to adversely affect*** the northern long-eared bat in those areas. In correspondence data June 1, 2018, the FWS concurred that implementation of the northern long-eared bat-related AMMs from the MSHCP, including the tree clearing restrictions noted above, would be sufficient to confirm a determination that the Project is *not likely to adversely affect* the northern long-eared bat on land not covered by the MSHCP consultation process (FWS, 2018b).

[29] Ohio is within the portion of the United States that is designated under the final section 4(d) rule as the white-nose syndrome (WNS) zone (i.e., U.S. counties within 150 miles of positive counties/districts containing WNS-infected hibernacula). As of May 31, 2018, the WNS zone encompassed the entire northeast, upper Midwest, and much of the southeast United States (FWS, 2018c). WNS is a fungal disease that affects many hibernating U.S. bat species. WNS has resulted in 90 to 100 percent mortality in bats affected by the disease in the eastern United States. The final 4(d) rule allows incidental take outside of the white-nose syndrome zone and specifies conditions in which incidental take is prohibited inside of the zone.

Mollusks

Correspondence from the ODNR (2017) noted that although the Project would cross the ranges of the endangered fanshell, sheepnose, pink mucket, and snuffbox mussels, given the location of the Project and that there would be no in-water work proposed in a perennial stream of sufficient size, the Project would likely not affect these species. However, suitable habitat for the fanshell, sheepnose, pink mucket, and snuffbox may occur in the Ohio River, which Columbia proposes to use as a hydrostatic test water source and discharge location.

The fanshell and sheepnose mussels are included in Columbia's MSHCP. Columbia would implement AMMs related to hydrostatic test water withdrawals and discharge in the Ohio River, including using water intake screens to minimize entrainment of aquatic organisms, maintaining water intake points well above the substrate, maintaining appropriate flow downstream of water intake devices by not exceeding upstream flow rates, and discharging water through a dewatering device. As such, consultation is considered complete for these species in MSHCP-covered areas. There is no suitable habitat for the fanshell and sheepnose mussels on non-MSHCP areas and we conclude that there would be ***no effect*** on these species in non-MSHCP area. The FWS concurred with these conclusions in correspondence dated June 1, 2018 (FWS, 2018b).

The pink mucket and snuffbox are not included in Columbia's MSHCP. However, Columbia would implement AMMs related to hydrostatic test water withdrawals and discharge and AMMs related to minimizing erosion and sedimentation in MSHCP areas. Therefore, the Project is ***not likely to adversely affect*** these species in MSHCP areas. There is no known suitable habitat for the pink mucket and snuffbox mussels on non-MSHCP areas and therefore the Project would have ***no effect*** on these species in areas not covered by the MSHCP. The FWS concurred with these conclusions in correspondence dated June 1, 2018 (FWS, 2018b).

Plants

Running Buffalo Clover

The running buffalo clover is not included in Columbia's MSHCP. However, the FWS noted in its *Species Informal Consultation Concurrence Letter* within the Consultation Document for the MSHCP (FWS, 2015) that although there are no known populations of running buffalo clover present on MSHCP-covered lands, there are extensive tracts of suitable habitat in Ohio, and in Lawrence County in particular. The FWS has determined that with implementation of appropriate AMMs, which include conducting surveys for the species and avoiding any observed populations, Columbia's projects under the scope of the MSHCP would not likely adversely affect populations of running buffalo clover (FWS, 2015). Columbia conducted running buffalo clover surveys along the Project corridor between May 31 and June 14 in 2017 and between May 8 and

June 21 in 2018. All Project areas with potential suitable habitat have been surveyed. No running buffalo clover was present, but suitable habitat for the species was observed (Power Engineers, 2018a). Given these findings, we conclude that the proposed Project is ***not likely to adversely affect*** the running buffalo clover.

Summary of Conclusions for Federally Listed Species

Consultation is considered complete for the federally listed species that occur on the MSHCP-covered areas crossed or otherwise affected by the Project. The FWS (2015) concluded in its Biological Opinion for the MSHCP that, with implementation of the applicable AMMs, take associated with Columbia's activities ***is not likely to result in jeopardy*** of the Indiana bat, northern long-eared bat, fanshell mussel, and sheepnose mussel. Additionally, the FWS concluded that the Project ***is not likely to adversely affect*** the Indiana bat and northern long-eared bat on non-MSHCP-covered lands (FWS, 2018b). The FWS further concluded that the Project ***is not likely to adversely affect*** the pink mucket mussel and the snuffbox mussel in MSHCP areas and would have ***no effect*** on the species in areas not covered by the MSHCP (FWS, 2018b). We concur.

We received a comment from the USFS requesting that we address potential effects of the project on the American burying beetle (*Nicrophorus americanus*), a federally (endangered) and State of Ohio endangered species that the FWS proposed for reclassification from endangered to threatened on May 3, 2019. The FWS Environmental Conservation Online System indicates the range of the American burying beetle includes Vinton County, Ohio (FWS, 2017a). In recent years, propagated American burying beetles have been released in the Athens District of the Wayne National Forest and in a Wildlife Area in northeast Vinton County, at two sites, approximately 32 and 36 miles northeast of the northern terminus of the Project (FWS, 2015). The USFS stated that the ODNR reintroduced the American burying beetle on the Waterloo Wildlife Area, approximately 17 miles northeast of the northern terminus of the Project, starting in 1998. We know of no instances of this species being documented any closer to the Project area than these. In correspondence with the ODNR and the FWS, the ODNR made no mention of the American burying beetle in its listing of species that may be affected by the Project (ODNR, 2017f), and the FWS concluded that the Project, based on its location, would have ***no effect*** on the American Burying Beetle (FWS, 2018b). We concur.

The FWS did not provide a consultation determination for the running buffalo clover in its June 1, 2018 letter to Columbia (FWS, 2018b). Surveys in areas where suitable habitat potentially existed, but which Columbia was not able to survey in 2017 were still underway at the time of the FWS correspondence. However, in its *Running Buffalo Clover Field Survey Report Addendum* (Power Engineers, 2018a; filed after the FWS June 2018 letter), Columbia states all portions of the proposed Project route containing potentially suitable habitat have been surveyed. Although suitable habitat for running buffalo clover was documented, no plants were observed. As noted above, we have determined that the

Project ***is not likely to adversely affect*** the running buffalo clover and request concurrence from the FWS for this conclusion.

Given that the FERC has not received a determination of effects from the FWS for running buffalo clover, **we recommend that:**

- **Columbia should not begin construction of the Project <u>until</u>:**

    a. the FERC staff completes any necessary ESA Section 7 consultation with the FWS; and

    b. Columbia has received written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.

4.2 State-Listed Species

The Project would potentially overlap the range of 73 state-listed species: 5 mammals; 5 birds; 2 reptiles; 5 amphibians; 9 fish; 13 mussels; 3 insects; and 31 plants (see appendix B.4-2). Of this total, seven are also federally listed as discussed above (Indiana bat, northern long-eared bat, fanshell, pink mucket, sheepnose, snuffbox, and running buffalo clover) and are not considered further. The potential effects of the Project on these species are discussed in section B.4.1. Thirty-two of the 73 species were not identified by the ODNR (2017f) as having the potential to be present in the Project area; nonetheless, these species are included here because they are listed by the WNF as regional forester sensitive species (RFSS) and thus could potentially be present within the portions of the WNF crossed by the Project.

Columbia's coordination with the ODNR and WNF and subsequent habitat assessment surveys indicated that the Project does not cross suitable habitat for the Henslow's sparrow, eastern hellbender (*Cryptobranchus alleganiensis*), Tippecanoe darter (*Etheostoma tippecanoe*), or green-faced clubtail (*Gomphus viridifrons*). Habitat suitable for the grizzled skipper (*Pyrgus wyandot*) such as forest openings, including pipeline rights-of-way, exists in the Project area, but this species is not known to occur in the portions of Ohio through which the Project crosses. The only known population of this species in Ohio is more than 20 miles northeast of the northern-most extent of the Project in the Athens Unit of the WNF (ODNR, 2017f; USFS, 2017a).

The potential impacts of the Project on the state-listed species' habitat and individuals would be similar to those described in the vegetation, aquatic resources, and wildlife resources sections (B.3.1, B.3.2, and B.3.3). Likewise, we expect the AMMs described in the preceding sections would also minimize impacts on state-listed species. Summaries and determinations of effects for the species are provided below.

Mammals

Suitable foraging and roosting habitat exists in the Project area for the little brown bat (*Myotis lucifugus*) and tri-colored bat (*Perimyotis subflavus*), both of which are listed as species of concern. Additionally, little brown bats have been documented within a mile of the proposed construction right-of-way (WNF, 2018a). The little brown bat and the tri-colored bat roost in trees during the summer and in caves and mines during the winter (the little brown bat will also roost in human made structures, rock crevices, and wood piles during the summer). As noted, we expect that the AMMs to reduce impacts on the Indiana bat and northern long-eared bat would also minimize impacts on these two species. Therefore, we conclude the Project ***would not significantly impact*** the little brown bat and tri-colored bat.

Suitable habitat is also present in the Project area for the state endangered black bear. However, as large, mobile animals, black bears are expected to avoid the construction areas and remain in habitat undisturbed by construction (ODNR, 2017f). Therefore, we conclude the Project ***would not significantly impact*** the black bear.

Birds

Suitable habitat is likely present in the Project area for the cerulean warbler (*Dendroica cerulea* syn. *Setophaga cerulean*), a species of concern, and may be present for the northern bobwhite, ruffed grouse, and whip-poor-will, which are also listed as species of concern. None of these species were noted by the ODNR as having the potential to be affected by the Project (ODNR, 2017f); however, they are listed as WNF RFSS. Columbia proposed to the WNF that surveys for these species would not be necessary on USFS lands because the northern bobwhite, ruffed grouse, and whip-poor-will are habitat generalists and Columbia would refrain from tree clearing in the WNF during May and June, which is the nesting season of the cerulean warbler. The WNF agreed to this approach (WNF, 2018b). Additionally, these species would benefit from Columbia's commitment to protecting suitable summer bat habitat (e.g., forested patches and wooded linear features such as riparian forests), which would result in Columbia further refraining from tree clearing in forested areas in the WNF throughout August as well.

We conclude that, as mobile animals and habitat generalists, the northern bobwhite, ruffed grouse, and whip-poor-will, would be able to avoid the construction areas and remain in habitat undisturbed by construction. Therefore, the Project ***would not significantly impact*** these species. Likewise, we conclude that given Columbia's plan to refrain from tree clearing in the WNF during May and June, the Project ***would not significantly impact*** the cerulean warbler.

Reptiles

Suitable habitat for the Kirtland's snake (*Clonophis kirtlandii*), which is listed as state threatened, and timber rattlesnake (*Crotalus horridus horridus*), which is listed as state endangered, occurs along the Project right-of-way. Presence of the timber rattlesnake has been documented in the vicinity of the Project. Columbia conducted surveys in 2018 to assess the presence of Kirtland's snake and timber rattlesnake habitat in the vicinity of the Project route (Wynn, 2018). The results of the Kirtland's snake habitat surveys indicated that suitable habitat exists at the proposed locations of the contractor yards CY-001-B and CY-004-B and along the R-801 pipeline route near MPs 38.7 and 43.2 among 2- and 1-acre parcels, respectively, of wetland and grass habitat. The results of Columbia's timber rattlesnake habitat surveys indicated that suitable occupied habitat exists along the R-801 pipeline route.

The ODNR-approved herpetologist that conducted the habitat surveys provided recommendations to allow Columbia to minimize impacts on Kirtland's snakes, timber rattlesnakes, and their respective habitats. The recommendations include refraining from conducting construction activities at the four locations on the R-801 pipeline route with suitable habitat for Kirtland's snakes until a presence-absence survey is performed over an entire season from April 1 through November 1. If no Kirtland's snakes are found, then no mitigation would be necessary. Columbia has agreed to conduct the surveys beginning in April 2019. Recommendations for the timber rattlesnake would include implementing the rattlesnake safety and avoidance measures during construction at specific locations including the following:

- arrange for an ODNR-approved herpetologist to be present during construction to provide a rattlesnake safety and avoidance orientation to all workers on the Project site and to be immediately contacted if a timber rattlesnake was observed;
- arrange for the herpetologist to pre-coordinate daily with construction personnel to survey and "clear" work areas each day before construction begins, continuously clear roads and construction sites throughout each day of construction, and assess potential Project-related mortality daily;
- use the herpetologist to flag potential sensitive habitat areas to indicate areas where no disturbance should occur (Columbia should discuss avoidance measures for any previously undocumented dens on a case-by-case basis with ODNR);
- engage the herpetologist to monitor restoration activities in a manner similar to active construction;
- use the herpetologist to manage timber rattlesnake captures or observations on a case-by-case basis (including potential scientific study) or to serve as contact if a worker was bitten by a potentially venomous snake; and

- engage the herpetologist to provide periodic status reports to ODNR as well as a final Project close-out report.

Columbia is currently assessing the feasibility of implementing a minor adjustment of the R-801 pipeline route to avoid permanent impacts on snake habitat within the currently proposed Project right-of-way[30]. Columbia is also continuing discussions with the ODNR and WNF regarding any other impact avoidance, minimization, and mitigation options for timber rattlesnakes in the Project area, the results of which will be documented in the final COM Plan. The USFS indicated that Columbia should adopt the minor route adjustment, and the ODNR supported the route adjustment in a letter dated May 2, 2019. However, Columbia indicated that biological, wetland/waterbody, and cultural resource surveys were needed first to assess what other potential resources could be affected by the minor route adjustment. Presumably, Columbia would also perform an engineering feasibility assessment. Given the USFS request and the pending surveys, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary, for review and written approval by the Director of OEP, a plan developed in coordination with the USFS, designed to avoid, minimize, and/or mitigate impacts on occupied timber rattlesnake habitat within the WNF.**

Given that Columbia has agreed to conduct surveys for Kirtland's snake and remains in communication with the ODNR and WNF regarding impact avoidance, minimization, and mitigation options for the timber rattlesnake occupied habitat, including a possible route adjustment, and our recommendation for a timber rattlesnake plan, we conclude the Project ***would not significantly impact*** the Kirtland's snake or timber rattlesnake. We have included a recommendation below to ensure that proper agency coordination and impact avoidance, minimization, and/or mitigation measures would be implemented to protect these species.

Amphibians

Presence of the state endangered eastern spadefoot (*Scaphiopus holbrookii*), state endangered green salamander (*Aneides aeneus*), state threatened mud salamander (*Pseudotriton montanus*), and state species of concern and RFSS four-toed salamander (*Hemidactylium scutatum*), has been documented at various points along the proposed Project right-of-way and near the proposed staging areas and contractor yards. Columbia conducted habitat surveys for the listed amphibians in July 2018.

[30] Columbia indicated that it was considering the minor route adjustment in docket filings 20190318-5097 and 20190402-5156. The USFS commented on the need for surveys in docket filing 20190419-5034.

The surveys indicated that the eastern spadefoot is present in the vicinity of the proposed contractor yard CY-004-B, but vegetation at the contractor yard site was too dense to determine whether the site contains soils suitable to serve as upland burrowing habitat. The surveyors concluded that no suitable green salamander habitat is present in the vicinity of the Project. Likewise, no mud salamanders or areas of high-quality mud salamander habitat were observed during the surveys. Four-toed salamanders were also not observed during the surveys, but four-toed salamanders have less selective habitat requirements and are therefore likely relatively common in areas of woodland habitat associated with boggy wetlands along the Project right-of-way. According to the USFS, both mud and four-toed salamanders are known to occur on WNF lands in close proximity to the Project area.

Given that surveys indicated no suitable habitat for green salamanders is present in the vicinity of the Project and that no green salamander individuals were observed during the surveys, we conclude that the Project would have ***no impacts*** on the green salamander.

The ODNR-approved herpetologist that conducted the amphibian surveys for Columbia concluded that a follow-up eastern spadefoot habitat survey at proposed contractor yard CY-004-B after the fall vegetation die-back would be necessary to determine whether the contractor yard contains suitable burrowing habitat. The herpetologist also concluded that an eastern spadefoot survey during a breeding event (i.e., after a flooding rainfall between March and August) would be necessary to determine whether eastern spadefoots migrate across the contractor yard site to reach nearby breeding habitat.

The herpetologist advised Columbia that installing silt fencing along the perimeter of the contractor yard would minimize Project impacts on the eastern spadefoot by re-routing migrating eastern spadefoots around Project activities. The herpetologist further advised Columbia that Project impacts on mud and four-toed salamander habitat due to siltation could be minimized by installing well-maintained silt fencing along the Project right-of-way where small streams are crossed (which would be in accordance with Columbia's ECS).

Columbia's implementation of all suggested impact avoidance recommendations provided by the ODNR-approved herpetologist (including the eastern spadefoot follow-up surveys), and coordination with the ODNR to arrange for appropriate avoidance, minimization, and mitigation measures for Columbia to follow if eastern spadefoot burrowing habitat is documented at proposed contractor yard CY-004-B, would allow us to conclude that the Project ***would not significantly impact*** the eastern spadefoot, mud salamander, or four-toed salamander. We have included a recommendation below to ensure that proper agency coordination and impact avoidance, minimization, and/or mitigation measures would be implemented to protect these species.

Fish

Of the eight fish species with suitable or potentially suitable habitat in waterbodies affected by the Project [gilt darter (*Percina evides*), goldeneye (*Hiodon alosoides*), Ohio lamprey (*Ichthyomyzon bdellium*), shoal chub (*Machrybopsis hyostoma*), shovelnose sturgeon (*Scaphirhynchus platorynchus*), channel darter (*Percina copelan*), river darter (*Percina shumardi*), and lake chubsucker], only the lake chubsucker is known to occur in waterbodies crossed by the Project. Potentially suitable habitat for the other seven species is found only in the Ohio River. As noted above, the Project would not cross the Ohio River. The river would only be used as a source and discharge location for hydrostatic test water. Columbia would withdraw about 1,197,600 gallons from the Ohio River and subsequently return this water to the Ohio River at an estimated discharge rate of 2,000 to 3,000 gallons per minute. Discharge pipes would be positioned to release water well above the riverbed to avoid sediment scour and associated increases in water column turbidity. The average daily flow of the Ohio River in the vicinity of the Project in 2017 was about 41.8 million gallons per minute (USGS, 2018d). Additionally, Columbia would install intake screens on the water withdrawal pumps to reduce the likelihood of fish becoming entrained. Therefore, we conclude the Project ***would not significantly impact*** the gilt darter, goldeneye, Ohio lamprey, shoal chub, shovelnose sturgeon, channel darter, or river darter.

The threatened lake chubsucker has been documented where the installation of the R-801 pipeline would cross Black Fork Creek (near MP 29.8); 0.7 mile downstream of where the R-801 pipeline would cross an unnamed tributary of Symmes Creek (near MP 21.8); and 0.3 mile upstream of where the R-801 pipeline would cross Cambria (Lefthand Fork) Creek (near MP 30.1). The lake chubsucker has also been documented in the unnamed tributary of Symmes Creek, 1.1 miles downstream of MP A18.4 and 0.6 mile downstream of MP A19.9, where pipe exposure work and road work would be conducted, respectively, in association with the Abandonment component of the Project. Columbia would use the dam-and-pump method, a dry trench crossing method, to implement crossings at these locations. Section A.7 describes the crossing method and section B.3.2 describes the measures Columbia would implement to minimize effects on aquatic organisms at the crossings. If Columbia determined blasting was necessary in streams containing threatened or endangered species, Columbia would confer with the FWS and/or ONDR-DOW to determine whether additional mitigation measures would be necessary. Once the dams have been installed on the stream and water has been pumped from the pipeline right-of-way, qualified personnel would relocate downstream any aquatic organisms (e.g., fish and mussels) 4 inches or larger in size that remain in the dewatered right-of-way.

Columbia conducted site-specific surveys in 2018 for the listed fish species using seine nets or electro-shocker sampling equipment (Dinkins et al., 2018). No federal or state-listed species or RFSS were documented. Based on these results and the waterbody

crossing techniques proposed for use by Columba, we conclude that the Project ***would not significantly impact*** the lake chubsucker.

Mollusks

Of the nine species of freshwater mussels with suitable or potentially suitable habitat in waterbodies that would be affected by the Project [ebony shell (*Fusconaia ebenus*), elephant-ear (*Elliptio crassidens*), monkeyface (*Quadrula metanevra*), Ohio pigtoe (*Pleurobema cordatum*), washboard (*Megalonaias nervosa*), black sandshell (*Ligumia recta*), threehorn wartyback (*Obliquaria reflexa*), salamander mussel (*Simpsonaias ambigua*), and little spectaclecase], only the little spectaclecase has been documented in a waterbody that would be crossed by the Project. Potentially suitable habitat for the other eight species is found only in the Ohio River. As noted above, the Project would not cross the Ohio River as the river would only be used as a source for hydrostatic test water withdrawal and location for hydrostatic test water discharge. Based on the same conditions discussed above for the federally listed mollusks and state-listed fish regarding potential effects on aquatic organisms associated with withdrawing and discharging hydrostatic test water in the Ohio River, we conclude that the Project ***would not significantly impact*** the ebony shell, elephant-ear, monkeyface, Ohio pigtoe, washboard, black sandshell, threehorn wartyback, or salamander mussel.

The Ohio-endangered little spectaclecase has been documented 1.6 and 1.8 miles downstream of where installation of the R-801 pipeline would cross Black Fork Creek, near MP 29.8. Based on Ohio Revised Code,[31] all freshwater mussels native to Ohio are protected. The ODNR Ohio Mussel Survey Protocol (ODNR, 2016) requires all streams that contain mussels or potential mussel habitat to be surveyed prior to any stream disturbance. Group 1 streams (small to mid-sized streams that are not expected to contain federally listed species) and unlisted streams with a drainage area over 10 square miles may be assessed using the *Reconnaissance Survey for Unionid Mussels* (ODNR, 2016) to determine if mussels are present. Group 2 (small to mid-sized streams that are expected to contain federally listed species), Group 3 (large rivers that are not expected to contain federally listed species), and Group 4 (large rivers that are expected to contain federally listed species) require that mussel surveys be conducted using the *Ohio Mussel Survey Protocol*.

The Project would not cross any Group 2, 3, or 4 streams as listed in the ODNR survey protocols (though the Ohio River is a Group 4 stream). The Project would cross 10 Group 1 streams and 2 unlisted streams with drainage areas over 10 square miles (see table B.4-2). Columbia conducted reconnaissance surveys at these streams between May 1 and October 1, 2018 (Dinkins et al., 2018). Based on the ODNR protocols, any stream where live mussels or fresh dead shells were found would require a full mussel survey. The surveyors conducted full mussel surveys at the crossings of Little Raccoon Creek, Black

[31] Chapter 1533.324.

Fork, Johns Creek, and Buffalo Creek (Site 2). The surveyors only documented mussel presence within the proposed area of direct impact of the crossing at Buffalo Creek (Site 2). They observed two live mussels and one relic shell. They documented a total of 24 live mussels and 3 fresh dead mussel shells within the upstream and downstream reaches of Little Raccoon Creek, Black Fork, and Johns Creek (surveyors did not document live mussels or mussel shells in the upstream or downstream reaches of Buffalo Creek [Site 2]).

TABLE B.4-2
Streams Crossed by the Project that Meet Ohio Mussel Survey Protocol Criteria

Waterbody	Milepost	Stream Group	Survey Type	Survey Results
BXP Replacement				
Little Raccoon Creek	2.8	Group 1	Full Mussel Survey	No mussels observed
Black Fork	29.8	Group 1	Full Mussel Survey	Live mussels observed upstream of crossing; fresh dead mussel shells observed downstream of crossing
Dirtyface Creek	33.3	Group 1	Reconnaissance	No mussels observed
Caulley (Coulley Fork) Creek	36.8	Group 1	Reconnaissance	No mussels observed
Buffalo Creek (Site 1)	38.1	Group 1	Reconnaissance	No mussels observed
Buffalo Creek (Site 2)	38.7	Group 1	Full Mussel Survey	Live mussels observed at crossing
Buckeye Creek	41.0	Group 1	Reconnaissance	No mussels observed
Buckeye Creek	41.1	Group 1	Reconnaissance	No mussels observed
Johns Creek	43.2	Group 1	Full Mussel Survey	Live mussels observed upstream and downstream of crossing
Ice Creek	55.2	Unlisted stream with watershed greater than 10 square miles above point of impact	Reconnaissance	No mussels observed
BXP Abandonment				
Buckeye Creek	A38.3	Group 1	Reconnaissance	No mussels observed
Ice Creek	A51.3	Unlisted stream with watershed greater than 10 square miles above point of impact	Reconnaissance	No mussels observed

Sources: ODNR, 2016; Dinkins et al., 2018.

The little spectaclecase was not observed during the 2018 surveys. None of the documented mussels were federally listed species, state threatened or endangered species, or RFSS. One of the live mussels documented at the Buffalo Creek crossing location (Site 2) was a creek heelsplitter (*Lasmigona compressa*), which is listed as a species of concern in Ohio. The surveyors, with approval from the ODNR, relocated the two live mussels at the Buffalo Creek site to suitable habitat upstream of the crossing and beyond the extent of potential Project impacts.

As noted above, Columbia would use the dam-and-pump dry-crossing method to cross Black Fork Creek upstream of where the little spectaclecase was previously observed, and at all other waterbody crossings with the potential to contain listed species. Columbia would have qualified personnel remove any mussels stranded in the dewatered area during dam-and-pump activities and relocate them to suitable habitat with flowing water. A relatively recent study assessing the magnitude and timing of suspended sediment produced from open-cut dry-crossing methods indicates the duration of increased sedimentation would be mostly short-term (i.e., less than 1-4 days) and remain near the crossing location (i.e., an approximate downstream distance of a few hundred feet) (Reid et al., 2002). Based on this estimate and the results of the 2018 surveys, we conclude the Project ***would not significantly impact*** the little spectaclecase or other freshwater mussels.

Insects

Suitable habitat for Uhler's sundragon (*Helocordulia uhleri*), a dragonfly present near swift flowing streams that is listed as endangered and as a RFSS, may be present in the Project area. Columbia did not conduct habitat surveys for the Uhler's sundragon. It stated in its special status species survey plan submitted to the WNF that any impacts on Uhler's sundragon habitat would be limited and of short duration. The WNF agreed to this approach (WNF, 2018b). We therefore conclude that the Project ***would not significantly impact*** the Uhler's sundragon.

Plants

Suitable habitat and/or documentation of specific occurrences of 30 state endangered, threatened, or potentially threatened plant species have been documented at various points along the proposed Project right-of-way and/or near the proposed locations for staging areas and contractor yards (see appendix B.4-2). The ODNR (2017f) recommended that Columbia conduct surveys for three state-listed plant species: gray beard-tongue (*Penstemon canescens*, listed as threatened), lined sedge (*Carex striatula*, listed as endangered), and Walter's Saint John's-wort (*Triadenum walteri*, listed as threatened).

In 2018, Columbia conducted surveys at the locations of all Project components that would occur in suitable habitat for these three species. Columbia also conducted surveys in the WNF for RFSS plants in 2018. No populations of lined sedge were documented

during the surveys. Surveyors documented two instances of gray beard-tongue and one group of Walter's Saint John's wort adjacent to Project components. The instances of gray beard-tongue were adjacent to two proposed temporary access roads (one new and one existing). The group of Walter's Saint John's wort was documented within a forested wetland about 70 feet from a permanent access road and a proposed staging area. To minimize impacts on these populations, Columbia would install exclusion area fencing around the gray beard-tongue and silt fencing around the construction work areas adjacent to the forested wetland containing the Walter's Saint John's wort. Columbia would also coordinate with the ODNR to determine if further mitigation is required.

In addition to the targeted species, surveyors documented nine non-target state-listed plants within the Project area during plant and stream surveys and wetland delineations in 2018. Four of these species were documented within the proposed Project footprint (see table B.4-3).

TABLE B.4-3
Non-Target State-Listed Plant Species Document During 2018 Surveys

Species	Scientific Name	State Status	Distance from Project Footprint
Blackjack oak	*Quercus marilandica*	Potentially Threatened	< 100 ft
Blunt-leaved milkweed	*Asclepias amplexicaulis*	Potentially Threatened	Within footprint
Bush's sedge	*Carex bushii*	Threatened	< 200 ft
Canada yew	*Taxus canadensis*	Potentially Threatened	< 100 ft
Downy white beard-tongue	*Penstemon pallidus*	Threatened	< 400 ft
Large marsh St. John's wort	*Triadenum tubulosum*	Threatened	Within footprint
Spring coral-root	*Corallorhiza wisteriana*	Potentially Threatened	> 600 ft
Tall nut-rush	*Scleria triglomerata*	Potentially Threatened	Within footprint
White milkweed	*Asclepias variegata*	Potentially Threatened	Within footprint

Source: ODNR, 2018g; Power Engineers, 2018b.

Columbia states that it will coordinate with the ODNR regarding potential effects of the Project on the non-target state-listed plants that were documented during the surveys and any mitigation actions that may be appropriate. Therefore, we conclude that, with implementation of any appropriate ODNR-recommended mitigation actions, as needed, the Project ***would not significantly impact*** gray beard-tongue, lined sedge, Walter's Saint John's-wort, or blackjack oak, blunt-leaved milkweed, Bush's sedge, Canada yew, downy white beard-tongue, large marsh St. John's-wort, spring coral-root, tall nut-rush, or white milkweed. We conclude the Project would have ***no impacts*** on the remaining 25 species listed in appendix B.4-2 that are not included here.

Conclusions for State-Listed Species

In this section we concluded that the Project would have ***no impacts*** on green salamander, given that no suitable habitat for this species is known to be present in the Project area, and 25 plant species listed in appendix B.4-2. We concluded that the Project ***would not significantly impact*** the following species: the black bear and little brown and tri-colored bats; the cerulean warbler, northern bobwhite, ruffed grouse, and whip-poor-will; the gilt darter, goldeneye, lake chubsucker, Ohio lamprey, shoal chub, shovelnose sturgeon, channel darter, and river darter; the creek heelsplitter, ebony shell, elephant-ear, little spectaclecase, monkeyface, Ohio pigtoe, washboard, black sandshell, threehorn wartyback, and salamander mussel, and the Uhler's sundragon. Columbia is continuing to consult with the ODNR and WNF regarding avoidance, minimization, and mitigation measures for state-listed threatened and endangered species, including the Kirtland's snake and timber rattlesnake; the eastern spadefoot, mud salamander, and four-toed salamander; and the 12 state-listed plants cited above. Therefore, **we recommend that:**

- **Columbia should not begin construction of the proposed Project at designated Project-specific locations until:**

  a. **Columbia completes the Kirtland's snake (at CY-001-B, CY-004-B, MP 38.7, and MP 43.2) and eastern spadefoot (at CY-004-B) biological surveys and reports;**

  b. **Columbia has finalized its plan, developed in consultation with the ODNR, WNF, and USFS (where applicable), regarding its planned approach for protecting state-listed species; and**

  c. **Columbia has received written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin.**

With implementation of our recommendation, we conclude that the Project ***would not significantly impact*** state-listed species.

4.3 Wayne National Forest

Columbia corresponded with the USFS to determine what types of special status species could be affected by the Project within the WNF. The *National Forest Management Act of 1976* requires the USFS to manage habitats, participate in the recovery of threatened and endangered plant and animal species, and avoid actions that could cause a species to become threatened or endangered. Consequently, Regional Foresters develop sensitive species lists for each National Forest (i.e., the RFSS).

The RFSS are plant and animal species found on NFS lands for which population viability is a concern based on significant current or predicted downward trends in population numbers, population density, or habitat capability that would reduce the existing

distribution of the species and potentially lead to federal listing as threatened or endangered (USFS, 2005). The effects on RFSS are defined differently than for federally listed threatened and endangered species. Options for determinations include the following: "No Impacts," if an action would not have any impacts on a species; "Beneficial Impacts," when positive effects may occur with no adverse effects (e.g., the action would result in the creation of new habitat for a given species); "May Impact – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability," and "May Impact – Is Likely to Cause a Trend Toward Federal Listing or Loss of Viability."

Wayne National Forest Regional Forester Sensitive Species

The WNF RFSS list consists of 48 species of which 41 are also listed at the state level (see appendix B.4-2). However, 6 of the 48 species are not known to be present within the Ironton Ranger District of the WNF, through which the Project would pass. Therefore, the Project would have ***no impacts*** on Henslow's sparrow, eastern hellbender, redside dace, rapids clubtail (*Gomphus quadricolor*), grizzled skipper, or green-faced clubtail (*Hylogomphus viridifrons*). Likewise, as noted in section 4.2, we conclude the Project would also have ***no impacts*** on the green salamander based on there being no suitable habitat for the species within the Project area.

We further concluded that the Project would be ***not likely to cause a trend toward federal listing or loss of viability*** for the following species: the little brown bat and tri-colored bat; the cerulean warbler, northern bobwhite, ruffed grouse, and whip-poor-will; the timber rattlesnake; the mud salamander and four-toed salamander; the Ohio lamprey and lake chubsucker; the little spectaclecase and salamander mussel; and Uhler's sundragon. This conclusion is based on impact minimization approaches Columbia would take, our conclusion that the species would have adjacent habitat available to allow them to avoid Project activities, our conclusion that the species' habitat would only be minimally affected by the Project, and our recommendations above for timber rattlesnake habitat and state-listed species. We conclude the same for two butterfly species that are not listed at the state level: the monarch (*Danaus plexippus*) and northern metalmark (*Calephelis borealis*). Suitable habitat may be present in the Project area for both species, but Columbia's impact minimization approaches and adjacent habitat available to the species would result in the Project being ***not likely to cause a trend toward federal listing or loss of viability*** for these two butterfly species.

Columbia conducted surveys for 25 RFSS plants between July 16 and August 2, 2018. Surveyors documented two populations of the butternut (*Juglans cinerea*) but observed no other RFSS. Surveyors missed the optimal survey time period for three RFSS plants (balsam squaw-weed, Coville's phacelia, and juniper sedge [*Carex juniperorum*]). WNF staff indicated to Columbia on August 16, 2018, that additional surveys for these three species would not be needed on USFS lands (WNF, 2018c). The WNF staff stated the Project would likely have ***no impacts*** on the balsam squaw-weed and Coville's phacelia based on the locations of known populations of these species. The WNF staff also noted

it was possible that juniper sedge is present along ridgetops that would be traversed by the Project but that the Project would be ***not likely to cause a trend toward federal listing or loss of viability*** for the juniper sedge. Columbia stated it is currently evaluating the feasibility of avoiding the butternut populations documented during the 2018 surveys. However, during correspondence with Columbia on August 16, 2018, the WNF staff acknowledged that avoiding or transplanting the plants may not be feasible and that the resulting impacts on the butternut populations, if no avoidance actions were undertaken, would be ***not likely to cause a trend toward federal listing or loss of viability*** for the butternut (WNF, 2018c). Based on the results of the RFSS plant surveys and correspondence with the WNF, we conclude the Project would be ***not likely to cause a trend toward federal listing or loss of viability*** for the remainder of the plant species designated as RFSS. Additional details for RFSS and the BXP are provided in the Biological Evaluation prepared by the USFS (appendix B.4-3).

Conclusions for Wayne National Forest

The potential impacts of the Project on the WNF RFSS habitat and individuals would be similar to those described in the vegetation, aquatic resources, and wildlife resources sections (B.3.1, B.3.2, and B.3.3). Likewise, we expect the AMMs described in the preceding sections would also minimize impacts on RFSS. The USFS and Columbia are continuing to coordinate regarding proposed construction activities, such as for sensitive species and their habitats within the WNF, and potential mitigation measures that will be included in the final COM Plan. Columbia would be required to adopt USFS-mandated mitigation measures on NFS lands. We conclude the Project would have ***no impacts*** on 9 of the 48 species designated as RFSS and would be ***not likely to cause a trend toward federal listing or loss of viability*** for the remaining 39 species designated as RFSS.

5. Land Use and Visual Resources

5.1 Land Use

General land use types that would be affected by the Project include agricultural land, forest land, open land, wetlands, open water, and developed land. A detailed discussion of forest land and open land is included in section B.3, and wetlands and open water are discussed in section B.2. The sections below focus on land uses not described in detail elsewhere in the EIS.

The proposed Project would affect 1,532.4 acres of land during construction, including the pipeline construction right-of-way, ATWS areas (see appendix A-3), contractor yards (see table A-4), cathodic protection areas (see table A-5), staging areas (see appendix A-5), access roads (see appendix A-6), and aboveground facilities. Following construction, 1,044.2 acres would be restored to pre-construction uses. The remaining 488.2 acres would be maintained for operation of the Project. Table B.3-4 summarizes the acreage of each land use type that would be affected during construction and operation of the Project facilities. We included a recommendation in section A that would restrict the new permanent right-of-way for the R-801 pipeline to 25 feet in width where the new easement would be immediately adjacent to Columbia's existing right-of-way. If adopted by the Commission, this recommendation would reduce the total operational footprint of the Project's Replacement component by approximately 98 acres.

The Project would consist of two main Project components (as described in section A.4): the BXP Replacement and the BXP Abandonment. The BXP Replacement includes construction of the R-801 pipeline and updates to associated aboveground facilities and would affect 1,405.7 acres during construction, while 474.7 acres would be permanently maintained for operation following construction. The BXP Abandonment includes abandonment of the R-500 and R-501 pipelines and would affect 406.2 acres during construction, while 36.2 acres would be permanently maintained for operation, most of which would be needed for permanent access roads and aboveground facilities. Some areas, including access roads, aboveground facilities, and ATWS, would be used for both Project components.

Agricultural Lands

The Project would cross agricultural lands used for cultivated row crops (mostly corn or soybeans) and improved pasture. About 16 percent of the Project route would be agricultural land. An estimated 239.0 acres of agricultural land would be affected during construction and 70.6 acres would be maintained after construction for operation of the Project as presented in table B.3-4. No specialty crops or organic farms would be affected by the Project.

BXP Replacement

The BXP Replacement would impact 221.0 acres of agricultural lands during construction and 69.8 acres for operation of the R-801 pipeline. During construction, Columbia would maintain landowner access to fields and other agricultural facilities. Within actively cultivated or rotated croplands, managed pastures, and hayfields, Columbia would segregate the entire topsoil layer, to a maximum depth of 12 inches separately from the subsoil during grading to preserve soil fertility. All drainage systems would remain operational during construction. Following construction, and in accordance with the terms of landowner easement agreements, Columbia would visually inspect crops to ensure that crop growth and vigor in areas affected by construction was similar to those of adjacent portions of the same field. As described in FERC's Plan and Columbia's ECS, ongoing monitoring of drainage and irrigation systems would continue until restoration was successful. The depth of cover over the pipeline in agricultural areas could exceed 4 feet based on site-specific circumstances such as anticipated deep tillage, installing the pipeline beneath drain tiles, side slope, or by landowner request.

Columbia committed to locating drain tiles and irrigation systems, repairing any systems damaged by Project construction using a qualified drain tile specialist, installing temporary fences, allowing for livestock crossings of the trench, developing grazing deferment plans, and not reseeding in cultivated croplands except upon request. Columbia would work with individual landowners to develop reimbursement plans for damaged crops or reduced annual yield with the plans determined as part of its easement negotiations, where applicable. Impacts on agricultural lands would generally be short-term, but permanent impacts associated with BXP Replacement would occur with the land use conversion of 1.1 acres of agricultural land at aboveground facilities, 2.7 acres for cathodic protection, and 3.0 acres for permanent access roads. Additionally, Columbia plans to construct a temporary 1.0-acre pond (Oak Hill Pond) adjacent to the existing Oak Hill CS. The Oak Hill Pond would be on a 10.3-acre parcel that is currently agricultural land and is owned by Columbia.

In response to a comment from the Ohio Farm Bureau expressing concern that there could be provisions in decades old easement agreements that could negatively affect farm lands or farming, Columbia indicated that it would be held to all current environmental and safety rules for its pipelines regardless of easement agreements (which may be decades old) and would be willing to coordinate with farmers regarding a possible need to amend past easement agreements. With implementation of the measures described above, we conclude that potential impacts on agricultural land would be adequately prevented or mitigated.

One commentor expressed concern about potential damage to a drainage system on his farm. The FERC Plan would require Columbia to locate drainage systems, check for damage, and repair any damaged systems to as good or better condition. The Ohio Farm Bureau also commented about agricultural drainage systems, as well as farming, soils,

agricultural mitigation plans and inspections, which are discussed here and in sections A and B.1. Another commenter expressed concern about the loss of grazing for her horses. The FERC Plan requires pipeline companies to develop grazing deferment plans in coordination with willing landowners in order to minimize grazing disturbance.

BXP Abandonment

The BXP Abandonment would temporarily cause impacts on 95.2 acres of agricultural lands during construction. Of these, more than half of the impacts would be from contractor yards and staging areas (see table B.3-4). Columbia would follow the same measures as outlined above and as discussed in its ECS to avoid, minimize, or mitigate impacts. Once construction was complete, the majority of the areas impacted would be restored and typical agricultural practices would be allowed to resume, including 0.3 acre within the permanent right-of-way of the Wellston Lateral and within the 0.3 acre of the John's Creek Point of Receipt. The remaining 13.1 acres of land that are part of operation of the BXP Abandonment include 10.3 acres of the Oak Hill Pond, 2.4 acres for new permanent access roads associated with the BXP Replacement and Abandonment, and 0.4 acre associated with aboveground facilities that are also part of the BXP Replacement. The overall permanent impact from the abandonment portion of the Project would be negligible.

Developed Land

Developed land composes about 9 percent of the Project acreage and consists of roads as well as industrial, commercial, and residential areas. About 136.6 acres of developed land would be affected during construction as presented in table B.3-4. The Project would have minimal impacts on railroads, highways, and most paved roads as they would be crossed by the conventional subsurface boring method (see appendix A-8). Columbia would cross unpaved roads and driveways using the open-cut method, but would restore these roads to pre-construction conditions. Transportation impacts are discussed in section B.6.2. About 46.8 acres of developed lands would be maintained for operation of the Project following construction as part of permanent access roads, aboveground facilities, or permanent right-of-way.

BXP Replacement

The BXP Replacement would temporarily cause impacts on 124.9 acres of developed land during construction, 36.6 acres of which would be permanently maintained for operation of the R-801 pipeline following construction. The 88.3 acres of developed land that would not be maintained for operation would be restored at the completion of the BXP Replacement in accordance with individual landowner negotiations. Given the already disturbed nature of developed land, we conclude no significant impacts would occur from construction and operation of the BXP Replacement.

BXP Abandonment

The BXP Abandonment would temporarily cause impacts on 94.4 acres of developed land during construction, 13.3 acres of which would be permanently maintained for operation of the Project following construction. Columbia would restore the 81.1 acres of developed land not be maintained for operation in accordance with individual landowner negotiations. Given the already disturbed nature of developed land, we conclude no significant impacts would occur from construction and operation of the BXP Abandonment.

5.2 Residential Land and Planned Developments

Residential developments compose 1.5 percent of the Project acreage. The Project would affect 23.0 acres of residential land (a subset of developed land) during construction, of which 5.6 acres would be within the pipeline permanent right-of-way and 0.6 acre (total of 6.2 acres) would be converted for use as permanent access roads and cathodic protection. A list of residences and buildings within 50 feet of construction workspace is provided in appendix B.5-1.

BXP Replacement

The BXP Replacement would temporarily cause impacts on 16.2 acres of residential land during construction, 5.9 acres of which would be permanently maintained for operation of the R-801 pipeline following construction.

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

Columbia would install about 0.3 mile of the R-801 pipeline from MPs 64.1 to 64.2 and from MPs 65.9 to 66.2 within the existing R-500 trench through the "lift and lay" method. At those locations, Columbia would cut, remove, and replace the old sections of the R-500 in the same trench with the new R-801 pipeline. Columbia would use this technique at these two locations due to residential encroachment and to avoid direct impacts on the adjacent residences.

To minimize potential disruptions on residential areas near construction work areas, Columbia would contact affected landowners prior to construction. In addition, Columbia would work to ensure construction activities progress in a timely manner to minimize the residence's exposure to noise, dust, and the general presence of construction activities. To further minimize impacts on residential areas crossed by the BXP Replacement, Columbia would:

- ensure piping was installed as quickly as reasonably possible by pre-assembling pipe segments before trenching;
- ensure that a residence's utilities were not disrupted or if necessary, provide advance notice of outages to homeowners;
- backfill trenches as soon as pipe was laid or use steel plates or timber mats to cover the open trench;
- install temporary safety fencing for residences within 25 feet for a distance of 100 feet on either side of the residence to control access;
- maintain traffic flow and access;
- preserve mature trees and landscaping where practicable; and
- restore all lawn areas, landscaping, and disturbed areas per its ECS and terms of the individual easements.

Columbia developed site-specific construction plans for the 64 identified houses within 50 feet of the proposed BXP Replacement construction work areas (see appendix A-9). Of these, two are homes that would be crossed by the pipeline centerline (at MPs 2.4 and 27.0). Columbia has reached agreements with the landowners to purchase and remove these two houses. Four other homes are within the proposed construction workspace and could need to be relocated or removed. However, Columbia stated that the mobile home near MP 11.1 would be relocated by the owner and that a home at MP 17.3 would be avoided by a reduction of the temporary workspace. A house at a proposed staging area near MP 26.8 is unoccupied. The house would be left in place and avoided during construction, with no direct impacts to the structure. Finally, a house near MP 27.0 is unoccupied, and Columbia stated that it is in active negotiations to purchase it.

Columbia would implement special construction methods designed for working in limited workspaces near homes as described in section A.7.2 and in Columbia's ECS. These site-specific construction plans include a dimensioned drawing depicting the residence in relation to the pipeline; workspace boundaries; the proposed permanent right-of-way; and structures, roads, and miscellaneous features (see appendix A-9). The driveways of several residences would be partially or wholly within the construction work area. In order to ensure access to these homes during construction, Columbia would coordinate with landowners to ensure that the landowners have access to their homes through use of detours or use of steel plates to cover the trench, as described in more detail

in section B.6. We have reviewed the site-specific residential construction plans and find them to be acceptable. However, the owners of each of these residences are encouraged to provide comments on the plan for their individual property.

Columbia has provided confirmation for all tracts where construction would be within 10 feet of a residence with the exception of parcels OH-JA-090.320 or OH-LA-131.000. Columbia indicated that the status of landowner negotiations at these two parcels were "in progress" via active discussions with the landowners' legal representation. **We recommend that:**

- **<u>Prior to construction</u>, Columbia shall file with the Secretary evidence of landowner concurrence with the site-specific residential construction plans for parcels OH-JA-090.320 and OH-LA-131.000 where construction work areas will be within 10 feet of a residence.**

Columbia would conduct inspections after the first and second growing seasons. For any residential land that had not been successfully restored and revegetated, Columbia would conduct follow-up actions such as reseeding of the property in accordance with its ECS and easement agreements. Given the measures outlined above, in conjunction with the site-specific plans and our recommendation, overall impacts on residential land from construction of the BXP Replacement would generally be short-term (with the exception of any properties Columbia purchases and converts to its desired use). Depending on the specific vegetation type affected and its ability to be restored to pre-construction conditions, some residences would experience long-term and permanent impacts associated with the visual change in the landscape such as the loss of mature trees. Compensation for such impacts would be negotiated between individual landowners and Columbia during the easement process.

A commentor asked about potential loss of residential natural gas service at his home, as well as the effect of pipeline abandonment upon his use of existing easements. Columbia indicated in its response to scoping comments that the subject residential natural gas service would not be affected and that it would retain easement rights over the abandoned pipeline.

No planned residential, commercial, or industrial developments were identified within 0.25 mile of the BXP Replacement.

<u>BXP Abandonment</u>

The BXP Abandonment would temporarily cause impacts on 8.3 acres of residential land during construction, 0.2 acre of which would be permanently maintained for operations following construction. Mitigation measures outlined above for the replacement portion of the Project regarding residences would also be implemented for the BXP Abandonment. Columbia developed site-specific construction plans for the 36 houses

within 50 feet of the BXP Abandonment (17 of which are also within 50 feet of the BXP Replacement) construction work areas (see appendix A-9). Of these, eight are within 10 feet of the BXP Abandonment work areas. We have reviewed the site-specific residential construction plans and find them to be acceptable. However, the owners of each of these residences are encouraged to provide comments on the plan for their individual property. Additionally, as stated above, Columbia would be required to file landowner concurrence of site-specific plans for residences within 10 feet of construction work areas.

5.3 Mining Lands and Hazardous Waste Sites

The Project would cross or be within 0.25 mile of several active and inactive surface and underground mines. Mineral resources and mining in the Project area are discussed in detail in section B.1.1.

Hazardous waste sites potentially affecting groundwater resources are discussed in section B.2.1. The BXP Replacement component would cross two hazardous waste sites, both in Lawrence County, Ohio: South Point Plant (South Point Ethanol) and the Columbia-owned South Point RS. As discussed in section B.2, the South Point Plant (a former Superfund site) near MP 62.4 would not be crossed by pipeline facilities, but would be used by Columbia for two contractor yards (CY-004-B and CY-005-B). Yard CY-005-B is characterized as an industrial land use. No improvements are anticipated at this location. Yard CY-004-B is currently characterized as having a vacant industrial land use, and site improvements would include stripping topsoil, limited grading, installation of geotextile fabric and rock, and installation of electric and internet service. We included a recommendation in section B.2 that Columbia develop a site mitigation plan in coordination with the EPA to ensure that ongoing site remediation efforts are not impacted. With implementation of this recommendation, potential impacts would be avoided.

The South Point RS is listed as "small quantity generator" by the OEPA, but is not associated with known releases and there is no known existing soil or groundwater contamination at the site. Therefore, no significant impacts are anticipated due to construction of the Project.

5.4 Public Land, Recreation, and Special Interest Areas

The Project would not cross any known landfills, remnant prairie, Native American reservations, NPS units, state parks, state forests, or community parks. However, the Project would cross several areas identified as public lands, recreation, and special interest areas, including the WNF, the Wellston Wildlife Area, and several conservation easements and land trusts (see table B.5-1).

TABLE B.5-1
Recreation, Public Interest, and Conservation Areas Crossed by the Project

Ownership	Name/ Conservation Program	Begin MP	End MP	Crossing Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Collocated	Project Effects	Status of Coordination	Avoidance, Minimization, or Mitigation
BXP Replacement										
Private	Conservation Reserve Program	0.8	0.8	248	0.8	0.3	No	Ground disturbance	Agreement executed. CRP contract to end September 30, 2023.	Reseed with required warm season grass seed mix. The seed mix would be included in the construction contractor documents.
ODNR	Wellston Wildlife Area	2.6	2.9	1,361	4.7	1.6	Yes	Tree clearing; Grading	In progress. Standard Use Application submitted by Columbia on May 30, 2018. Relevant environmental impact information submitted to the ODNR July 25, 2018.	Collocation with the existing R-701 pipeline corridor
		3.5	3.7	971	2.6	1.1	Partial			Partial collocation with the existing R-701 pipeline corridor.
Private	Conservation Reserve Program	8.1	8.2	195	0.5	0.2	Yes	Ground disturbance	Agreement executed, CRP contract to end on September 30, 2019 prior to construction. The landowner now plans to renew the contract.	Collocation with the existing R-701 pipeline corridor.

TABLE B.5-1
Recreation, Public Interest, and Conservation Areas Crossed by the Project

Ownership	Name/ Conservation Program	Begin MP	End MP	Crossing Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Collocated	Project Effects	Status of Coordination	Avoidance, Minimization, or Mitigation
Private	Conservation Reserve Program	18.8	18.8	201	0.7	0.2	No	Tree clearing; Grading	Agreement executed, CRP contract to end September 30, 2025. USDA County Executive Director advised that there were no construction restrictions.	Reseed with required warm season grass seed mix. Seed mix would be included in construction contract documents.
Private	Stull Wetland – ODNR Conservation Site	20.6	21.2	2,690	8.1	3.1	No	Ground disturbance	Agreement executed.	Impacts would primarily occur in uplands. Impacts on wetlands would be limited to emergent wetlands consisting of 1 acre during construction and 0.4 acre during operation. No permanent wetland vegetation conversion impacts. Columbia would reseed the right-of-way per the ECS.
Private	Cackley Swamp	24.8	25.0	604				Avoided by HDD		

TABLE B.5-1
Recreation, Public Interest, and Conservation Areas Crossed by the Project

Ownership	Name/ Conservation Program	Begin MP	End MP	Crossing Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Collocated	Project Effects	Status of Coordination	Avoidance, Minimization, or Mitigation
Appalachia Ohio Alliance	Cackley Swamp	25.5	26.0	2,457	7.4	2.8	Yes	Tree Clearing; Grading	In progress	Collocation with existing R-System Pipelines. Columbia would reseed the right-of-way per the ECS.
Ohio Valley Conservation Coalition	Black Fork Swamp	29.7	30.1	2,072	6.5	2.4	Yes	Tree Clearing; Grading	In progress	Collocation with existing R-System Pipelines. Columbia would reseed the right-of-way per the ECS.

TABLE B.5-1
Recreation, Public Interest, and Conservation Areas Crossed by the Project

Ownership	Name/ Conservation Program	Begin MP	End MP	Crossing Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Collocated	Project Effects	Status of Coordination	Avoidance, Minimization, or Mitigation
USFS	WNF (Ironton District)	31.3	32.5	6,503	229.9	86.9	Yes	Tree clearing, forest fragmentation, trail crossings; Grading	In progress	Collocation with existing R-System pipelines where practicable. Columbia would reseed the right-of-way per the ECS and a WNF-specific seeding plan. All activities would be in compliance with the USFS authorization requirements.
		33.0	33.8	4,222			Yes			
		34.2	35.0	4,601			No			
		35.3	36.7	7,018			Partial (35.3-36.3)			
		36.8	36.9	387			No			
		37.1	38.5	7,555			Partial (37.1-37.9)			
		38.7	38.7	126			No			
		38.8	39.5	3,810			Yes			
		40.4	40.6	992			Yes			
		41.3	41.4	203			Yes			
		41.7	42.2	3,066			Partial (41.7-41.9)			
		43.7	44.7	4,962			Yes			
		45.6	46.9	7,158			Yes			
		47.3	50.3	15,494			Partial (47.3-48.0)			
		50.4	50.5	659			No			

TABLE B.5-1
Recreation, Public Interest, and Conservation Areas Crossed by the Project

Ownership	Name/ Conservation Program	Begin MP	End MP	Crossing Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Collocated	Project Effects	Status of Coordination	Avoidance, Minimization, or Mitigation
BXP Abandonment										
Private	Conservation Reserve Program	A0.6	A0.6	113	0.2	0.0	n/a	Ground disturbance within the existing right-of-way and open field.	Agreement executed, CRP contract to end September 30, 2023.	Reseed with required seed mix. Seed mix would be included in construction contract documents.
ODNR	Wellston Wildlife Area	A2.5	A2.6	477	0.5	0.0	n/a	Ground disturbance within the existing right-of-way	Columbia stated that coordination was in progress. Columbia submitted an application on May 30, 2018 and environmental information on July 25, 2018.	Impacts would occur within Columbia's existing right-of-way. Columbia would reseed the right-of-way per the ECS.
		A2.9	A3.0	148	0.3	0.0	n/a	n/a	Columbia stated that coordination was in progress. Columbia submitted an application on May 30, 2018 and environmental information on July 25, 2018.	Impacts would occur within Columbia's existing right-of-way. Columbia would reseed the right-of-way per the ECS.

TABLE B.5-1

Recreation, Public Interest, and Conservation Areas Crossed by the Project

Ownership	Name/ Conservation Program	Begin MP	End MP	Crossing Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Collocated	Project Effects	Status of Coordination	Avoidance, Minimization, or Mitigation
Private	Jackson County Soil and Water Conservation District	A6.7	A6.7	107	0.1	0.0	n/a	Some clearing for access; Columbia would limit activities to use of an existing permanent easement for access.	Columbia's legal counsel is working with the landowner's legal counsel.	Impacts would occur within Columbia's existing right-of-way.
Private	Stull Wetland – ODNR Conservation Site	A19.2	A19.4	1,202	1.4	0.0	n/a	Ground disturbance within the existing right-of-way	Negotiations between Columbia and the landowner group are in progress.	Impacts would occur in uplands.
Appalachia Ohio Alliance	Cackley Swamp	A23.4	A23.8	2,050	2.4	0.0	n/a	Ground disturbance within the existing right-of-way	In progress	Impacts would occur within Columbia's existing right-of-way.
USFS	WNF (Ironton District)	A29.9	A30.3	2,137	33.1	2.6	n/a	Ground disturbance within the existing right-of-way	In progress	Impacts would occur within Columbia's existing right-of-way.
		A31.2	A31.2	219						
		A31.9	A32.1	824						
		A32.1	A32.1	138						
		A33.1	A33.9	4,002						
		A34.8	A34.9	131						
		A34.9	A34.9	256						
		A35.5	A35.7	558						
		A38.6	A38.7	257						

TABLE B.5-1
Recreation, Public Interest, and Conservation Areas Crossed by the Project

Ownership	Name/ Conservation Program	Begin MP	End MP	Crossing Length (feet)	Land Affected During Construction (acres)	Land Affected During Operation (acres)	Collocated	Project Effects	Status of Coordination	Avoidance, Minimization, or Mitigation
		A39.3	A39.4	622						
		A40.9	A41.1	1,339						
		A41.1	A41.2	120						
		A44.0	A44.0	155						
		A44.5	A44.7	923						
		A45.5	A45.5	145						
		A45.5	A45.6	146						
		A45.6	A45.6	142						
		A45.7	A46.0	1,464						
Appalachia Ohio Alliance	Cackley Swamp	D1.1	D1.1	93	0.1	0.0	n/a	Ground disturbance within the existing right-of-way	In progress	Impacts would occur within Columbia's existing right-of-way.

Abbreviations and notes:

n/a not applicable

CRP Conservation Reserve Program

The total acreages for impacts on the WNF for Replacement and Abandonment should not be summed as there would be some overlap in workspaces.

The Project would cross 12.6 miles of the WNF for the BXP Replacement and 2.6 miles for the BXP Abandonment, but the crossings would not be continuous. Rather, the WNF would be crossed in multiple segments covering an area about 19 miles in length. A detailed discussion of resources and potential impacts on the WNF is provided further below in this section.

The Wellston Wildlife Area would be crossed between MPs 2.6 and 2.9 and between MPs 3.5 and 3.7. The ODNR-managed Wellston Wildlife Area is 1,414 acres in size, including 325-acre Lake Rupert at its center. It is open to the public for fishing, boating, and hunting, as well as the lake providing a water source for the city of Wellston. Construction of the BXP Replacement would affect 7.3 acres of the Wellston Wildlife Area, of which 2.7 acres would be within the permanent right-of-way. Because the replacement portion of the Project would not cross the lake and would not cross or limit access to the public boat ramp, there would be no direct impacts on users fishing or boating within the lake. During construction, Columbia would prohibit hunting within the construction workspace. However, given the limited crossing distance, impacts on hunters would be temporary and minor. Tree felling would occur, but trees would be allowed to regrow in temporary workspaces following restoration. Impacts on forested areas would be further minimized by collocating the proposed R-801 pipeline with the existing R-701 pipeline corridor in the Wellston Wildlife Area.

During the BXP Abandonment, construction activities within the wildlife area would be limited to areas within the existing right-of-way and would affect 0.5 acre. Columbia would fill the portion of the pipe under Lake Rupert with flowable fill (concrete) and abandon it in place; no direct impacts on the lake are expected. Given the activities and proposed mitigation measures, we conclude that impacts on the Wellston Wildlife Area would be adequately minimized.

Columbia would cross or be within close proximity to several conservation easements and land trusts. The Conservation Reserve Program (CRP) is managed and administered by USDA's Farm Service Agency with technical assistance provided by USDA's NRCS. The program provides eligible farmers and ranchers both technical and financial assistance to conserve and protect soil, water, and related natural resources on their land. The Project would affect a total of 2.0 acres of CRP lands at MP 0.8, between MPs 8.1 and 8.2, and at MP 18.8 during construction of the BXP Replacement. Construction on the parcel at MP 18.8 would result in some tree clearing. Based on Columbia's coordination with the landowners, the CRP contract on the parcel at MP 8.1 is set to end before the start of construction; however, the landowner plans on renewing the contract. The other two parcels have contracts that are scheduled to end after completion of construction. The parcels would be reseeded with the required seed mix, and the USDA's County Director indicated that there would be no restrictions on Project construction activities. No permanent impacts are expected to CRP lands due to

construction or operation of the Project, except for the conversion of cleared forested land to open land at MP 18.8. However, these impacts are expected to be minor.

Construction of the BXP Replacement would cross Cackley Swamp, partially owned and managed by the Appalachia Ohio Alliance, between MPs 25.5 and 26.0. Construction within the swamp would affect 7.4 acres, including tree clearing. Columbia would limit the extent of the impacts by collocating the pipeline through this area with an existing Columbia-owned pipeline. While tree clearing would result in permanent loss of trees, the overall impact would be minor.

Between MPs 29.7 and 30.1 of the BXP Replacement, 6.5 acres of land owned by the OVCC would be impacted during construction. The replacement pipeline would be collocated with existing Columbia-owned rights-of-way through the OVCC land, minimizing the overall impact to the area. Abandonment activities within the OVCC land would be limited to the existing permanent easement for the R-501 pipeline, and no new land would be impacted during construction. We received letters from the OVCC and the OEPA regarding this parcel focusing on the environmental resources protected by the conservation easement funded by OEPA. We evaluated the concerns in detail in section C.4 and concluded that Columbia's commitments to utilize the protective dam-and-pump dry-crossing method at Black Fork Creek and Cambria Creek, reduce the size of temporary workspaces, and to accomplish revegetation in coordination with OVCC would adequately mitigate impacts at this parcel.

The BXP Abandonment would cross a conservation easement owned by the Jackson County Soil and Water Conservation District at MP A6.7. The site's purpose was for wetland restoration in the Sandy Run and Little Raccoon Creek watersheds. The proposed construction activities would include access, removal of exposed sections of the R-501 pipeline, and removal of a pipeline crossover. Because Columbia maintains a permanent easement at this location, and abandonment activities would be restricted to Columbia's easement, no permanent impacts on the Jackson County Soil and Water Conservation District easement are anticipated.

The privately owned Stull Wetland is a conservation site that would be crossed by the BXP Replacement from MPs 20.6 to 21.2, with a crossing length of 2,690 feet affecting 8.1 acres during construction. Columbia stated that it developed the proposed route to avoid impacts on forested wetlands in Stull Wetland. Construction wetland impacts in this area would be temporary and limited to about 1 acre of emergent (PEM) wetland. Columbia's permanent easement would encompass 3.1 acres of Stull Wetland overall, but mostly in areas not delineated as wetland. Only 0.4 acre of permanent wetland (emergent) impact would result.

BXP Abandonment activities would affect Stull Wetland between MPs A19.2 and A19.4 on an existing Columbia easement. The area is managed by the ODNR, and the crossing site contains agricultural areas and open land; no trees would be felled, and no

wetlands were delineated in the area that would be affected by the BXP Abandonment. For those reasons, we conclude that Stull Wetland would not be impacted by the abandonment activities.

Three additional recreation and special use areas are within 0.25 mile of the Project; Cooper Hollow Wildlife Area, Elkins Creek Horse Camp, and the Fairgreens Golf Club. The Cooper Hollow Wildlife Area is 0.2 mile east of MP 25.0 of the BXP Replacement. The wildlife area is popular for recreational opportunities, including hunting, fishing, hiking, and wildlife watching (ODNR, 2017g). Elkins Creek Horse Camp and Tack Shop is 0.25 mile west of the proposed BXP Replacement between MPs 47.1 and 47.4. The wildlife area and horse camp are far enough from the Project area that noise impacts are not expected.

Fairgreens Golf Club is about 200 feet west of a proposed work area associated with abandonment of the pipeline at a road crossing near MP A11.9. Given the proximity to Project activities, there could be negligible to minor noise impacts associated with equipment and personnel. However, these impacts would be limited to the period of construction activity at this one site, likely intermittently over several months, and would be temporary.

The James A. Rhodes Airport is approximately 900 feet west of MP 19.5 and would be avoided due to a reroute adopted by Columbia in October 2018. The reroute was prompted by information from the Federal Aviation Administration (FAA) regarding avoidance of FAA-designated safety zones.

An indoor horse arena is proposed to be built about 150 feet from the BXP Replacement pipeline between MPs 12.7 and 12.8, although there is no definitive schedule for completion. We do not anticipate impacts on this area because the pipeline would be installed underground using HDD between MPs 12.7 and 12.9. Further, the Project would not cross any areas identified as growth areas and/or planned road or bridge projects.

Wayne National Forest

The WNF is managed by the USFS and encompasses 244,265 acres composed of 3 units within 12 Ohio counties. The Project would cross the Ironton District of the WNF in Gallia and Lawrence Counties. Construction of the Project would cross 12.6 miles of the WNF and impact 245.2 acres during construction and 87.4 acres during operation. Detailed data regarding Project impacts for land use types on WNF lands is provided in table B.5-2. A detailed discussion regarding the potential impacts of the Project on vegetation types (which directly relate to land use types) within the WNF can be found in section B.3.1. A discussion regarding impacts on wetland and waterbodies within the WNF can be found in section B.2.

TABLE B.5-2
Summary of Land Use Impacts on Wayne National Forest Lands a/, b/, c/

Facility	Agricultural		Developed (Industrial)		Developed (Residential)		Forest		Open Land		Wetlands d/, e/		Project Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
BXP Replacement f/														
Pipeline														
Right-of-Way	0.8	0.5	0.6	0.2	0.0	0.0	186.51	73.2	4.2	2.5	0.2	0.1	192.2	76.5
ATWS	0.0	0.0	0.1	0.0	0.0	0.0	9.1	0.0	3.0	0.0	0.0	0.0	12.2	0.0
Staging Areas/ Contractor Yards	1.7	0.0	0.4	0.0	0.1	0.0	0.8	0.0	8.1	0.0	0.3	0.0	11.3	0.0
Access Roads	0.2	0.2	0.1	0.1	0.0	0.0	5.4	1.9	0.9	0.2	0.0	0.0	6.6	2.4
Cathodic Protection	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	7.7	7.7	0.0	0.0	7.9	7.9
Oak Hill Pond	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
Subtotal	*2.7*	*0.7*	*1.1*	*0.3*	*0.1*	*0.0*	*201.8*	*75.3*	*23.9*	*10.4*	*0.5*	*0.1*	*230.3*	*86.8*
Aboveground Facilities														
None														
BXP Replacement Total	**2.7**	**0.7**	**1.1**	**0.3**	**0.1**	**0.0**	**201.8**	**75.3**	**23.9**	**10.4**	**0.5**	**0.1**	**230.3**	**86.8**
BXP Abandonment f/														
Pipeline														
R-501 Right-of-Way	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.0	16.1	0.0	<0.1	0.0	16.6	0.0
R-500 Right-of-Way	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
Wellston Lateral	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
R-530 Right-of-Way	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
ATWS	0.0	0.0	<0.1	0.0	0.0	0.0	<0.1	0.0	<0.1	0.0	0.0	0.0	<0.1	0.0
Staging Areas/ Contractor Yards	1.6	0.0	0.4	0.0	0.1	0.0	0.8	0.0	7.7	0.0	0.3	0.0	10.9	0.0
Access Roads	0.2	0.2	0.3	0.3	0.0	0.0	4.6	1.7	0.2	0.2	0.0	0.0	5.3	2.3
Oak Hill Pond	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
Subtotal	*1.9*	*0.2*	*1.0*	*0.3*	*0.1*	*0.0*	*5.4*	*1.7*	*24.1*	*0.2*	*0.4*	*0.0*	*32.8*	*2.3*

TABLE B.5-2

Summary of Land Use Impacts on Wayne National Forest Lands a/, b/, c/

Facility	Agricultural		Developed (Industrial)		Developed (Residential)		Forest		Open Land		Wetlands d/, e/		Project Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
Aboveground Facilities														
Markin Fork VS	0.0	0.0	0.2	0.2	0.0	0.0	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.3	0.3
Subtotal	*0.0*	*0.0*	*0.2*	*0.2*	*0.0*	*0.0*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*0.0*	*0.0*	*0.3*	*0.3*
BXP Abandonment Total	**1.9**	**0.2**	**1.2**	**0.5**	**0.1**	**0.0**	**5.4**	**1.7**	**24.1**	**0.2**	**0.4**	**0.0**	**33.0**	**2.6**
Project Total g/, h/	**2.7**	**0.7**	**1.8**	**0.7**	**0.1**	**0.0**	**202.0**	**75.5**	**38.0**	**10.4**	**0.6**	**0.1**	**245.2**	**87.4**

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/ Land affected during construction includes all areas identified for temporary (construction) and permanent (operation) use.

c/ Land affected during permanent (operation) use only.

d/ The construction impact acreages shown in this table do not account for those wetland areas that would be avoided through the use of horizontal directional drill to install the pipeline, but they do include the impacts associated with the use of temporary matting (e.g., timber mats, board mats) to facilitate vehicle and equipment access across wetland areas.

e/ Operational impacts on wetlands would be associated with permanent fill and the conversion of forested and scrub-shrub wetlands to non-forested or non-woody wetland types over a portion of the maintained permanent pipeline right-of-way. The operational impact acreages shown in this table represent the acres of wetland that fall within the 50-foot-wide permanent right-of-way or within a permanent access road where permanent fill would occur.

f/ Certain work areas (e.g., aboveground facilities, temporary workspace, staging areas, contractor yards, access roads) would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these work areas are included with each applicable Project component.

g/ The Project Total represents the impact associated with the overall Project-wide disturbance area without double counting impacts associated with overlapping work areas between the BXP Replacement and BXP Abandonment components.

h/ The USFS is considering alternatives to the proposed abandonment in place of the R-501 pipeline that would consist of physically removing the abandoned pipeline from WNF lands in whole or in part. Implementing either of these alternatives (discussed as WNF Removal Alternatives 1 and 2 in section C.4 of this EA) would substantially change the total affected acreages listed within this section. The total acreages associated with implementing these alternatives are reported in section C.4.

Seven public roads would be crossed by the Project on WNF lands. These roads and pertinent details are listed in table B.5-3. Construction activities, potential impacts, and mitigation measures for roads are discussed in sections A.7 and B.6.

TABLE B.5-3
Public Roads Crossed by the R-801 Pipeline on Wayne National Forest Lands

Road/Railroad	Milepost	Proposed Crossing Method	Surface Type	Road Type
Gallia County, Ohio				
C H and D Road	33.3	Open-Cut	Gravel	County
Hoadley Road	34.4	Open-Cut	Gravel	Township
Lawrence County, Ohio				
NF 212 (Forest Road 212)	37.3	Bore	Gravel	USFS
Township Highway 129 / Waterloo - Mt. Vernon Road	38.1	Open-Cut	Gravel	Township
Township Road 196 W (Gum Stump Road)	44.0	Open-Cut	Dirt	Township
County Road 5 (Elkins Creek - Storms Creek Road)	47.3	Bore	Asphalt	County
Township Highway 256 (Martin Road)	49.4	Bore	Asphalt	Township

Columbia would use 10 access roads for the BXP Replacement and Abandonment components on WNF lands. Eight of the roads would be used for both components, with one unique road proposed for each of the BXP Replacement and Abandonment. Two of the roads would be new, the others would require modifications of existing roads. Columbia would maintain six different access roads for permanent use; four would be used for both replacement and abandonment purposes and one each would be used exclusively for each component. Additionally, the WNF requested that selected temporary roads be left in place for use by WNF staff, as indicated in the final COM Plan. Columbia and WNF are coordinating which roads would be left in place. Access roads and pertinent details, including the required construction activities and disturbance, are listed in table B.5-4.

TABLE B.5-4
Access Roads on Wayne National Forest Lands

Milepost	Road ID	Temporary/ Permanent	New/ Existing	Existing Land Use	Proposed Modifications	Length (feet)	Existing Width (feet)	Proposed Width (feet)	Construction Impacts (acres)	Operation Impacts (acres)
BXP Replacement a/										
32.1	TAR-GA-004-B	Temporary	Existing	Dirt path and tree lined	Widening, blading, and placement of geotextile fabric and gravel	1,266	10	25	0.7	0
32.5	TAR-GA-005-B	Temporary	New	Wooded area	Tree clearing, blading, and placement of geotextile fabric and gravel	727	0	25	0.4	0
35.4	PAR-GA-001-B	Permanent	New	Farm field	Blading and placement of geotextile fabric and gravel	362	0	25	0.2	0.2
42.1	PAR-LA-001.3B-B	Permanent	Existing	Farm land and gravel driveway	Culvert installation, widening, blading, and placement of geotextile fabric and gravel	2,588	10	25	1.5	1.5
44.0	TAR-LA-004-B	Temporary	Existing	Dirt path	Widening, blading, and placement of geotextile fabric and gravel	4,896	10	25	2.8	0
45.7	PAR-LA-001.3C-R	Permanent	Existing	Gravel drive	Widening, blading, and placement of geotextile fabric and gravel	900	10	25	0.5	0.5
48.0	PAR-LA-001.3D-B	Permanent	Existing	Gravel drive	Widening, blading, and placement of geotextile fabric and gravel	1,567	10	25	1.0	1.0
48.8	TAR-LA-001.3E-B	Temporary	Existing	Dirt path	Widening, blading, and placement of geotextile fabric and gravel	1,389	10	25	0.8	0

TABLE B.5-4
Access Roads on Wayne National Forest Lands

Milepost	Road ID	Temporary/ Permanent	New/ Existing	Existing Land Use	Proposed Modifications	Length (feet)	Existing Width (feet)	Proposed Width (feet)	Construction Impacts (acres)	Operation Impacts (acres)
49.0	PAR-LA-001.3E-B	Permanent	Existing	Gravel drive	Widening, blading, and placement of geotextile fabric and gravel	58	10	25	0.1	0.1
BXP Abandonment a/										
A30.0	TAR-GA-004-B	Temporary	Existing	Dirt path and tree lined	Widening, blading, and placement of geotextile fabric and gravel	1,106	10	25	0.6	0
A30.3	TAR-GA-005-B	Temporary	New	Wooded area	Tree clearing, blading, and placement of geotextile fabric and gravel	604	0	25	0.4	0
A33.1	PAR-GA-001-B	Permanent	New	Farm field	Blading and placement of geotextile fabric and gravel	241	0	25	0.2	0.2
A39.3	PAR-LA-001.3B-B	Permanent	Existing	Farm land and gravel driveway	Culvert installation, widening, blading, and placement of geotextile fabric and gravel	2,588	10	25	1.5	1.5
A41.1	TAR-LA-004-B	Temporary	Existing	Dirt path	Widening, blading, and placement of geotextile fabric and gravel	4,384	10	25	2.5	0
A44.5	PAR-LA-001.3D-B	Permanent	Existing	Gravel drive	Widening, blading, and placement of geotextile fabric and gravel	2,098	10	25	1.2	1.2
A45.5	PAR-LA-001.3E-B	Permanent	Existing	Gravel drive	Widening, blading, and placement of geotextile fabric and gravel	58	10	25	<0.1	<0.1

TABLE B.5-4
Access Roads on Wayne National Forest Lands

Milepost	Road ID	Temporary/ Permanent	New/ Existing	Existing Land Use	Proposed Modifications	Length (feet)	Existing Width (feet)	Proposed Width (feet)	Construction Impacts (acres)	Operation Impacts (acres)
A45.5	TAR-LA-001.3E-B	Temporary	Existing	Dirt path	Widening, blading, and placement of geotextile fabric and gravel	105	10	25	0.1	0
A45.6	PAR-LA-001.4-A	Permanent	Existing	Gravel driveway	Add gravel if needed	425	25	25	0.2	0.2

a/ Certain work areas, such as access roads, would be used for activities associated with both BXP Replacement and BXP Abandonment components. In such cases and for the purposes of this table, these work areas are included with each applicable Project component.

Abbreviations:

PAR Permanent Access Road

TAR Temporary Access Road

There are over 400 miles of recreation trails within the WNF that provide the public with opportunities for hiking, horseback riding, mountain biking, and all-terrain vehicle riding. Many other opportunities for recreation are available within the WNF, including hunting, fishing, camping, and canoeing (USFS, 2017b). The Project area would be more than 2 miles from the nearest recreational area, except for the Elkins Creek Horse Camp and Tack Shop which includes a campground and access to approximately 100 miles of trails including horse trails within the WNF (Elkins Creek Horse Camp and Tack Shop, 2019). The Elkins Creek Horse Camp and Tack Shop would be 0.25 mile west of the BXP Replacement component between MPs 47.1 and 47.4. However, the Replacement component would cross the Vesuvius Main Loop Trail between MPs 45.7 and 47.9 and abuts the trail between MPs 45.7 and 46.2 and MPs 47.9 and 48.0 (see appendix B.5-2). Additionally a portion of the existing R-501 right-of-way that crosses the trail would be used as an access path during construction. The trail is used for hiking throughout the year and is open for horseback riding between April 15 and December 15.

Columbia has stated that it is continuing to coordinate with the WNF to establish safety protocols for working near the Vesuvius Main Loop Trail. These measures would, if approved by the USFS, include safety fencing and posting signs/or stationing personnel at the crossing to assist trail users during construction. Temporary trail closures would be necessary during construction. Columbia would work with the WNF to alert the public of the timing and duration of the closures. Closure of the trail would result in a temporary impact to trail users. Additional impacts on trail users would be due to construction noise and changes to the viewshed. Noise impacts would be limited to the period of construction, with the main sources from equipment and personnel as discussed in section B.8.2. Access roads crossing WNF lands are listed and described above in table B.5-4. Visual impacts are discussed below in section B.5.5. The impacts on users of the trail would be minimal with implementation of Columbia's mitigation measures described above and other measures if deemed necessary by USFS staff.

The FERC Plan (as adopted within Columbia's ECS) requires Columbia to coordinate with the WNF regarding unauthorized off-road vehicle access and to implement measures such as signs, fences, gates, timber or other types of barriers, and/or tree planting. Columbia committed to installing fences and locking gates where the BXP would cross roads within the Project's WNF footprint, but recommended against using timbers or boulders in consideration of the safety off-road vehicle users. The USFS and Columbia are continuing to coordinate regarding proposed construction activities that could affect unauthorized access, and potential mitigation measures. Columbia would be required to adopt USFS-mandated mitigation measures on NFS lands as specified in the final COM Plan.

The USFS proposes future forest management activities, such as the Sunny Oaks Project in the WNF. These activities may include prescribed burns, the construction of

new roads, modifications to existing roads, timber harvesting, and manual timber stand improvements. The Sunny Oaks Project is discussed in more detail in section B.10.

Impacts on resources within the WNF would generally be minimized by the extent of collocation of the new R-801 pipeline with existing Columbia-owned pipeline corridors. About 54 percent of the proposed R-801 route within the WNF would be collocated (see appendix A-4b). Columbia stated that the other areas within the WNF could not be collocated due to avoidance of ravines, steep vertical slopes, steep side slopes, wetlands, and waterbodies, all of which would affect constructability or sensitive resources (see appendix A-4c).

Given the degree of collocation that was maximized to the extent practical, and the impact avoidance, minimization, and mitigation measures that Columbia would use on WNF lands, including those specified in the final COM Plan, we conclude that impacts on the WNF would be adequately minimized, and mostly temporary (with the obvious exception of forested vegetation removal).

5.5 Visual Resources

The Project could alter existing visual resources in three ways: (1) construction activity and equipment may temporarily alter the viewshed; (2) lingering impacts along the right-of-way from clearing during construction could alter existing vegetation patterns; and (3) aboveground facilities would represent permanent alterations to the viewshed. The significance of these visual impacts primarily would depend on the quality of the viewshed, the degree of alteration of that view, the sensitivity or concern of potential viewers, and the perspective of the viewer.

The majority of the land traversed by the BXP Replacement component of the Project consists of rolling hills with a mix of forested areas (53 percent), open land (22 percent), and agricultural land (16 percent).

Impacts would be greatest during construction because of the increased right-of-way needed for construction, the displaced soil, and the presence of personnel and equipment. After construction, temporary workspaces would generally be returned to pre-construction conditions by the restoration methods discussed in Columbia's ECS. Impacts would also be minimized by the proposed R-801 pipeline route's collocation with existing maintained rights-of-way for the BXP Replacement component.

Visual impacts would be most noticeable in areas of forested land. The conversion of forested land to open land has the potential to impact its use as a visual buffer and reduce its aesthetic quality. In restored areas, regrowth to pre-construction conditions would generally take 20 to 30 years for many tree species, such as loblolly pine. Hardwood species, such as oaks, could take up to 50 years or longer to reach maturity. Permanent operation impacts on forest lands would occur along the permanent right-of-way, where

periodic vegetation maintenance activities, such as mowing, would prohibit the regrowth of trees.

Visual resource impacts from the BXP Abandonment component would mainly be limited to the addition of equipment and personnel within the existing permanent rights-of-way during construction, as well as areas of ground disturbance. After construction, these areas would be returned to pre-construction conditions. Areas of exposed pipe would be removed. Therefore, impacts for BXP Abandonment would be minor and temporary, and potentially beneficial.

The visual impacts associated with the new aboveground facilities would have the most potential to cause viewshed impacts (along with forest clearing). Generally, these impacts would be minimized by proximity to adjacent developed areas and by using existing tree buffers for visual screening, or by a combination of both. As part of the BXP Replacement, Columbia would install four new MLVs (MLV-1, MLV-3, MLV-4, and the R-701 MLV Setting) and the new Oak Hill CS/VS (MLV-2) that would be constructed at new locations within the replacement pipeline right-of-way. The proposed MLV sites would be directly over the pipeline, but the MLV sites would not be completely contained within the permanent right-of-way. Columbia has obtained easement agreements for all MLV locations except for MLV-1 and MLV-3. Columbia states that the landowners at both locations were "actively engaged and cooperating in ongoing negotiations" and that "Columbia anticipates that negotiations with both landowners will be successful."

The MLV-4 and R-701 MLV Setting would affect views for nearby residents (four homes and a church) and along the Deering Bald Knob and Sugar Creek-Johnstown Roads, but would not cause visual obstruction to residents or motorists, as the MLVs' chain link fence and aboveground piping would not exceed 8 feet in height. Additionally, trees and vegetation would allow for partial visual screening for motorists in this area. Three of the above-mentioned residences would be on the same parcel where the MLVs would be installed. The other residence is north of Deering Bald Knob Road and the church is west of Sugar Creek-Johnstown Road. Both the fourth residence and the church would be partially screened seasonally by trees and vegetation. In consideration of these factors and because Columbia committed to coordination with landowners near MLV-4 and R-701 MLV to address potential concerns regarding visual impacts (though no comment letters about this topic from concerned landowners have been filed to date), we conclude that visual impacts would be adequately minimized.

The BXP Replacement and BXP Abandonment components at MLVs 1, 2, and 3 along with updates at 17 other existing aboveground facilities have residences in proximity to certain degrees. The construction activities at each of these facilities would vary, but could include the addition of new aboveground piping, expansion of existing fence line, removal of piping, and removal of some minor aboveground components. Given the current viewshed settings at these locations, we conclude that work at existing aboveground facilities would not cause impacts on residences.

Wayne National Forest

The WNF has designated Scenic Integrity Objectives (SIO) of high, medium, or low for different areas of the National Forest. Scenic integrity is the state of naturalness, or conversely, the state of disturbance created by human activities or alteration. Appendix B.5-3 includes maps that show the existing SIO of the WNF lands along the proposed BXP Replacement and Abandonment components. A SIO of high indicates a landscape that appears unaltered, an SIO of moderate/medium indicates a slightly altered landscape, and a low SIO indicates a moderately altered landscape. While most of the area along the northern portion of the replacement line has a low SIO, most of the area along the proposed route between MPs 44.0 and 49.4 has a moderate to high SIO. Within the WNF, visual impacts would be most noticeable in areas of forested land. The conversion of forested land to open land has the potential to impact its use as a visual buffer and reduce its aesthetic quality. Construction through the WNF, primarily for the BXP Replacement component, would require clearing of forested land within the construction right-of-way, which would produce long-term and permanent impacts. Clearing would convert existing forested areas to open areas and result in a new or expanded corridor with distinctive edges. In areas of high SIO, clearing of these areas may result in a change to a moderate (or slightly altered landscape).

As discussed above, WNF visitors that would be most affected by these changes would be users of the Vesuvius Main Loop Trail. During construction, trail users would be subject to view changes from cleared vegetation as well as from the presence of construction equipment and personnel. While the presence of construction personnel and equipment would only be temporary, the clearing of trees along the edge of the trail would result in a permanent change to the viewshed of trail users. Columbia minimized the potential impacts by collocating the replacement pipeline with existing rights-of-way at the crossing location and would implement measures as specified in the final COM Plan.

There are no designated scenic vistas or overlooks within the proposed BXP Replacement and BXP Abandonment in the Ironton District of the WNF. Given the extent of collocation and by implementing specified mitigation measures as included in the final COM Plan, we conclude that impacts on visual resources within the WNF would be adequately minimized.

National and Ohio Scenic Byways

The BXP Replacement component would cross two scenic byways: the Ohio River Scenic Byway and the Welsh Scenic Byway. The proposed crossings are listed and described in table B.5-5. The Ohio River Scenic Byway crosses 14 counties in southern Ohio along the Ohio River with views of the valley and historic towns. The Welsh Scenic Byway extends for 64 miles through Gallia and Jackson Counties, Ohio, linking several Welsh farms, churches, and cemeteries.

TABLE B.5-5
Scenic Byways Crossed by the R-801 Pipeline

Name	National/State Designation	Begin Milepost	End Milepost	Crossing Length (feet)	Crossing Method
Welsh Scenic Byway	State	17.8	17.9	201	HDD
Welsh Scenic Byway	State	26.9	26.9	36	Bore
Welsh Scenic Byway	State	28.8	28.8	70	Bore
Ohio River Scenic Byway	National	65.7	65.8	192	Bore

Source: ODOT, 2017.

Abbreviation:
HDD horizontal directional drill

The R-801 pipeline would cross the Ohio River Scenic Byway, which is a National Scenic Byway, between MPs 65.7 and 65.8. Columbia is proposing to cross the byway using the conventional bore method, requiring ATWS at both sides of the highway for equipment and personnel. The bore would take an estimated 10 to 15 days to complete. Columbia collocated this crossing with its existing R-701 pipeline corridor. The pipeline would be bored under the highway, thereby minimizing impacts on byway traffic. Some traffic flows could be impacted as construction equipment entered or exited the construction right-of-way. Scenic views from the road could be affected during construction, as construction activities would be within view of the byways. Trees would be permanently removed along the north side of the byway, but no tree clearing would be required on the south side.

The R-801 pipeline would also cross an Ohio-designated Scenic Byway, the Welsh Scenic Byway, at three separate locations (MPs 17.8, 26.9, and 28.8). The crossing at MP 17.8 would be accomplished using the HDD crossing method. The remaining two crossings would be completed by the conventional bore method. The crossings at MPs 17.8 and 26.9 would be collocated with existing Columbia pipeline corridors, but the crossing at MP 28.8 cannot be collocated due to topographic constraints and the location of a nearby house. Potential impacts on traffic on the byway would be avoided, as the pipeline would be installed by either HDD or bore under the highway depending upon the location. The bore would take an estimated 6 days, while the HDD could take about 60 days. Visual impacts, including tree clearing for HDD work areas and road boring activities would be visible to motorists traveling along the Welsh Scenic Byway at all three locations. Columbia is continuing to coordinate with ODOT regarding any additional mitigation measures required at the Welsh Scenic Byway. At this time, the ODOT has not indicated any special measurements would be needed and Columbia clarified that ODOT requirements for crossing of the Welsh Scenic Byway would be identical to the crossing of any other ODOT state highway.

Columbia committed to following applicable regulations and permits, as well as implementation of the required traffic control plans. Following construction, Columbia would restore construction work areas to pre-construction contours and revegetate disturbed areas. Therefore, we conclude that the impacts on the viewsheds to motorists would generally be minor and temporary during active construction and minor, but permanent during operation. Given the extent of collocation, use of subsurface boring or drilling methods, and implementation of the ECS, we conclude that impacts on the Ohio River Scenic Byway and the Welsh Scenic Byway would be adequately minimized and no significant impacts on these resources would occur as a result of the Project.

6. Socioeconomics

The BXP would primarily affect four counties in Ohio (Vinton, Jackson, Gallia, and Lawrence) and one county in West Virginia (Wayne). The Project would consist of two major components: the BXP Replacement and the BXP Abandonment, as described in section A.4.

Columbia's anticipated construction spending in the Project area for the BXP Replacement would total about $50,000,000 for overall payroll, up to $15,000,000 for local payroll, and about $73,000 for materials purchases. Estimated spending for the BXP Abandonment would be considerably smaller: $5,500,000 for overall payroll, up to $1,100,000 for local payroll, and $26,000 for materials purchases. This influx of payroll and expenditures for supplies would have a limited positive and temporary effect on the local economy.

6.1 Employment

Based on data from the U.S. Bureau of Labor Statistics (2018), the November 2018 statewide unemployment rate for Ohio was 4.6 percent, while the unemployment rates in the counties crossed by the Project included 5.4 percent in Vinton County (293 workers unemployed), 5.8 percent in Jackson County (729 workers unemployed), 5.0 percent in Gallia County (590 workers unemployed), and 4.8 percent in Lawrence County (1,160 workers unemployed). The unemployment rate for West Virginia was 5.2 percent, while the Wayne County rate was 5.6 percent.

BXP Replacement

Construction of the BXP Replacement portion of the Project would require an estimated peak workforce of 950 workers for approximately 19 months. Columbia anticipates that about 50 percent of the workforce would be local workers, depending on the availability of qualified local personnel. Due to the relatively short duration and transient nature of construction, we anticipate that most non-local workers would not be accompanied by their families. The influx of non-local workers would be temporary. We conclude the increase in employment for local workers would result in a temporary and negligible impact on unemployment in the proposed Replacement component area.

BXP Abandonment

Activities associated with the BXP Abandonment portion of the Project would not begin until construction of the BXP Replacement was complete. Columbia would retain a portion of the workforce from the Replacement component to complete the activities associated with the BXP Abandonment. Columbia would need an estimated peak workforce of 170 workers to complete the abandonment activities over a 2-month period.

Similar to the BXP Replacement, we conclude any increase in employment for the local workforce would be temporary and negligible.

Columbia would not hire any new permanent workers for either Project component.

6.2 Transportation

BXP Replacement

Construction of the replacement pipeline would cross a total of 74 public roads and 4 railroads. Construction of the R-801 pipeline could result in minor, temporary impacts along some roads due to construction within the roadway as well as from movement of heavy equipment and personnel. Of the 74 public roads that would be crossed by the R-801 pipeline, Columbia would open-cut 38, conventional bore 32, and HDD 4. Columbia would follow state and local regulations and permits regarding temporary traffic control zones, and consult with state, county, and other local officials to identify and address concerns with construction related traffic regarding extended closure of roads. For the 38 roads that would be open-cut, the roadway would not be available for use to the public or landowner during active construction. However, Columbia would establish temporary detours or bypasses, or use steel plates to cover the trench and allow vehicular passage to maintain traffic or otherwise maintain access to homes and businesses when not actively installing the pipeline. Steel plates would also be kept on-site to be available to provide passage to emergency vehicles if needed.

Columbia would use the ODOT's online system to identify the suitable places and times for road crossings. Most construction personnel would travel to and from the BXP Replacement area during off-peak traffic hours, which would minimize impacts on transportation systems.

The movement of construction equipment and materials to and from the proposed pipeline and aboveground facilities may have minor impacts on the transportation system during construction. Columbia would use appropriate traffic control measures, such as flagmen, pilot vehicles, and signs to ensure safety of local traffic. Fencing would be used on either side of road crossings to ensure that materials and spoil remain off the roadway. Columbia developed a *Traffic Control Plan* in January 2019 that outlines mitigation measures that would limit impacts on traffic levels and promote safety in the BXP Replacement area. In addition to the measures discussed above, the major elements of the *Traffic Control Plan* include:

- emphasizing vehicle speed control and enforcement particularly near sensitive areas such as school zones, high traffic areas, and residential areas, as well as driver training;

- engaging in pre-Project and ongoing coordination and communication with state and local law enforcement and relevant agencies regarding traffic safety and route concerns;
- reducing Project traffic volume through use of staging and parking areas, as well as buses and carpooling to transport workers;
- prohibiting parking on public roads or shoulders outside of approved workspaces;
- conducting vehicle checks and maintenance; and
- developing site-specific safety plans.

Additionally, Columbia is conducting a *Heavy Haul Route Study* to assess potential haul routes for heavy equipment along the identified temporary and permanent access roads. The study will include an initial condition review which will assess the current condition of existing roads that would be used by Columbia to transport equipment to the BXP Replacement site. The study will also include a safety review to evaluate any safety issues along those routes and will include recommendations to mitigate any issues that are identified. However, Columbia has not yet filed the results of that study. Therefore, **we recommend that:**

- **Prior to construction, Columbia should file the *Heavy Haul Route Study* with the Secretary for review and written approval by the Director of OEP.**

With the mitigation measures outlined in Columbia's *Traffic Control Plan* and our recommendation that Columbia file the pending *Heavy Haul Route Study* for our review and approval, we conclude that impacts on traffic and transportation in the BXP Replacement area would be temporary and minor.

BXP Abandonment

The BXP Abandonment activities would not result in any direct impacts on roadways because pipelines under roads and railroads would be cut, plated, and grouted. The only impacts on transportation and traffic from the abandonment would be due to the movement of construction equipment and materials to and from the work areas. Columbia would implement the same mitigation measures as outlined in its *Traffic Control Plan*. Overall, we conclude that the impacts on traffic and roadways in the Project area from the Abandonment component would be negligible and temporary.

6.3 Housing

BXP Replacement

Construction of the BXP Replacement portion of the Project would require a peak workforce of 950 workers. Construction of the pipeline would take place along three separate spreads with 250 to 350 workers per spread. There would be an influx of about 475 non-local workers into the area during peak construction. There are about 12,000 vacant housing units in the BXP Replacement area. In addition, there are about 40 hotels (or similar lodging) within the five counties crossed by the R-801 pipeline (HotelMotels, 2018).

The presence of the construction crews could cause a minor temporary impact on the availability of hotels in the area, especially during peak tourism seasons. However, the workforce would be spread out and move along the pipeline route during the course of construction, thus any impacts at a single location would be temporary. Based on the number of available rental units and hotels in the BXP Replacement area and the transient nature of construction, we conclude that the peak Project workforce would be temporary and not significantly impact housing availability in the BXP Replacement area.

Operation of the BXP Replacement would not result in any new full-time workers; therefore, there would be no impact on the available housing in the Project area.

BXP Abandonment

Construction of the BXP Abandonment portion of the Project would not begin until construction of the BXP Replacement was completed. A smaller portion of the workforce from the Replacement component, approximately 170 workers at peak with 50 to 60 workers per spread, would be retained for the Abandonment component. The abandonment would commence once the BXP Replacement is complete, and these workers would likely be the same as those described above for the replacement. Based on the anticipated influx of workers and the available housing units, we conclude the BXP Abandonment would have a minor and temporary impact on housing availability.

6.4 Property Values

Appraisals determine land values, which take into account objective characteristics of the property such as size, location, and any improvements. We received a comment from a landowner about possible land devaluation associated with the proposed R-801 pipeline in an area that would not be collocated with other existing Columbia pipelines. The potential impact of a pipeline on the value of a tract of land would be related to many tract-specific variables, including the size of the tract, the current value of the land, the utilities and services available or accessible, the current land use, and the values of the adjacent properties. Subjective valuation is generally not considered in appraisals. That is

not to say that the presence of a pipeline, and the restrictions associated with a pipeline easement, could not influence a potential buyer's decision to purchase a property. If a buyer is looking for a property for a specific use which the presence of the pipeline renders infeasible, then the buyer may decide to purchase another property more suitable to their objectives. For example, a buyer wanting to develop the land for a commercial property with subsurface structures would likely not find the property suitable, but a farmer looking for land for grazing or additional cropland could find it suitable for their needs. This would be similar to other buyer-specific preferences that not all homes have, such as close proximity to shopping, relative seclusion, or access to high quality school districts.

As discussed in section B.5, Columbia would acquire easements for both the temporary (construction) and permanent rights-of-way and compensate landowners for the limited use during construction, and any construction related damages, per the terms of the individual landowner easement agreements.

6.5 Environmental Justice

EO 12898 on Environmental Justice recognizes the importance of using the NEPA process to identify and address, as appropriate, any disproportionately high and adverse health or environmental effects of federal programs, policies, or activities on minority populations and low-income groups. The provisions of EO 12898 apply equally to Native American populations. Consistent with EO 12898, the CEQ has called on federal agencies to actively scrutinize the following issues with respect to environmental justice:

- 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 NEPA process.

Table B.6-1 summarizes the minority and low-income populations throughout the Project corridor and compares them to state and federal averages. The EPA provides guidance on determining whether there is a minority or low-income community to be addressed in a NEPA analysis. According to this guidance, minority population issues must be addressed when minorities comprise over 50 percent of an affected area or when the minority population percentage of the affected area is substantially greater than the minority percentage in the larger area of the general population. Low-income populations are those that fall within the annual statistical poverty thresholds from the U.S. Department of Commerce, Bureau of the Census Population Reports, Series P-60 on Income and Poverty. The U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of the residents are below the poverty level (U.S. Census Bureau, 2019).

TABLE B.6-1
Demographics and Low-Income Populations in the Buckeye XPress Project Area

Country/State/ County	Percent of Households Below Poverty Level	Percent White Non-Hispanic	Percent Black	Percent Hispanic	Percent Asian	Percent Native American
UNITED STATES	**14.6**	**61.5**	**12.3**	**17.6**	**5.3**	**0.7**
West Virginia	**17.8**	**92.3**	**3.5**	**1.5**	**0.8**	**0.2**
Wayne	21.2	97.5	0.3	0.6	0.2	0.1
Ohio	**14.9**	**79.6**	**12.1**	**3.6**	**2.0**	**0.1**
Vinton	21.1	96.8	0.5	0.5	0.1	0.1
Jackson	20.6	96.2	0.8	1.0	0.1	0.0
Gallia	20.9	93.6	2.8	1.3	0.7	0.5
Lawrence	18.6	94.9	1.9	0.9	0.5	0.0

Source: U.S. Census Bureau, 2019.

As shown in table B.6-1, all of the counties within the Project area have household poverty levels greater than their respective states. Additionally, Wayne County, West Virginia and Vinton, Jackson, and Gallia Counties, Ohio, have poverty levels greater than 20 percent. There are no counties with a minority population over 50 percent. The county with the largest minority population is Gallia County, Ohio at 6.4 percent, which is well below the state average.

In addition to analyzing county level data, we evaluated data at the census tract and census block level to more accurately assess the local populations near the Project area (see appendix B.6-1). Eleven census tracts and 22 census blocks were identified that would be affected by the Project. All of the census tracts and block groups have minority populations less than 50 percent, with all census tracts and census blocks except one having minority populations of 10 percent or less. As such, none of the census tracts and census blocks meet the definition of an environmental justice community based on minority populations. Poverty rates were also assessed for each of the affected census tracts and census blocks; 8 of the census tracts and 13 census blocks have household poverty rates above those of their respective states.

According to Columbia, the primary purpose of the Project is to replace portions of Columbia's existing R-System in accordance with current USDOT regulations to ensure safe and reliable transportation service and to meet current demands. To accomplish this, abandonment and construction activities must be carried out throughout the entire R-System corridor in the four affected counties.

The Project facilities (either related to the Abandonment or the Replacement activities) were not sited based on the socioeconomic conditions of local populations, but rather selected based on the need to replace Columbia's existing utility infrastructure. The majority of new right-of-way would be collocated with, and aboveground facilities installed near, existing natural gas pipeline infrastructure, For example, approximately 34 miles of the R-801 pipeline route (about 51 percent) would be adjacent to existing pipeline corridors (mostly Columbia's existing pipelines), electric transmission lines, or other linear infrastructure. Facilities were also sited to maintain natural gas service to existing customers, such as through the Wellston Lateral. Further, the reason for this replacement is the aging nature of the BXP Abandonment pipeline, and Columbia's routing of new pipeline facilities was selected to be adjacent (where practicable) to this existing line. No disproportionate impacts on low-income or minority communities are expected.

The EPA's Environmental Justice Screen analyzes Environmental Justice Indexes and demographic data to identify potential environmental justice communities. Similar to the assessments above, various census blocks and census tracts indicate that there are potential environmental justice communities within the Project area. However, as previously stated, given the type and location of the Project, no disproportionate impacts on environmental justice communities are expected. Additionally, Project-related efforts to facilitate public participation were extensive as described in section A.

In summary, the Project facilities were not sited based on the socioeconomic conditions of local populations, but rather selected based on the need to replace portions of Columbia's existing utility infrastructure in order to meet USDOT requirements and current demand. Overall, there is no evidence that the construction of the Project would disproportionately impact the health, social, or economic conditions of minority or low-income communities. Therefore, we conclude that impacts on environmental justice communities would not be significant.

7. Cultural Resources

Section 106 of the National Historic Preservation Act requires that the FERC take into account the effects of its undertakings on properties on or eligible for listing on the National Register of Historic Places (NRHP), and afford the Advisory Council on Historic Preservation an opportunity to comment. Columbia, as a non-federal party, is assisting the Commission in meeting these obligations under Section 106 and the implementing regulations of 36 CFR 800 by preparing the necessary information, analyses, and recommendations, as authorized by 36 CFR 800.2(a)(3).

Columbia consulted with the West Virginia Division of Culture and History (WVDCH) regarding the survey strategy for the Project on January 29, 2018. In West Virginia, the Project is confined to the Ceredo CS in Wayne County, which was previously evaluated and culturally cleared as part of the previously FERC-certified Leach XPress Project (FERC Docket CP15-514-000). Columbia did not recommend any additional work at the Ceredo CS site. On February 26, 2018, the WVDCH concurred with Columbia's survey strategy and recommendation for no further work at the Ceredo CS site. In the February 26, 2018 letter, the WVDCH also provided concurrence with the UDP for the portion of the plan that applies to West Virginia.

7.1 Survey Results

Columbia conducted a Phase I field survey for archaeological and architectural resources in Ohio between February and November of 2017 for most of the Project area (Picklesimer et al., 2018a), as well as the remainder of the Project in 2018 (Picklesimer et al., 2018b). The initial report and a supplemental revised report were provided to the FERC, Ohio State Historic Preservation Office (SHPO), and the WNF. The archaeological survey Area of Potential Effects (APE) included the proposed limits of ground disturbance, including new and abandonment sections of pipeline right-of-way, aboveground facility locations, temporary workspaces, additional temporary workspaces, staging areas, contractor yards, and associated access roads. The survey corridor for the pipeline ranged in width from 300 to 700 feet, whereas the survey corridor for abandonment areas was 300 feet in width. Columbia has completed archaeological survey of 5,280.8 acres. The APE for the architectural resources survey comprised the survey corridor used for the archaeological survey, plus an additional 328 feet beyond that to account for visual and auditory effects. Columbia has completed the archaeological and architectural resources surveys for all portions of the Project.

The 2017 archaeological survey in Ohio resulted in the identification of 38 archaeological resources within the proposed Project survey corridor. Of this total, 33 sites were newly identified and 5 were previously recorded sites that were revisited during the survey. The 38 investigated sites include 10 prehistoric sites and 7 isolated finds, 3 sites with both historic and prehistoric components, and 18 historic sites, of which 9 are cemeteries. Columbia recommended that all of these sites be considered as ineligible for

listing in the NRHP, but further recommended avoidance of the nine historic cemeteries. Because none of the identified archaeological resources are eligible for the NRHP, no further work was recommended and Columbia concluded that no historic properties would be affected by the Project.

During the 2018 addendum survey, an additional 16 historic-age architectural resources were identified within or adjacent to the Project APE. Of these, four were recommended as eligible for listing in the NRHP. Columbia indicated that none of these would be impacted by the Project, and as a result, it recommended no further work. In addition, the 2018 addendum survey resulted in the discovery of an additional eight archaeological resources. Columbia recommended none of these resources as eligible for the NRHP and concluded that the Project would not affect any archaeological resources.

In the initial survey report, Columbia recommended geomorphological analysis on terraces above the Ohio River floodplain between MPs 65.51 and 65.69. These investigations, which included six excavated trenches, were completed by Columbia on May 23-24, 2018, specifically between MPs 65.75 and 65.89. This work did not reveal any deeply buried cultural resources. Columbia recommended no further geomorphological or geoarchaeological work.

In addition, in January 2019, a *Cemeteries Avoidance Plan* was filed by Columbia and was submitted to the Ohio SHPO and the WNF for 11 locations along the Project corridor, including the 10 cemeteries and 1 memorial. Protection and avoidance of these resources has been incorporated into the current Project design. Columbia will implement the plan to avoid any inadvertent disturbances to these resources during construction-related work.

The Ohio SHPO requested how the boundaries of small or family cemeteries with missing headstones would be defined. In addition, the WNF recommended that cemetery buffer sizes be increased on WNF lands. Columbia has not yet provided this information; therefore, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary, for review and written approval by the Director of OEP, an addendum to the *Cemeteries Avoidance Plan* indicating how the boundaries of small or family cemeteries with missing headstones would be defined. Additionally, the Plan should address cemetery buffer sizes developed in coordination with the USFS regarding cemeteries within the WNF. Columbia should also file the Ohio SHPO and USFS comments on the addendum.**

The 2017 architectural survey in Ohio identified 195 architectural resources within or adjacent to the proposed Project architectural APE. Nineteen of the 195 architectural resources are previously recorded, whereas the remaining 176 are newly discovered

architectural resources. Columbia recommended that 12 of the 195 architectural resources be considered as eligible for inclusion in the NRHP under Criterion A and/or Criterion C (see table B.7-1).[32] The remaining architectural resources are recommended as not eligible. Two of the 12 resources recommended as eligible are previously recorded architectural resources and 10 are newly identified. Four of the recommended NRHP-eligible architectural resources may be indirectly affected by the proposed work; therefore, Columbia would avoid these resources. With the avoidance of these three resources, Columbia concluded that the proposed Project would not adversely affect these properties.

In a letter dated February 28, 2018, the Ohio SHPO made numerous comments on the initial Phase I survey report requesting additional information; concurred with the non-eligibility of 23 of the archaeological sites; and indicated that the Project would not directly impact the recommended eligible buildings and have no adverse effect to recommended eligible landscapes. We concur with the Ohio SHPO. In addition, through its own independent research, the Ohio SHPO also identified and requested additional research pertaining to the Underground Railroad, the Poke Patch Rural Landscape, and field data, and requested that a revised report be submitted for review and comment. The Poke Patch Landscape is significant for its association with the Underground Railroad, the Civil War, and African-American history in the state of Ohio. The Poke Patch community began in the 1820s and consisted of interconnected farmsteads mostly owned by African Americans, many of whom were free blacks or former slaves. It encompassed a radius of 5 miles, centered in Gallia County but extended into Jackson and Lawrence Counties. The community was comprised of less than 100 people, but several operators of the Underground Railroad were known to have lived here, and many residents were active in assisting runaway slaves prior to the Civil War. Significant alterations that occurred with the construction of the original pipeline in the 1940s already modified the landscape, and demolition is not planned for any of the contributing resources as part of the Project. Therefore, Columbia indicated that the Project would not adversely affect the Poke Patch Rural Landscape. Columbia provided this information in the supplemental revised report that was submitted to the Ohio SHPO in January 2019. To date, Columbia has not filed the most recent letter from the Ohio SHPO to the docket.

[32] Criterion A is association with events that have significantly contributed to history; Criterion B is association with persons of historical significance; Criterion C is a distinctive characteristic of a particular type or style, or the work of a recognized master; and Criterion D is the ability to yield information important in prehistory or history.

TABLE B.7-1
National Register of Historic Places-Listed or Eligible Architectural Resources

Ohio Historic Inventory Number	Temporary Historic Resource Number	Temporal Association and Resource Type	NRHP Eligibility	Proposed Treatment
GA0014507	N/A	ca. 1910 Farmstead	Eligible Criterion A	No Effect
LAW0031112	N/A	ca. 1880 House	Eligible Criterion C	No Effect
JAC0024605	21	ca. 1900 Grange	Eligible Criterion A	Avoidance
JAC0024205	24	ca. 1820 House	Eligible Criterion C	Avoidance
JAC0024305	25	ca. 1900 House	Eligible Criterion C	No Effect
JAC0023912	31	ca. 1900 Farmstead	Eligible Criterion C	Avoidance
N/A	37	ca. 1965 House	Eligible Criterion A	No Effect
LAW0138103	40	ca. 1860 House	Eligible Criterion A	No Effect
LAW0138312	53	ca. 1965 House	Eligible Criterion C	No Effect
LAW0138212	55	ca. 1880 House	Eligible Criterion C	Avoidance
LAW0138412	65	ca. 1900 Farmstead	Eligible Criterion C	No Effect
LAW0138512	75	ca. 1939 House	Eligible Criterion C	No Effect
LAW0138613	114	ca. 1955 House	Eligible Criterion C	No Effect
JAC0024405	124	ca. 1925 Landscape	Eligible Criterion A	No Effect
JAC0024112	143	ca. 1900 House	Eligible Criterion A	No Effect
N/A	144	ca. 1900 House	Eligible Criterion A	No Effect

Abbreviations:
N/A not available

7.2 Native American Consultation

On June 20, 2017, Columbia sent a Project notification letter describing the proposed Project to 13 federally recognized Native American Tribes and one state recognized Native American Tribe. This letter was also transmitted via e-mail on June 22, 2017. This letter described the Project and proposed activities and requested that the Tribes inform Columbia of any known or potential concerns regarding impacts on culturally sensitive lands. The 14 Tribes contacted were the Absentee Shawnee Tribe of Oklahoma, the Delaware Nation, the Delaware Tribe of Indians, the Eastern Shawnee Tribe of Oklahoma, the Forest County Potawatomi, the Miami Nation of Indians of the State of Indiana, the Miami Tribe of Oklahoma, the Osage Nation, the Peoria Tribe of Indians of Oklahoma, the Pokagon Band of Potawatomi, the Seneca Nation, the Seneca-Cayuga Tribe of Oklahoma, the Shawnee Tribe, and the Wyandotte Nation. In response to changes and expansions to the proposed Project's scope, updated Project notification letters were sent by Columbia to these 14 Tribes via e-mail and certified mail on November 15, 2017.

Presently, seven Tribes, the Absentee Shawnee Tribe of Oklahoma, the Delaware Nation, the Delaware Tribe of Indians, the Osage Nation, the Miami Tribe of Oklahoma, the Forest County Potawatomi, and the Shawnee Tribe, have responded to these letters. Their comments are summarized as follows:

- The Absentee Shawnee Tribe of Oklahoma responded to the initial Project notification letter via e-mail on June 28, 2017. They have no objection to the proposed Project and request notification and consultation in the instance of the discovery of human remains or items of cultural significance that are subject to protection under the *Native American Graves Protection and Repatriation Act of 1990* (NAGPRA). This would only apply on federal or Tribal lands. They replied to the updated Project notification letter via e-mail on December 14, 2017, stating that they do not object to the Project changes and wish to be notified of the discovery of unrecorded artifacts or human remains.
- The Delaware Nation replied to the Project notification letter via two e-mails sent on June 29, 2017 and July 10, 2017. In their response, the Tribe posed no objections to the Phase I Survey Plan and requested that a buffer of between 50 and 100 feet be maintained around archaeological sites with particular attention paid to keeping heavy equipment out of those areas. They further requested protection, or re-introduction, of native plant species as well as notification and consultation of unexpected discovery during construction. Columbia has agreed to maintain a protective buffer of at least 50 feet around all known cultural resources. In instances where a 50-foot buffer is not possible, Columbia would consult with the Delaware Nation to determine a proper course of action and to decide on the need for a cultural monitor. Columbia has further agreed to use seed mixes for

restoration and stabilization of construction areas compliant with USDA-NRCS guidance and in coordination with the landowner and/or land managing agency.

- The Delaware Tribe of Indians replied to the Project notification letter via e-mail dated November 20, 2017. In their letter, they stated that in order to comment on the Project they would need background research, a copy of the cultural resources inventory, as well as any other cultural resources reports that pertain to cultural resources within the Project APE. A copy of the Phase I Cultural Resources Investigation report was submitted to the Tribe for review and comment on February 28, 2018. To date, no comments on the report have been received.
- The Osage Nation replied to the initial Project notification letter via a letter dated July 13, 2017 and to the updated Project notification letter in a letter dated November 20, 2017. In both replies, they requested a copy of the Phase I Cultural Resources Investigation report for review and comment. This report was submitted to the Osage Nation on February 28, 2018. To date, no comments on the report have been received.
- The Miami Tribe of Oklahoma replied to the initial Project notification letter via e-mail dated July 17, 2017, and to the updated Project notification letter in a letter dated November 30, 2017. In both responses, they made no objection to the Project. They did request immediate consultation with the agency or party of jurisdiction in the instance of the unexpected discovery of human remains or other cultural items protected by NAGPRA.
- The Forest County Potawatomi replied to the initial Project notification letter via e-mail dated July 20, 2017 in which they requested to remain a consulting party and copies of all archival review, survey results, and State Historic Preservation Officer comments for the Project. A reply to the updated Project notification letter was received via e-mail on December 28, 2017. In this response, they requested a copy of the Phase I Cultural Resources Survey for review and comment. A copy of the Phase I Cultural Resources Investigation report was submitted to the Forest County Potawatomi for review on February 28, 2018. The Forest County Potawatomi requested additional information regarding sites 33VI0839 and 33LE0849 via electronic mail to Columbia on April 19, 2018, and Columbia's cultural resources consultant responded and addressed the Tribe's questions via electronic mail on October 15, 2018.
- The Shawnee Tribe replied to the initial Project notification letter via e-mail dated August 14, 2017, in which they concurred that no historic properties would be adversely affected by the proposed Project. They did request that they be notified immediately upon the discovery of archaeological materials during construction, use, or maintenance of the proposed facilities.

On October 16, 2017, we sent our NOI to the federally recognized Tribes listed above. To date, no Tribes have provided a response to the NOI.

On January 25, 2018, we sent follow-up letters to the 13 federally recognized Native American Tribes. This letter described the Project and proposed activities and requested comments on the Project to ensure that Tribal concerns are addressed and that properties of traditional, religious, or cultural importance to the Tribes are identified.

Presently, only the Miami Tribe of Oklahoma has responded to this letter. In a response dated February 5, 2018, the Miami Tribe of Oklahoma offered no objection to the Project. They did request that should any human remains or other Native American cultural items falling under NAGPRA be discovered as a result of Project-related activity, that the Tribe be notified immediately and consultation with the entity of jurisdiction for the location of discovery be initiated. The UDP provides for notification of Tribes in the event of discoveries during construction. Additionally, the Miami Tribe of Oklahoma requested to be a consulting party to the Project.

7.3 Wayne National Forest

The initial Phase I survey report was submitted to the WNF on February 9, 2018. On June 1, 2018, the acting Forest Archaeologist for the WNF indicated that the WNF would provide comments directly to the Ohio SHPO. Columbia provided the WNF with the supplemental revised report. The cultural resources survey within the WNF revealed one historic architectural resource that was not recommended eligible for listing on the NRHP. A total of four archaeological sites and four historic cemeteries were identified within the WNF. None of the four archaeological sites were recommended eligible for listing on the NRHP. Avoidance was recommended for the four historic cemeteries within the WNF. The WNF staff completed additional tribal consultation related to the portions of the Project that would require special use permits from the USFS.[33] On March 15, 2019,

[33] The list of tribes that the WNF staff consulted with include: Absentee-Shawnee Tribe of Indians of Oklahoma, Bad River Band of Lake Superior Chippewa Indians, Bay Mills Indian Community, Bois Forte Band of Chippewa, Citizen Potawatomi Nation, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Fond du Lac Band of Lake Superior Chippewa, Forest County Potawatomi Community, Grand Portage Band of Lake Superior Chippewa, Grand Traverse Band of Ottawa and Chippewa Indians, Hannahville Indian Community, Keweenaw Bay Indian Community, Kickapoo Traditional Tribe of Texas, Kansas Kickapoo Tribe, Kickapoo Tribe of Oklahoma, Lac Courte Oreilles Band of Lake Superior Chippewa Indians, Lac du Flambeau Band of Lake Superior Chippewa Indians, Lac Vieux Desert Band of Lake Superior Chippewa Indians, Leech Lake Band of Ojibwe, Little River Band of Ottawa Indians, Little Traverse Bay Band of Odawa Indians, Gun Lake Tribe (Match-e-be-nash-she-wish Band of Potawatomi), Miami Tribe of Oklahoma, Mille Lacs Band of Ojibwe, Minnesota Chippewa Tribe, Nottawaseppi Huron Band of Potawatomi, Ottawa Tribe of Oklahoma, Peoria Tribe of Indians of Oklahoma, Pokagon Band of Potawatomi Indians, Prairie Band Potawatomi, Red Cliff Chippewa Tribe, Red Lake Band of Chippewa Indians, Saginaw Chippewa Indian Tribe, Sault Ste. Marie Tribe of Chippewa, Shawnee Tribe, *cont'd.*

the WNF staff sent, via certified mail, a letter notifying 46 Native American Tribes identified in the 1795 Treaty of Greenville of the USFS's consideration of Columbia's proposal. On March 21, 2019, the WNF sent via electronic mail these letters to the individuals listed as copies. Presently, nine Tribes responded; their comments are summarized as follows:

- The tribes of the Delaware Nation and Hannahville Indian Community declined further consultation but requested immediate notification if any human remains or artifacts are found.

- The Minnesota Chippewa Tribe stated it had no questions or intention to request consultation at this time.

- The Miami Tribe of Oklahoma offered no objection to the Project, requested immediate notification if any human remains or artifacts are found, and requested the Tribe be a consulting party to the Project.

- The Forest County Potawatomi Community affirmed the comments it previously submitted to FERC and reiterated the Community's request for immediate notification if any human remains or artifacts are found.

- The Shawnee Tribe and Lac de Flambeau Band of Lake Superior Chippewa Indians Tribe accepted consultation.

- The Stockbridge-Munsee Mohican Band of Mohican Indians stated the Project location is not in its cultural area of interest and declined participation.

- The Kickapoo Tribe of Oklahoma responded with an electronic mail address clarification but did not indicate additional needs.

The WNF is following up with the Shawnee and Lac de Flambeau Band of Lake Superior Chippewa Indian Tribes and will address other responses as warranted. The WNF provided FERC with the consultation letters and responses during development of the EA. The WNF will notify the same Native American Tribes of the release of the EA and again will offer the opportunity for government to government consultation.

The WNF staff provided comments to the Ohio SHPO on February 11, 2019, including: site 33LE0053 should continue to be classified as a "mound" instead of reclassification to a "historic sorghum mill" based on insufficient supporting research. The WNF also informed Columbia via letter dated April 24, 2019, that this resource should be avoided with a minimum buffer of 50 feet, marked with construction fencing, and observed

Sokaogon Chippewa Community (Mole Lake), St. Croix Chippewa Indians of Wisconsin, Stockbridge-Munsee Band of Mohican Indians, Turtle Mountain Band of Chippewa, White Earth Band of Chippewa Indians, Wyandotte Nation, Seneca-Cayuga Nation, and the Osage Nation.

by an archaeological monitor (or utilize a buffer of at least 100 feet if no monitor is present); cemetery buffers should be expanded on WNF lands, particularly at Yates Cemetery; a rock shelter within the APE should be investigated further with the possibility of additional recommendations; and that the WNF staff be contacted in the event of an unanticipated discovery.

The USFS, Columbia, and the Ohio SHPO are continuing to coordinate regarding proposed construction activities, cultural resources, and potential mitigation measures, including for site 33LE0053. Columbia would be required to adopt USFS-mandated mitigation measures on the WNF as specified in the final COM Plan.

7.4 Unanticipated Discovery Plan

Columbia provided an UDP to the FERC, Ohio and West Virginia SHPOs, and to the WNF. This plan provides guidance for the notification of relevant parties, including appropriate Tribal authorities, in the event of the unanticipated discovery of cultural resources or human remains during Project-related activity. The West Virginia SHPO provided concurrence with the Plan on February 26 2018. To date, no comments from the Ohio SHPO have been received, and Columbia indicated that none were anticipated. Columbia has committed to filing any comments that are received with the FERC. The USFS noted that the UDP requires notification of the Ohio SHPO, the FERC, and local law enforcement in the event of an applicable find, but does not include WNF staff for a find on USFS lands. The USFS requested that the WNF staff notification provision be added to the UDP. We agree. Therefore, **we recommend that:**

- **As part of the *Implementation Plan*, Columbia should provide a revised UDP that includes notification of the proper WNF staff in the event of unanticipated finds on WNF lands.**

With implementation of our recommendation, we find the UDP acceptable.

7.5 Compliance with the National Historic Preservation Act

Cultural resource surveys have been completed for all proposed facilities for both archaeological and architectural surveys. Consultation with the Ohio SHPO is not yet complete. If any historic properties will be adversely affected, a treatment plan would be prepared. Therefore, **we recommend that:**

- **Columbia should <u>not begin construction</u> of facilities and/or use of staging, storage, or temporary work areas and new or to-be-improved access roads <u>until</u>:**

  a. Columbia files with the Secretary:

  i remaining cultural resources survey reports;

ii site evaluation reports, avoidance plans, or treatment plans, as required; and

iii comments on the reports and plans from the Ohio SHPO and USFS, as applicable.

b. the Advisory Council on Historic Preservation has been given an opportunity to comment if historic properties would be adversely affected; and

c. the FERC staff reviews and the Director of OEP approves all cultural resources reports and plans and notifies Columbia in writing that either treatment measures (including archaeological data recovery) may be implemented or construction may proceed.

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

8. Air and Noise

Construction and operation of the BXP would result in effects on the existing air quality and noise environment. Temporary air emissions and noise would be generated during pipeline replacement and abandonment activities, and long-term air emissions and noise would be generated during operation and maintenance, as detailed below.

8.1 Air Quality

Air quality is substantially influenced by climate and meteorological conditions; therefore, prevalent weather patterns are a major factor in both short- and long-term air quality conditions. The proposed Project would be within the Allegheny Plateaus of western West Virginia and southern Ohio. The Allegheny Plateaus has a continental climate with a significant range of daily and annual temperatures. Summers are typically warm and humid and winters are cold, snowy, and overcast. Rainfall is fairly distributed over the year, with fall being the driest season (Rubel et al., 1981). The closest location with extensive climate information from the National Climatic Data Center is Huntington, West Virginia, 3.8 miles south of the existing Burlington RS. Temperatures in Huntington tend to peak in July with a normal daily maximum of 86°F and are the coolest in January with a normal daily low of 25°F. Huntington's mean annual precipitation is 42.6 inches. Precipitation averages from a low of 2.8 inches in September to a maximum of 4.7 inches in May. The average annual snowfall in Huntington is 23.6 inches and wind speed is 5.8 miles per hour (National Climactic Data Center, 2017).

Ambient air quality is protected by federal and state regulations. With authority granted by the Clean Air Act (CAA), 42 U.S.C. 7401 et seq. as amended in 1977 and 1990, the EPA established National Ambient Air Quality Standards[34] (NAAQS) to protect human health (primary standards) and public welfare (secondary standards). The EPA (2016) codified the NAAQS in 40 CFR 50 for the following "criteria pollutants:" nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), lead, particulate matter (PM) with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), and PM with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$). These NAAQS reflect the relationship between pollutant concentrations and health and welfare effects. While states can promulgate more stringent standards than the NAAQS, the West Virginia Department of Environmental Protection (WVDEP) has adopted the NAAQS in Title 45 Code of State Rules (CSR) 8-3.1, and the OEPA has adopted the NAAQS in Ohio Administrative Code (OAC) Chapter 3745-25. Additional pollutants, such as volatile organic compounds (VOC) and hazardous air pollutants (HAP), are emitted during fossil fuel combustion. These pollutants are regulated through various components of the CAA.

[34] The current NAAQS are listed on EPA's website at https://www.epa.gov/criteria-air-pollutants/naaqs-table.

The EPA has established Air Quality Control Regions (AQCR) in accordance with Section 107 of the CAA. AQCRs are defined as contiguous areas considered to have relatively uniform ambient air quality, and are treated as single geographical units for reducing emissions and determining compliance with the NAAQS. Areas where ambient air pollutant concentrations are below the NAAQS are designated as "attainment," while areas where ambient air concentrations are above the NAAQS are designated as "nonattainment." Areas previously designated as nonattainment that have subsequently demonstrated compliance with the NAAQS are designated as "maintenance" for a period of time (normally 20 years after the effective date of attainment); this time period assumes that the area remains in compliance with the standard. Areas that lack sufficient data to determine their designation are designated "unclassifiable," and are treated as attainment areas for the purpose of stationary source air permitting.

The Project area includes portions of Vinton, Jackson, Gallia, and Lawrence Counties in Ohio, and Wayne County in West Virginia. Vinton and Jackson Counties are part of the Wilmington-Chillicothe-Logan Intrastate AQCR. Gallia and Lawrence Counties, Ohio and Wayne County, West Virginia are part of the Huntington (West Virginia)-Ashland (Kentucky)-Portsmouth-Ironton (Ohio) Interstate AQCR (40 CFR 81). All counties intersected by the proposed Project are designated as attainment or unclassifiable for the criteria pollutants.[35] A portion of Gallia County is classified as an SO_2 maintenance area, but not where the Project is proposed (EPA, 2018c; d).

Data were gathered from monitoring stations closest to the Project area to characterize the existing ambient air quality. For PM_{10}, $PM_{2.5}$, SO_2, and O_3, the closest monitoring site is in Ironton (Lawrence County), Ohio. For CO, NO_2, and lead, the closest site is further away, in Columbus (Franklin County), Ohio. Data from these monitoring sites indicate that criteria pollutant concentrations were below the NAAQS for 2015 through 2017 (EPA, 2018e).[36]

Greenhouse gases (GHG) occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. GHGs are non-toxic and non-hazardous at normal ambient concentrations, and there are no applicable ambient air quality standards or emission limits for GHGs under the CAA. Increased atmospheric concentration of GHGs are the primary contributor to climate change. The primary GHGs that would be emitted by the Project are carbon dioxide (CO_2), methane, and nitrous oxide. During construction and operation of the Project, these GHGs would be emitted from the

[35] The 8-hour O_3 (1997) standard was revoked on April 6, 2015; the 1-hour O_3 (1979) standard was revoked on June 15, 2005; and the primary annual $PM_{2.5}$ (1997) standard of 15 micrograms per cubic meter was revoked in attainment and maintenance areas for that NAAQS.

[36] Monitoring data are available on EPA's website at https://www.epa.gov/outdoor-air-quality-data/air-quality-statistics-report for Site ID 39-087-0012 in Ironton, and Site IDs 39-049-0005, 39-049-0038, and 39-049-0039 in Columbus.

majority of construction and operational equipment, as well as from fugitive methane leaks from the pipeline and aboveground facilities.

Emissions of GHGs are typically quantified and regulated in units of carbon dioxide equivalents (CO_2e). The CO_2e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO_2. Thus, CO_2 has a GWP of 1, methane has a GWP of 25, and nitrous oxide has a GWP of 298 (EPA, 2017b).[37]

Federal Air Quality Regulations

The CAA and 40 CFR 50 through 99 provide the federal statutes and regulations governing air pollution in the United States. Because the proposed Project does not include installation of any permanent stationary air emissions sources, the following federal requirements were determined to be not applicable to the Project: New Source Review/Prevention of Significant Deterioration, New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants, Title V Operating Permit Program, GHG Reporting Rule, and Compliance Assurance Monitoring. Furthermore, because the Project does not cross a maintenance or nonattainment area, General Conformity regulations are not applicable. Lastly, natural gas pipelines that are subject to USDOT requirements or to USDOT-certified state natural gas programs are not subject to the Chemical Accident Prevention Provisions of 40 CFR 68.

State Air Quality Regulations

The following state requirements were determined to be applicable to the Project. In Ohio, OAC Chapter 3745-19 would apply during construction if open burning of cleared vegetation and stumps is conducted. Cleared material, including tree trimmings, stumps, brush, weeds, shrubbery, and crop residues, may be burned outside of city limits (i.e., unrestricted areas and at least 1,000 feet from any inhabited building) with prior written permission from the OEPA. Furthermore, OAC Chapter 3744-15-07 prohibits the emission of smoke, ashes, dust, dirt, or any other substance in such a manner that would be declared a public nuisance (i.e., endanger the health, safety, or welfare of public, or cause unreasonable injury or damage to property). Columbia would apply for all necessary permits and comply with these requirements as required during construction.

In West Virginia, Title 45 CSR 17-3 prohibits fugitive PM from being discharged beyond the property lines on which the discharge originates or at any public or residential

[37] These GWPs are based on a 100-year time period, and have been selected over other published GWPs for other timeframes because these are the GWPs the EPA has established for reporting of GHG emissions and air permitting requirements. This allows for a consistent comparison with these regulatory requirements.

location, which causes or contributes to air pollution. Furthermore, Title 45 CSR 4-3 prohibits the discharge of air pollutants that cause or contribute to an objectionable odor at any public location, and Title 45 CSR 6-3 authorizes open burning for land clearing under certain circumstances with WVDEP approval if the health, safety, comfort, and property of persons are protected from the effects of the burning. Columbia would apply for all necessary permits and comply with these requirements as required during construction.

Environmental Impacts

Construction Air Emissions Impacts and Mitigation

Construction of the proposed Project consists of a Replacement component and an Abandonment component that would affect existing air quality as detailed below.

Replacement Component

Air quality impacts associated with construction of the Project's Replacement component would include emissions from fossil fuel-fired construction equipment, deliveries, and worker commutes; fugitive dust from ground disturbance and transportation; and emissions associated with burning wood debris in construction work areas. Construction for the Replacement component is estimated to take roughly 19 months; beginning in 2019 (subject to receipt of necessary permits and regulatory approvals) and ending in 2020.

Fossil fuel-fired construction equipment, trucks, and delivery vehicles are a source of combustion emissions, including nitrogen oxides (NO_X), CO, VOC, SO_2, PM_{10}, $PM_{2.5}$, and small amounts of HAP. Construction equipment, trucks, and delivery vehicles also emit GHGs. Gasoline and diesel engines must comply with the EPA mobile source regulations in 40 CFR 85 for on-road engines and 40 CFR 89 for non-road engines. These regulations are designed to minimize emissions and require a maximum sulfur content in diesel fuel of 15 parts per million. Columbia has identified additional mitigation measures and on-site management practices to minimize construction combustion emissions, including implementing vehicle idling reduction policies and properly maintaining construction equipment as required by state motor vehicle inspection and maintenance program rules (e.g., OAC Chapter 3745-26).

The EPA requested that Columbia implement various techniques for minimizing construction emissions for on-road and non-road vehicles and equipment contained within the EPA's Construction Emission Control Checklist. Columbia did not commit to requiring its contactor to use this checklist, but did state that it would recommend that the contractor use equipment that was manufactured after 2010 or has been retrofitted to minimize exhaust emissions.

Fugitive dust is a source of respirable airborne PM, including PM_{10} and $PM_{2.5}$, which could result from land clearing, grading, excavation, and mobile source traffic on paved and unpaved roads. The amount of dust generated is a function of construction activity, silt and moisture content of the soil, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. West Virginia regulations require measures to prevent fugitive dust from becoming airborne and leaving the property boundary. Ohio regulations prohibit emissions of dust and dirt in a manner that would cause public nuisance.

Columbia's *Fugitive Dust Control Plan* identifies mitigation measures that it would implement during construction to minimize the generation of dust, including:

- using water sprays (or suitable biodegradable or water-soluble chemicals) to control dust from heavy construction and earth-moving activities material stockpiles, unpaved roadways, laydown area, work areas, and demolition areas;
- paving and/or grading of roadways;
- creating a graded and graveled transition area (i.e., construction entrance) between paved and unpaved roadways to limit the transport of tracked materials onto paved roads by vehicles;
- cleaning of paved roadways and removal of spilled or tracked materials from paved roadways;
- reducing vehicle speeds when vehicle operation generates fugitive dust (dry days, operation on fine-textured soils);
- covering open-bodied haul trucks;
- minimizing soil disturbance; and
- using off-site parking and shuttle buses to minimize traffic (if necessary).

Implementation of these measures would be based on Columbia's visual determination of need, atmospheric conditions (such as persistence of dry, windy conditions), and compliance with state or local regulations for control of fugitive dust emissions.

Ground-level open burning emissions are affected by many variables, including wind, ambient temperature, composition and moisture content of the debris burned, and compactness of the pile. In general, the relatively low temperatures associated with open burning increase emissions of NO_X, CO, VOCs, PM_{10}, and $PM_{2.5}$. Although Columbia does not anticipate burning of cleared vegetation and stumps, it estimated emissions due to burning and would apply for all necessary permits as well as comply with West Virginia and Ohio open burning requirements if these activities subsequently became necessary.

This would include burning only in approved burn areas and during appropriate weather conditions, and complying with any applicable setback requirements to avoid impacts on nearby residences.

Estimated construction emissions for the Replacement component of the proposed Project for years 2019 and 2020 are shown in table B.8-1. Emissions associated with the pipeline Replacement component would not typically be concentrated in any one location, but would occur incrementally along the pipeline route. Pipeline replacement with an HDD may occur at a single location for a longer duration. However, this activity would be temporary, and typical meteorological conditions would likely cause rapid dispersal of emissions. As a result, air emissions from the BXP Replacement would result in localized minor, intermittent, and temporary impacts but would not impact regional air quality or result in any violation of applicable ambient air quality standards.

Abandonment Component

Air quality impacts associated with the proposed Project's Abandonment component would be similar to the Replacement component discussed above, except abandonment activities are anticipated to last for 2 months rather than 19 months. Abandonment would also result in additional emissions of VOCs, HAPs, and GHGs from the blowdown events and pigging activities to empty and clean the pipelines.

Estimated construction emissions for the Abandonment component for year 2020 are shown in table B.8-1. Air emissions would result in localized minor, intermittent, and temporary impacts but would not affect regional air quality or result in any exceedance of applicable ambient air quality standards.

TABLE B.8-1
Estimated Construction Emissions

Emission Source	Annual Pollutant Emissions (tons), by Year							
	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	VOCs	HAPs	GHGs
Year 2019 Replacement Emissions								
Commuter transit	1.1	7.7	0.0	0.0	0.0	0.3	0.1	1,321
On-road vehicles	0.3	0.5	0.0	0.0	0.0	0.0	0.0	174
Off-road equipment	61.8	594.1	0.1	2.7	2.6	22.1	5.0	25,771
Open burning	7.2	268.4	2.9	28.8	26.4	15.3	--	4,011
Fugitive dust	--	--	--	108.5	14.0	--	--	--
YEAR 2019 TOTAL	**70.5**	**870.8**	**3.0**	**140.1**	**43.1**	**37.8**	**5.1**	**31,277**
Year 2020 Replacement Emissions								
Commuter transit	1.9	10.8	0.0	0.1	0.1	0.5	0.1	2,159
On-road vehicles	0.6	0.8	0.0	0.0	0.0	0.1	0.0	305
Off-road equipment	83.5	889.1	0.2	3.7	3.6	32.5	7.3	36,525
Open burning	19.2	716.3	7.7	76.7	70.4	40.9	--	4,621
Fugitive dust	--	--	--	205.2	26.3	--	--	--
Year 2020 Subtotal	**105.3**	**1,617.0**	**7.9**	**285.7**	**100.3**	**74.0**	**7.4**	**43,610**
Year 2020 Abandonment Emissions								
Commuter transit	0.9	4.8	0.0	0.0	0.0	0.2	0.1	970
On-road vehicles	0.3	0.7	0.0	0.0	0.0	0.0	0.0	173
Off-road equipment	21.4	240.7	0.1	1.0	0.9	8.7	1.9	9,566
Open burning	--	--	--	--	--	--	--	--
Fugitive dust	--	--	--	57.1	8.2	--	--	
Blowdown/pigging activities	--	--	--	--	--	45.2	0.3	23,978
Year 2020 Subtotal	**22.5**	**246.2**	**0.1**	**58.1**	**9.1**	**54.1**	**2.3**	**34,688**
YEAR 2020 TOTAL	**127.8**	**1,863.1**	**7.9**	**343.9**	**109.5**	**128.2**	**9.7**	**78,298**

Operational Air Emissions Impacts and Mitigation

Operation of the Project would result in fugitive emissions from incidental leaks or releases from valves, pumps, and flanges, resulting in emissions of VOCs, HAPs, and GHGs. The EPA recommended that Columbia utilize BMPs to reduce leakage of methane from the Project, and referenced the EPA's Natural Gas STAR Program. Columbia is not a participant in the Natural Gas STAR Program, but Columbia states it would reduce methane leakage from the Project through implementation of industry BMPs. Additionally, Columbia anticipates that the replacement of the existing pipeline would

result in a net reduction in emissions as a result of the installation of newer, more efficient equipment.

Estimated operational emissions for the Project are shown in table B.8-2. Because there would be no permanent stationary air emission sources associated with the Project, emissions would be minimal. As a result, air quality impacts due to long-term operation would be negligible and would not affect regional air quality or result in any exceedance of applicable ambient air quality standards.

TABLE B.8-2
Estimated Operational Emissions

Emission Source	Annual Pollutant Emissions (tons per year)							
	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	VOCs	HAPs	GHGs
Fugitives from underground pipeline	--	--	--	--	--	0.0	0.0	19.4
Fugitives from pipeline components	--	--	--	--	--	0.3	0.0	164.0
Valve inspection pigging	--	--	--	--	--	0.0	0.0	20.4
TOTAL	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.4**	**0.0**	**204.0**

Wayne National Forest

The proposed Project would cross NFS lands of the WNF. No aboveground facilities would be installed within the WNF, so there would be no long-term operational impacts on air quality. Impacts within the WNF would be limited to emissions related to construction, as discussed in the sub-section above. As a result, air emissions would result in localized minor, intermittent, and temporary impacts and are not expected to affect regional air quality or result in any exceedance of applicable ambient air quality standards. Other measures required by the USFS to protect air quality within the WNF, if any, would be included in the final COM Plan.

8.2 Noise and Vibration

Sound is energy transmitted by pressure waves in media such as air or water (FTA, 2006). When the sound level becomes excessive, annoying, or unwanted, it is referred to as "noise." Noise may be continuous (constant noise at a steady level), steady (constant noise with a fluctuating level), impulsive (having a high peak of short duration), stationary (occurring from a fixed source), intermittent (at intervals of high and low levels), or transient (occurring at different levels).

Noise levels are quantified using decibels (dB), which are units of sound pressure. The A-weighted sound level, expressed as dBA, is an expression of the relative loudness

of sounds in air as perceived by the human ear. Therefore, A-weighted sound levels are usually used to quantify audible sound and its effect on people (EPA, 1978). On the dBA scale, normal conversation falls at about 60 to 65 dBA, and sleep disturbance occurs at about 40 to 45 dBA (Caltrans, 2013; FTA, 2006).

Existing ambient noise levels, or background noise levels, are the current sounds from natural and artificial sources at the receptors. The magnitude and frequency of background noise at any given location may vary considerably over the course of a day or night and throughout the year. The variations are caused in part by weather conditions, seasonal vegetation cover, insect and wildlife-generated noise, and human activity. Two common measures used to relate the time-varying quality of environmental noise levels to known effects on people are the 24-hour equivalent sound level ($L_{eq(24)}$) and the day-night sound level (L_{dn}). The $L_{eq(24)}$ is the level of steady sound with the same total energy as the time-varying sound, averaged over a 24-hour period. The L_{dn} is the $L_{eq(24)}$ with 10 dBA added to the nighttime sound levels between the hours of 10:00 p.m. and 7:00 a.m. to account for people's tendency to be more sensitive to sound during nighttime hours.

Where the nature of a new sound is similar to the ambient noise level, an increase of 3 dBA is barely detectable by the human ear and an increase of 5 dBA is considered clearly noticeable. Increases of 10 dBA are perceived as a doubling of noise (i.e., twice as loud).

Ground-borne vibration consists of oscillating motion within the ground. The effects of ground-borne vibration are typically no more than a nuisance; however, at extreme vibration levels, buildings can be damaged. Blasting is one of the construction activities that typically generate the most severe vibrations.

Regulatory Noise and Vibration Requirements

There are no applicable state or local noise or vibration regulations within the proposed Project area. Furthermore, because the proposed Project does not include a new or modified compressor station relative to compressor equipment, the FERC regulations at 18 CFR 380.12(k)(4)(v)(A) and (B) for noise and vibration are not applicable.

In 1974, the EPA published its *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local governments to use when developing their own ambient noise standards. The EPA has indicated that an L_{dn} of 55 dBA protects the public from outdoor activity noise interference and annoyance, and an L_{dn} of 70 dBA protects the public from hearing damage. Absent an applicable noise level limit, these criteria have been used to evaluate the potential noise impacts from construction and operation of the Project. The potential for noise impacts are assessed by comparing the Project's estimated noise levels with the applicable noise level criterion at the nearest noise sensitive areas (NSA), such as residences, schools and day-care facilities, hospitals, long-

term care facilities, places of worship, and libraries. For nighttime noise, where the background ambient noise levels are already above the 55 dBA noise level criterion, noise level increases should be restricted to less than 10 dBA over background.

Environmental Impacts

Construction Noise and Vibration Impacts and Mitigation

The proposed Project consists of a Replacement component and an Abandonment component that would affect the existing noise environment as detailed below.

Replacement Component

Noise impacts associated with construction of the Project's Replacement component would result from the use of typical construction equipment, blasting, and HDD.

General Construction

Construction noise levels are temporary and are rarely steady; they fluctuate depending on the number and type of vehicles and equipment in use at any given time. In addition, construction-related sound levels experienced by a noise sensitive receptor in the vicinity of the construction activity would be a function of distance, other or existing noise sources, and the presence and extent of vegetation, structures, and intervening topography between the noise source and receptor.

Pipeline construction would result in noise along the entire length of the Replacement component; however, noise impacts would be transient as construction progresses from one location to the next along the pipeline corridor and aboveground facility locations. It is expected that construction-related noise would last 3 to 4 weeks at any one location. Prevalent noise sources would come from internal combustion engines used by construction equipment (e.g., trucks, backhoes, excavators, loaders, cranes). However, construction noise would be localized and temporary, and no NSA would be expected to be exposed to significant noise levels for an extended period of time. Columbia would minimize noise impacts by equipping construction equipment with mufflers, and maintaining construction equipment in accordance with the manufacturers' recommendations.

Furthermore, Columbia would mitigate pipeline construction-related noise by limiting the majority of construction to daytime hours when ambient noise levels are often higher and most individuals are less sensitive to noise. However, some discrete activities (e.g., dam-and-pump crossings, hydrostatic testing, and drying/cleaning the line) may require nighttime or 24-hour work for limited periods of time (i.e., 2 to 3 days). Additionally, HDD would likely necessitate nighttime or 24-hour work, and is reviewed further below. Noise impacts at the nearest NSAs to the potential locations where

nighttime activities may occur were calculated using estimates of noise levels generated by the associated equipment and are shown in appendix B.8-1. Columbia assumed dam-and pump and hydrostatic testing equipment included a pump and light plant; and drying equipment included four compressors and two light plants.

As indicated in appendix B.8-1, noise levels attributable to nighttime activities (without the installation of noise barriers) would exceed the 55 dBA L_{dn} criterion at several locations. Columbia would implement noise mitigation, including installation of noise barriers, around the work sites. With the additional mitigation where necessary, the estimated nighttime noise levels would be below the 55 dBA L_{dn} criterion for all NSAs, except at two locations where the noise levels are estimated at 55.4 to 59.6 dBA L_{dn}. Columbia would monitor noise levels at the NSAs and if it exceeds an L_{dn} of 55 dBA, additional mitigation would be implemented. As such, noise impacts associated with nighttime activities would be localized, short-term, and adequately mitigated where necessary.

Horizontal Directional Drilling

The proposed Replacement component would use the HDD method to install the pipeline at two highway crossings and two wetland crossings, all in Jackson County, Ohio. Columbia estimated that HDD installation would take 60 to 144 days per crossing. Further, some activities associated with the HDDs, especially pulling the pipe through the drilled hole at the exit point, may be conducted on a continuous 24-hour basis.

Noise impacts at the nearest NSAs from HDD activities were calculated using estimates of noise levels generated by HDD at the entry point and at the exit point, with equipment not operating concurrently at both locations. Typically, most and/or the highest noise-generating activity at the exit point would involve changing reamers, attaching the pullback section, or other temporary specialized activities occurring at a time when drill rig activity at the entry point would be reduced or temporarily suspended. HDD equipment at the entry point includes a drill rig and engine-driven hydraulic power unit, engine-driven mud pump(s) and other engine-driven generator set(s); mud mixing/cleaning equipment and associated fluid systems shale shakers; crane, backhoe, front loader, and/or truck(s); storage tanks; and engine-driven light plants (nighttime operations only). HDD equipment at the exit point includes a backhoe, side-boom, and/or trucks; engine-driven generator set and small engine-driven pump; and engine-driven light plant (nighttime operations only). Figures B.8-1, B.8-2, B.8-3, and B.8-4 depict the nearest NSAs to the HDD entry and exit locations for the Highway 32 HDD, Highway 35 HDD, Wetland W-545B HDD, and Wetland W-558B HDD crossings, respectively.

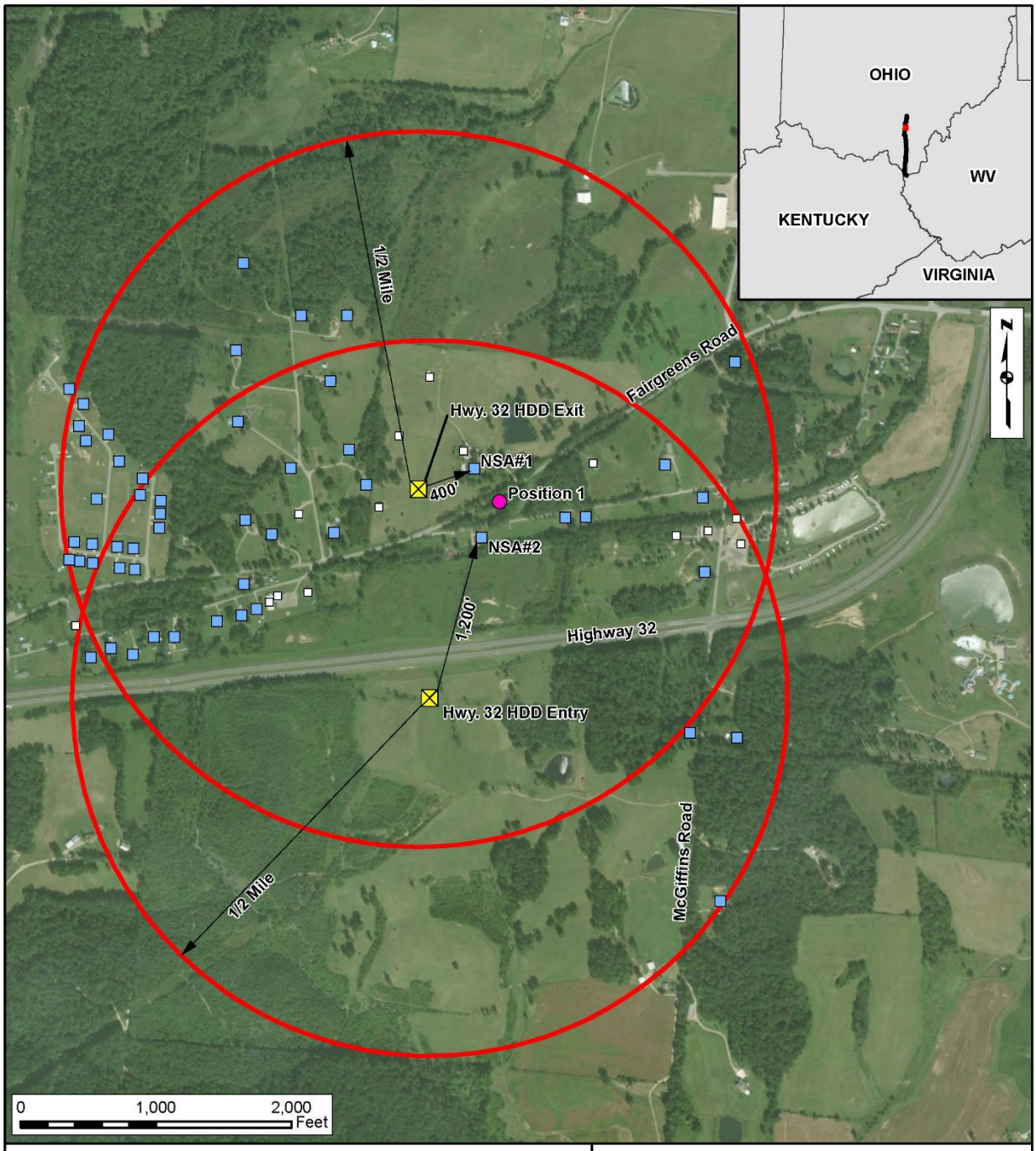
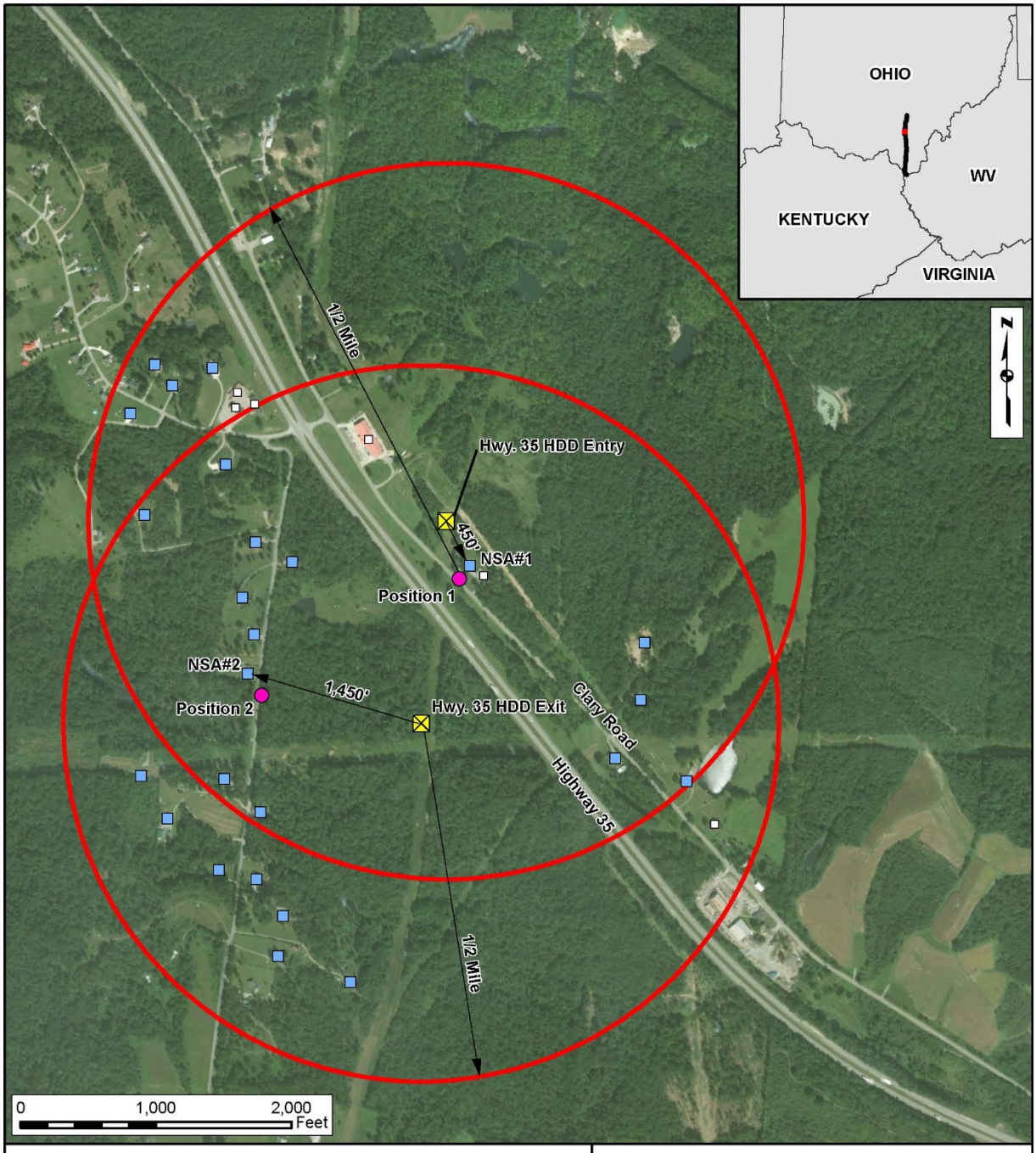


Figure B.8-1

Buckeye XPress Project

NSAs near the
Highway 32 HDD Crossing



HDD Entry/Exit Location
Measurement Location
House or Mobile Home (Residence)
Non-Residential Building

Figure B.8-2

Buckeye XPress Project

NSAs near the
Highway 35 HDD Crossing

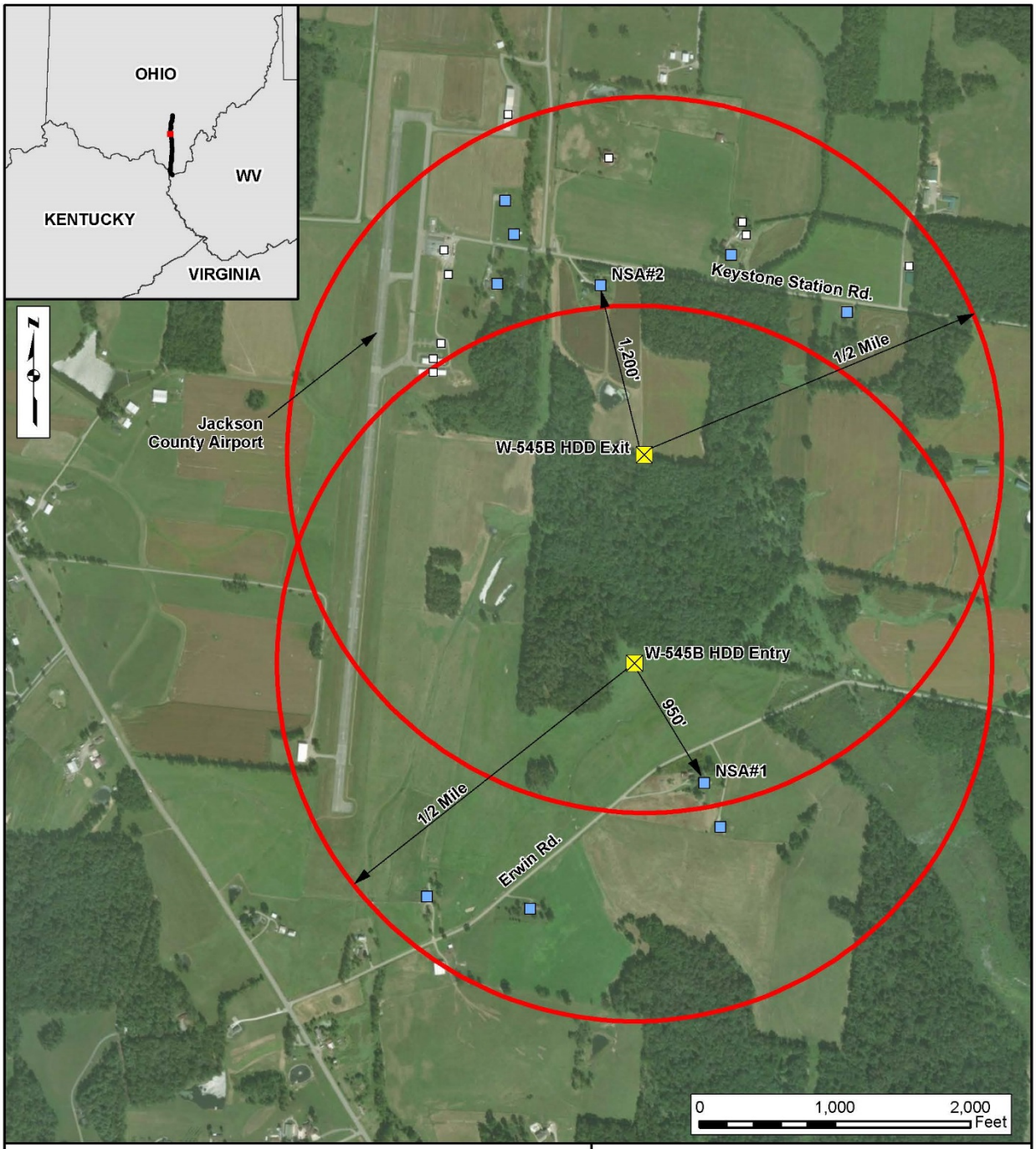


Figure B.8-3

Buckeye XPress Project

NSAs near the
Wetland W-545B HDD Crossing

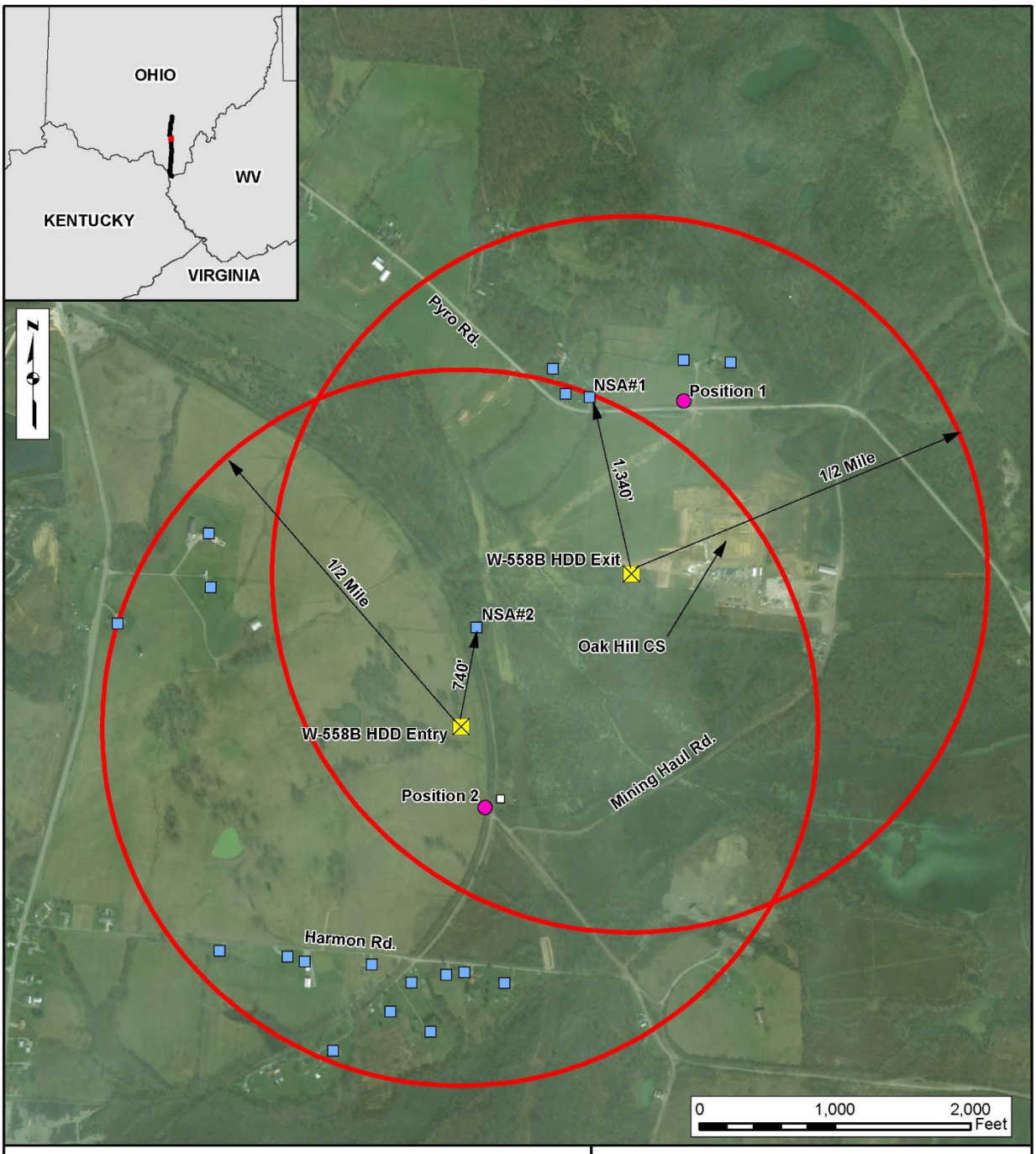


Figure B.8-4

Buckeye XPress Project

NSAs near the
Wetland W-558B HDD Crossing

As shown in table B.8-3, noise levels at the nearest NSAs attributable to HDD activities would exceed the 55 dBA L_{dn} criterion at the Highway 32 exit point, Highway 35 entry point, Wetland W-545B entry point, and Wetland W-558B entry point. At these locations, Columbia would implement noise mitigation, including installation of residential–grade exhaust silencers on all engines associated with the site equipment (e.g., generators, pumps, and hydraulic power unit). Further, noise barriers would be used as follows:

- Highway 32 HDD Exit: 14- to 16-foot-high barriers on the east and west sides of the exit site equipment;
- Highway 35 HDD Entry: 16-foot-high barrier on the southeast side of the entry site equipment;
- Wetland W-545B HDD Entry: 16-foot-high barrier on the southeast side of the entry site equipment; and
- Wetland W-558B HDD Entry: 12-foot-high barrier on the north side of the entry site equipment.

With the additional mitigation where necessary, the estimated HDD noise levels would be below the 55 dBA L_{dn} criterion for all NSAs. HDD activities would result in a 0.2 dBA to 6.6 dBA increase in ambient noise levels at NSAs; ranging from not detectable to the human ear to clearly noticeable. Further, where the background ambient noise level is greater than 55 dBA, the increase above ambient would be 0.2 dBA and likely not detectable. In the event that sensitive receptors still found the noise levels to be disruptive, Columbia would offer temporary housing (e.g., hotel or motel) accommodations as warranted, until the noise levels could be remedied. As such, noise impacts associated with HDD activities would be localized, temporary, and not significant.

Blasting

Blasting may be required to excavate the pipeline trench and at some aboveground facility locations where bedrock could be encountered at depths that may interfere with trenching or site excavation. Noise and vibration impacts produced during blasting would be instantaneous and would vary based on a number of factors, such as the type and amount of explosives used, distance of the receptor to the blast site, below-ground depth of explosives, and minimization measures applied. At a distance of 50 feet, typical construction blasting noise levels have been documented at about 94 dBA and vibration at about 100 vibration decibels (VdB). If the vibration level at a structure reaches 90 to 102 vibration decibels, depending on the building type, there may be damage effects (FHWA, 2006; FTA, 2006).

TABLE B.8-3
Noise Impacts from Horizontal Directional Drilling

HDD Site/ MP	NSA	Distance	Noise Level, L_{dn} (dBA) Existing Ambient at NSA	HDD Peak without Mitigation	HDD Peak with Mitigation	Combined Peak and Ambient	Increase Above Ambient
Highway 32							
Entry (MP 12.7)	NSA #2 (Residence)	1,200 feet North-Northwest	51.6	49.3	N/A	53.6	2.0
Exit (MP 12.9)	NSA #1 (Residence)	400 feet Northeast	51.6	58.9	45.5	52.5	0.9
Highway 35							
Entry (MP 17.8)	NSA #1 (Residence)	400 feet Southeast	66.9	67.9	53.6	67.1	0.2
Exit (MP 18.2)	NSA #2 (Residence)	1,450 feet West	43.8	36.0	N/A	44.4	0.6
Wetland W-545B							
Entry (MP 20.1)	NSA #1 (Residence)	950 feet Southeast	45.0 **a/**	62.0	50.5	51.6	6.6
Exit (MP 20.4)	NSA #2 (Residence)	1,200 feet North	45.0 **a/**	49.9	N/A	51.1	6.1
Wetland W-558B							
Entry (MP 24.8)	NSA #1 (Residence)	1,250 feet Northwest	42.3 **b/**	56.3	45.1	46.9	4.6
Exit (MP 25.1)	NSA #2 (Residence)	750 feet North	47.7 **b/**	50.0	N/A	52.0	4.3

a/ Ambient sound levels were estimated from land use category, very quiet suburban and rural residential.

b/ Ambient sound level measurements were completed prior to the recently constructed Oak Hill CS being placed into operation. The estimated full-load sound level contribution of the compressor station has been incorporated into the existing ambient sound levels.

Blasting operations would be conducted in accordance with Columbia's *Blasting Plan* and applicable regulations. Columbia's licensed blasting contractor would prepare a site-specific blasting plan prior to conducting blasting that would identify mitigation measures to control excessive noise and vibration. The site-specific plans would be reviewed and approved by Columbia's engineer. We included a recommendation in

section B.1 that Columbia should assess the potential for blasting-induced slope instability and to develop mitigation measures as applicable. If blasting is necessary within 150 feet of a residential or commercial building, Columbia would perform pre- and post-blast inspections as well as seismographic monitoring of ground-borne vibration if deemed necessary. Columbia would also implement the following measures to minimize blasting related noise and vibration impacts: limiting blasting to daylight hours; notifying occupants of nearby buildings, stores, residences, businesses, public gathering places, and farms of blasting events at least 48 hours in advance; filling blast holes with crushed stone or sand to direct energy into the rock instead of out of the holes; using blasting mats or overburden to cover the blast area and prevent scattering of loose rock; and using timing delays to limit the number of charges going off at the same time. With implementation of these mitigation measures and our recommendation in section B.1, significant noise and vibration impacts from blasting are not anticipated.

Abandonment Component

Noise impacts associated with construction of the proposed Project's Abandonment component would be similar to the general construction impacts identified for the replacement discussed, except abandonment impacts are anticipated to only last for 2 months rather than 19 months. Abandonment would also result in additional noise impacts from blowdown events at three existing mainline valve locations (approximately 4 hours for each event). As shown in table B.8-4, noise levels attributable to the blowdown events would exceed both the 55 dBA L_{dn} criterion and 70 dBA L_{dn} criterion at all three locations. Columbia would limit the blowdown events to daylight hours and would notify surrounding residents prior to initiating. However, because of the proximity to NSAs to the blowdown locations and the expected noise levels, which would exceed the threshold established by the EPA to be protective of human hearing, **we recommend that:**

- **Columbia should use mobile blowdown silencers at the McArthur RS, Symmes VS and the Neds Fork VS during the proposed abandonment activities to reduce noise levels to less than 70 dBA L_{dn}.**

With implementation of Columbia's planned measures, noise impacts would be localized, temporary, and not significant.

TABLE B.8-4
Noise Impacts from Blowdowns

Valve Site a/	NSA	Distance	Blowdown Noise Level, $L_{eq(4)}$ (dBA)	Blowdown Noise Level, L_{dn} (dBA) b/
McArthur RS	Residence	350 feet Southwest	101	93
Symmes VS	Residence	380 feet Northeast	100	92
Neds Fork VS	Residence	480 feet Southeast	98	90

a/ There are approximately 15 NSAs within 0.5 mile of the McArthur RS, 8 NSAs within 0.5 mile of the Symmes VS, and 15 NSAs within 0.5 mile of the Neds Fork VS.

b/ Resulting L_{dn} would be approximately 8 dB lower than the measured noise level because blowdown activities are assumed to occur during 4 daytime hours (i.e., no blowdown activities for the remaining 11-daytime hours and no nighttime blowdown activities).

Abbreviations:

$L_{eq(4)}$ equivalent sound level averaged over 4 hours

Operational Noise and Vibration Impacts and Mitigation

Natural gas traveling through the buried pipeline would not be expected to emit audible noise above the surface or result in a perceptible level of vibration. Further, proposed modifications at the existing RSs and VSs and installation of proposed MLVs would not be expected to increase operational noise, and the proposed Abandonment component would have no associated operational noise. However, there would be minimal noise associated with operation of the regulation run within the fence line of Columbia's existing Ceredo CS in Wayne County, West Virginia. This would include noise at the regulator control valve, including upstream and downstream piping radiated noise. Noise from operation of the existing compressor station is included in the baseline ambient conditions.

Figure B.8-5 depicts the nearest NSAs to the regulation run at the Ceredo CS. As shown in table B.8-5, noise levels attributable to the regulation run would not exceed the 55 dBA L_{dn} criterion and would result in impacts above the ambient noise levels of 0.0 dBA to 0.8 dBA, which would likely not be detectable to the human ear. As a result, we conclude noise impacts due to long-term operation would be negligible and not significant.

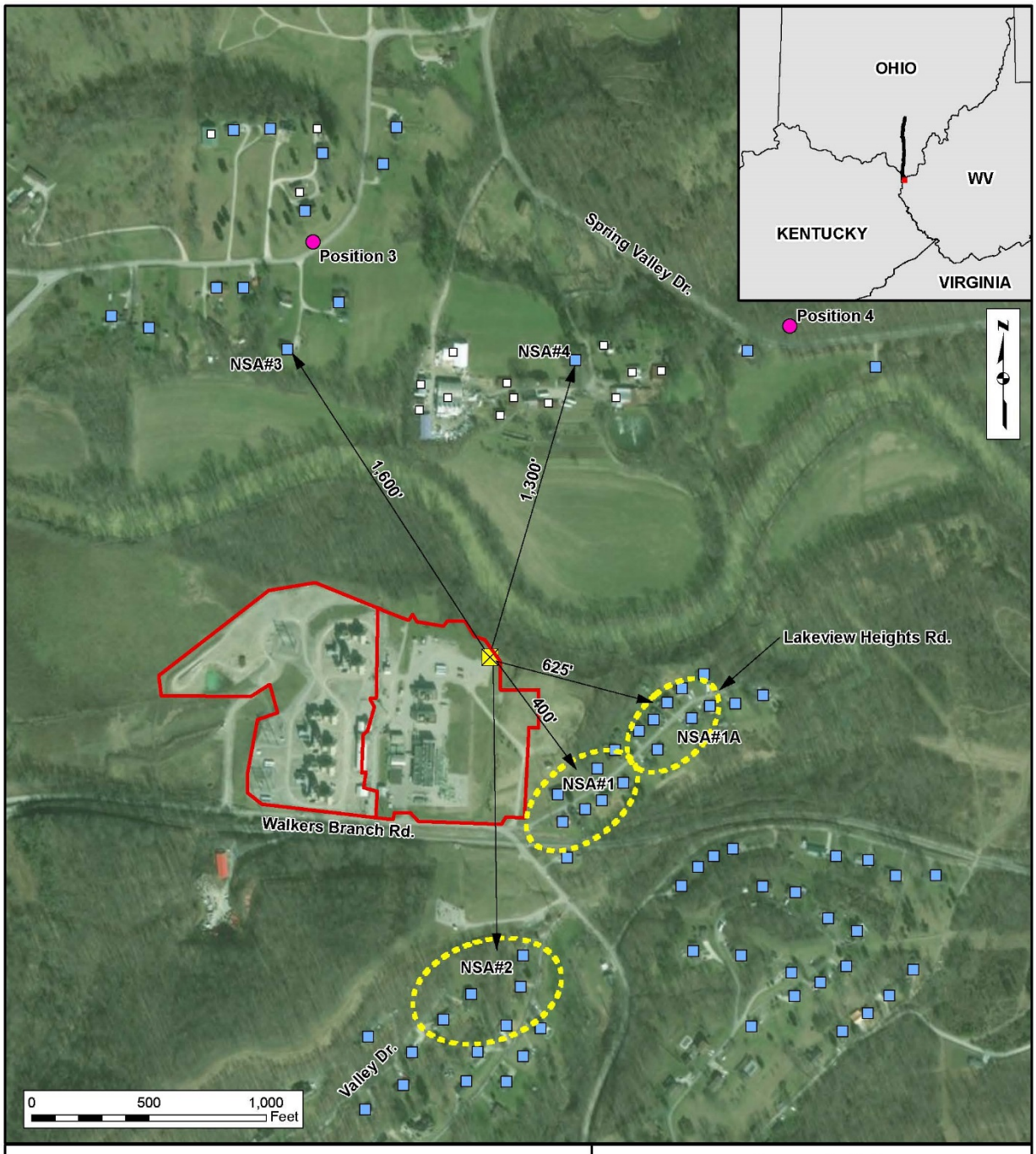


Figure B.8-5

Buckeye XPress Project

NSAs near the
Ceredo Compressor Station

TABLE B.8-5
Noise Impacts from Regulation Run at the Ceredo Compressor Station

NSA	Distance	Noise Level, L_{dn} (dBA)			
		Existing Ambient at NSA	Regulator Run Peak	Combined Peak and Ambient	Increase Above Ambient
NSA #1 (Residences)	600 feet Southeast	69.2	45.9	69.2	0.0
NSA #1A (Residences)	625 feet East to East Southeast	58.1	46.3	58.4	0.3
NSA #2 (Residences)	1,250 feet South	59.3	28.9	59.3	0.0
NSA #3 (Residence)	1,600 feet Northwest	50.2	36.3	50.4	0.2
NSA #4 (Residence)	1,300 feet North to Northeast	50.6	43.4	51.4	0.8

Wayne National Forest

The proposed Project would cross NFS lands of the WNF. Columbia has not proposed any aboveground facilities within the WNF, so no long-term operational noise impacts would occur. Noise and vibration impacts within the WNF would be limited to noise and vibration related to construction in a similar manner as discussed in the sub-section above with the exception of HDD activities, which are not proposed within the WNF. As a result, noise and vibration would be localized and temporary, and no NSAs would be exposed to substantial noise levels for an extended period of time. Other measures required by the USFS to protect sensitive noise receptors within the WNF, if any, would be included in the final COM Plan.

9. Reliability and Safety

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for accidental release of natural gas. The greatest hazard would be a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Methane 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 methane 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. Methane is buoyant at atmospheric temperatures and disperses upward rapidly in air.

9.1 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. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards, which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level.

Section 5(a) of the *Natural Gas Pipeline Safety Act of 1968*, as amended, provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state may also act as USDOT's agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement action. The state of Ohio is authorized by PHMSA under Section 5(a) to assume all aspects of the safety program for intrastate facilities. The USDOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses natural gas pipeline safety issues.

Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* dated January 15, 1993, between the USDOT and the FERC, the USDOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations require that an applicant certify that it 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. Columbia made this commitment in its application. The FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the USDOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of the USDOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the Project must be designed, constructed, operated, and maintained in accordance with the USDOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The USDOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

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

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

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

Class locations also specify the maximum distance to a sectionalizing block valve (e.g., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class

4). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; MAOP; inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Preliminary class locations for the Project have been developed based on the relationship of the pipeline centerline to other nearby structures and man-made features.

The proposed R-801 pipeline would be constructed through 56.0 miles of Class 1, 9.5 miles of Class 2, and 0.7 mile of Class 3 areas (see appendix B.9-1). Over the life of the pipeline, Columbia would monitor population changes near the pipeline. If a subsequent increase in population density adjacent to the right-of-way results in a change in class location for the pipeline, Columbia would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness if required, or take other measures as applicable to comply with the USDOT requirements for the new class location.

The *Pipeline Safety Improvement Act of 2002* required operators to develop and follow a written integrity management program (IMP) that contained all the elements described in 49 CFR 192.911 and addressed the risks on each transmission pipeline segment. Specifically, the law establishes an IMP, which applies to all high consequence areas (HCA). The following are the core elements of the IMP:

- identifying all HCAs;
- performing and integrating the results of integrity assessments;
- repairing defects and identifying additional measures to address the most significant pipeline threats;
- conducting risk analyses;
- evaluating information obtained to determine a plan for future integrity assessments; and
- evaluating the effectiveness of the IMP and identifying improvements as needed.

As part of the IMP, the BXP would also use advanced in-line inspection tools called smart pigs that would travel through the pipeline to record and measure any pipeline irregularities. These irregularities could be indications of corrosion, cracks, or defects along the pipeline. Using these tools, a baseline assessment would be required within 10 years of placing the pipeline in service, with recurring assessments on pipeline integrity being required every 7 years. The information that would be provided by these tools would be useful for planning preventative maintenance activities.

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.

HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;
- any area outside a Class 3 or Class 4 area where the potential impact radius[38] is greater than 660 feet, and the area within the potential impact circle[39] contains 20 or more buildings intended for human occupancy; 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, which 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 segments of the pipeline within HCAs. The USDOT regulations specify the requirements for the IMP in 49 CFR 192.911. Columbia has identified two HCAs along the proposed pipeline route: one from MPs 9.4 to 9.8 (0.4 mile), and one from MPs 65.7 to 66.2 (0.5 mile). Columbia would incorporate the Project into its existing IMP; however, it would use criteria specified by the USDOT to identify HCAs if conditions change along the pipeline.

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 response plan that includes procedures to minimize the hazards of a natural gas pipeline emergency. Key elements of the plan include:

[38] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in psig multiplied by the square of the pipeline diameter in inches.

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

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

Columbia would incorporate the proposed R-801 pipeline into its existing gas monitoring and control systems. Columbia would maintain a monitoring system that includes a gas control center to monitor system pressures, flows, and customer deliveries on its entire system. Columbia's data acquisition systems are at all compressor and regulator stations along the pipeline system. A decrease in system pressure would activate an alarm and notify Columba's Charleston Gas Control Center, which would then coordinate with field operations. Gas flow to the problem area could then be stopped by isolating selected sections of pipeline while inspections were conducted and repairs made.

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

Columbia would provide the appropriate training to local emergency service personnel before placing the pipeline into service. No additional specialized local fire protection equipment would be required to handle pipeline emergencies. Due to the collocation of the new Project facilities and/or location of non-collocated facilities in the same general area as existing facilities, Columbia's current emergency response program would also cover these new facilities.

Columbia would update its program with local emergency response organizations and local utility operators upon commencement of operations of the Project, if approved. Columbia would ensure that local officials and utility operators were kept apprised of Columbia's activities to operate and maintain its system. Columbia would provide annual emergency response training for its operations personnel, which would include coordination with local officials during an emergency event. Mock drills with local emergency response organizations would be a part of this program. In addition, Columbia would continue to meet annually with local emergency response agencies, public officials, and local excavators to review emergency procedures and gather feedback regarding the

effectiveness of the program and meetings. Information regarding emergency response agencies and resources are listed in table B.9-1.

TABLE B.9-1
Emergency Response Resources and Personnel along the Pipeline Route

Agency	County	Personnel Count	Equipment/ Resources	Begin MP	End MP
Richland Township Fire Department	Vinton	NA	NA	0.0	4.7
Washington Township Fire Department	Jackson	43 Full-Time 66 Part-Time	5 stations: • 5 front line engines • 1 ladder truck • 5 ambulances • 1 brush trunk • 1 tanker	4.7	9.2
Franklin Township Fire Department	Jackson	50 volunteers	2 stations: *Station 19:* • 2 engines • 1 rescue pumper • 1 tanker • 1 brush truck • 1 utility truck *Station 20:* • 1 engine • 1 rescue • 1 brush trunk	17.0	21.9
Madison Jefferson Joint Fire District	Jackson	38	• 2 engines • 2 tankers • 1 rescue truck • 1 brush truck • 1 utility vehicle • 1 first responder pick-up truck	22.5	30.1
Wellston Fire Department	Vinton and Jackson	30	• 2 engines • 1 brush truck • 1 rescue truck	Multiple	Multiple

TABLE B.9-1
Emergency Response Resources and Personnel along the Pipeline Route

Agency	County	Personnel Count	Equipment/ Resources	Begin MP	End MP
Greenfield Township Volunteer Fire Department	Gallia	20	• 2 engines • 1 tanker • 1 brush truck • 1 heavy rescue trailer • 2 rescue boats • 1 ATV	30.1	35.7
Loveland-Symmes Fire Department	Lawrence	60	• 3 ambulances • 4 engines • 1 tower truck • 2 quint trucks **a/** • 1 rescue truck • 1 dive rescue truck • 1 mass casualty incident command unit	35.7	42.5
Aid Township Volunteer Fire Department	Lawrence	16	NA	42.5	49.7
Lawrence Township Volunteer Fire Department	Lawrence	20	• 2 engines • 1 brush truck • 1 tanker • 1 first responder mini pump	19.7	54.3
Perry Township Volunteer Fire Department	Lawrence	25	NA	54.3	62.4
Fayette II Volunteer Fire Department	Lawrence	35	NA	62.4	66.2
Burlington Fayette Fire Department	Lawrence	25 volunteers	• 5 engines • 2 brush trucks • 1 tanker • 1 EMS vehicle • 1 car	62.4	66.2
South Point Volunteer Fire Department	Lawrence	37	NA	63.7	64.9

TABLE B.9-1
Emergency Response Resources and Personnel along the Pipeline Route

Agency	County	Personnel Count	Equipment/ Resources	Begin MP	End MP

a/ Quint tank – pump, water tank, fire hose, ground ladder, aerial ladder

Abbreviations:

NA Not Available

FT Full-time

PT Part-time

Columbia would update its existing *Emergency Procedures Manual* to include and address the R-801 pipeline, prior to commencement of operations. The current emergency response program would adequately cover the new Project facilities because the pipeline would be collocated with or in the same general area as the existing R-System pipelines.

For portions of the BXP that are within the WNF, in the event of a prescribed burn in the vicinity of the pipeline, the pipeline would not be affected as it would be insulated by the 24 inches to 36 inches of soil above it. In addition, Columbia's *Emergency Procedures Manual* includes establishing and maintaining adequate means of communication with appropriate fire, police, and other public officials, including the USFS. Columbia would actively participate in emergency response coordination with local fire personnel and would cooperate by providing the location of the pipeline easement, depth of cover, and measures that should be taken if the pipeline were to be crossed by heavy equipment such as water trucks and other fire-fighting machinery.

9.2 Pipeline Accident Data

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

- cause a death or personal injury requiring hospitalization; or
- involve property damage of more than $50,000 (1984 dollars).[40]

During the 20-year period from 1999 through 2018, a total of 1,086 significant incidents were reported on approximately 300,000 total miles of onshore natural gas transmission pipelines nationwide.

[40] $50,000 in 1984 dollars is approximately $124,031.40 as of February 2019 (U.S. Department of Labor, Bureau of Labor Statistics, 2019)

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table B.9-2 provides a distribution of the causal factors as well as the number of each incident by cause.

TABLE B.9-2
Natural Gas Transmission Pipeline Significant Onshore Incidents by Cause (1999-2018) a/

Cause	No. of Incidents	Percentage
Corrosion (External and Internal)	182	17.2
Excavation **b/**	190	17.7
Pipeline material, weld or equipment failure	378	34.1
Natural force damage	94	8.1
Outside force **c/**	71	6.2
Incorrect operation	53	4.7
All other causes **d/**	118	12.0
TOTAL	**1,086**	**-**

a/ All data gathered from PHMSA (2019a)
b/ Includes third-party damage
c/ Fire, explosion, vehicle damage, previous damage, intentional damage
d/ Includes miscellaneous causes or unknown causes

The dominant causes of pipeline incidents are corrosion, excavation, and pipeline material, weld, or equipment failure constituting 69 percent of all significant incidents. The pipelines included in the data set in table B.9-2 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. The use of both an external protective coating and a cathodic protection system,[41] required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe.

Outside forces are the cause in 6.2 percent of significant pipeline incidents. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as winds, storms, and thermal strains; and willful damage.

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

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller-diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movement. Table B.9-3 shows the various causes of outside force incidents.

TABLE B.9-3
Natural Gas Transmission Pipeline Outside Forces Onshore Incidents by Cause (1999-2018) a/

Cause	No. of Incidents	Percent of all Incidents b/
Third-party excavation damage	151	35.3
Operator/Contractor excavation damage	26	5.8
Unspecified material/weld failure	17	6.3
Heavy rain/floods	27	17.4
Earth movement	26	6.5
Lightning/temperature/high winds	30	6.7
Unspecified natural force/other natural force	11	2.5
Vehicle (not engaged with excavation)	38	11.6
Fire/explosion	11	2.2
Electrical arcing from other equipment	2	0.2
Previous mechanical damage	5	1.3
Fishing or maritime activity	1	1.6
Intentional damage	1	0.2
Unspecified/other outside force	11	2.5
TOTAL	**357**	**-**

a/ Excavation, Outside Force, and Natural Force from table B.9-2.
b/ Due to rounding, column does not total 100 percent.

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 pre-construction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

9.3 Impact on Public Safety

As stated above, Columbia would comply with the USDOT pipeline safety standards as well as regular monitoring and testing of the pipeline. While pipeline failures are rare, the potential for pipeline systems to rupture and the risk to nearby residents is discussed below.

The service incidents data summarized in table B.9-2 include pipeline failures of all magnitudes with widely varying consequences. Table B.9-4 presents the average annual injuries and fatalities that occurred on natural gas transmission lines in the 5-year period between 2014 and 2018.

TABLE B.9-4
Injuries and Fatalities – Natural Gas Transmission Pipelines a/

Year	Injuries b/	Fatalities c/
2014	1	1
2015	16	6
2016	3	3
2017	3	3
2018	8	1

a/ PHMSA, 2019b.
b/ Includes Public and Industry injuries.
c/ Includes Public and Industry fatalities.

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

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table B.9-5 to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to the other categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, or floods.

TABLE B.9-5
Accidental Deaths by Cause

Type of Accident	Number of Fatalities
All injuries (unintentional) **a/**	161,374
Motor vehicle accident **a/**	38,748
Poisoning (unintentional) **a/**	58,335
Falls (unintentional) **a/**	34,673
Drowning (unintentional) **a/**	3,786
Fire/flame (unintentional) **a/**	2,730
Floods **b/**	116
Lightning **b/**	16
Tornado **b/**	35
Natural gas distribution lines **c/**	7
Natural gas transmission pipelines **d/**	1

a/ National Vital Statistics Report for 2016, Vol. 67, No. 5, July 26, 2018 (CDC, 2019).

b/ National Weather Service Summary of Natural Hazards for 2017 in the U.S. (National Weather Service, 2019).

c/ PHMSA, 2019c – Includes Industry and Public Fatalities for 2018.

d/ PHMSA, 2019b – Includes Industry and Public Fatalities for 2018.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1999 to 2018, there were an average of 54 significant incidents, 9 injuries, and 3 fatalities per year. The number of significant incidents over the approximately 300,000 miles of natural gas transmission lines indicates that the risk is low for an incident at any given location. The rate of total fatalities for the nationwide natural gas transmission lines in service is approximately 0.01 per year per 1,000 miles of pipeline. Using this rate, implementing the proposed 66-mile-long R-801 line might result in a fatality (either an industry employee or a member of the public) on the pipeline every 1,515 years. The operation of the Project would represent a slight increase in risk to the nearby public.

10. Cumulative Impacts

The CEQ regulations for implementing NEPA, at 40 CFR 1508.7, define cumulative impacts as: "impacts on the environment which result from incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions…." The current environment of the Project area reflects a mixture of natural processes and human influences across a range of conditions. Current conditions have been affected by innumerable activities over thousands of years, as explained below. The CEQ issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which stated: "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The region in which the BXP is proposed has been affected by human activities for over 15,000 years, beginning with the original settlement of North America by Native Americans. The indigenous communities were affected by European settlement beginning in the 17th Century. Settlement of the region brought modifications to the landscape, including the imprints of farming and timbering activities. As population settlements grew, resources such as wetlands and forests were modified or converted. According to the OEPA for example, since the late 18th century, 90 percent of Ohio's wetland resources have been destroyed or degraded through draining, filling, or other modifications (OEPA, 2016), decreasing from about 5,000,000 acres to about 483,000 acres (USGS, 2018c). The total statewide wetland acreage of West Virginia is between 57,000 and 102,000 acres (FWS, 1996). Approximately 13 million people reside in Ohio and West Virginia.

Although the region has been substantially affected by human activity, natural resources remain. There are still large portions of the Project area that are currently rural and not densely occupied.

In order to understand the contribution of past actions to the cumulative effects of the proposed action, this analysis relies on current environmental conditions as a proxy for the effects of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. In this analysis, we generally consider the impacts of past projects within the resource-specific geographic scopes as part of the affected environment (environmental baseline) which was described under the specific resources discussed throughout section B. However, this analysis does include the present effects of past actions that are relevant and useful.

In accordance with the CEQ regulations for implementing NEPA, we identified other actions in the vicinity of the proposed BXP facilities and evaluated the potential for a cumulative impact on the environment. This analysis evaluates other actions that affect resources also affected by the Project, within the resource-specific geographic scopes. Actions outside the geographic scopes are generally not evaluated because their potential

to contribute to a cumulative impact diminishes with increasing distance from the Project. A commentor noted that induced or increased natural gas production, including the extraction of natural gas in shale formations by hydraulic fracturing, should be considered. Those topics are outside the scope of this EA. However, active oil and gas production activity is referenced in the table in appendix B.10-1 and considered in our cumulative impacts assessment as appropriate to the geographic scope for impact consideration.

The geographic scope for each resource is unique, and is generally more localized for somewhat stationary resources such as geological and soil resources; more expansive for resources with a large geographic area, such air quality. We evaluated cumulative impacts from a geographical perspective recognizing that the proximity of other actions to the Project is a major predictor of where cumulative impacts would most likely result. In general, the closer another action is to the Project, the greater the potential for cumulative impacts. For the purpose of this analysis, we are including the following resources: soils, groundwater, surface water, and wetlands; vegetation; wildlife; fisheries and aquatic resources; federally listed species; land use, recreation/special interest areas, and visual resources; air quality; and noise. For each environmental resource, the potential direct and indirect impacts associated with the projects are discussed in relation to the cumulative effects that may occur when they are added to other past, present, or reasonably foreseeable projects within the geographic scope of analysis defined for that resource, as described further below. Table B.10-1 summarizes the resource-specific geographic boundaries considered in this analysis and the justification for each.

As described throughout this EA, the BXP would both temporarily and permanently impact the environment primarily for the Replacement component (the proposed R-801 pipeline), but also to a lesser degree for the Abandonment component. Details about the impacts for the BXP are discussed in section B. In terms of other projects that were recently constructed, or may be constructed in the near future, we also considered permanent impacts on specific environmental resources (e.g., removal of forest).

Our review of the estimated BXP impacts concludes that nearly all construction impacts would be contained within the right-of-way and extra workspaces. Geologic resources are generally site-specific with a localized potential for effects. Consequently, most of the construction impacts would be temporary and localized and would not be expected to contribute to regional cumulative impacts. Columbia has committed to impact mitigation measures and we have included recommendations regarding geological resources as discussed in section B.1. Further, based upon our review of mapping and geologic feature location data and associated information, we conclude that known active mines, wells, and geologic hazard areas would not be directly intersected by both the proposed BXP and other projects. Given these reasons, we conclude that the projects would not significantly contribute to cumulative impacts on geological resources.

TABLE B.10-1
Resource-Specific Geographic Regions for Determining Cumulative Impacts for the Project

Environmental Resource	Geographic Scope and Justification for Cumulative Impacts
Groundwater, Surface water, and Wetlands	HUC-12 watershed – Projects/actions within the HUC-12 sub-watersheds (i.e., sixth-field watersheds) crossed by the Project were evaluated for cumulative impacts on water resources, aquatic resources, and wetlands.
Soils	Construction workspaces – Potential impacts on soils would be limited to the construction footprint.
Groundwater, Surface Water, and Wetlands	HUC-12 watershed – Projects/actions within the HUC-12 sub-watersheds (i.e., sixth-field watersheds) crossed by the projects were evaluated for cumulative impacts on water resources, aquatic resources, and wetlands.
Vegetation and Wildlife	HUC-12 watershed – Projects/actions within the HUC-12 sub-watersheds (i.e., sixth-field watersheds) crossed by the projects were evaluated for cumulative impacts on vegetation and wildlife. A watershed can serve as a geographic proxy for impacts on vegetation and wildlife, and provides a natural boundary to frame the analysis, as recommended by the CEQ.
Land Use	A 1-mile radius was considered for land use. Impacts on general land uses would be restricted to the construction workspaces and the immediate surrounding vicinity.
Visual	Assessing the impact based on the viewshed allows for the impact to be considered with any other feature that could have an effect on visual resources. This is assessed as 0.25 mile for pipelines and 0.5 mile for aboveground facilities.
Noise – Operations	Other projects' noise impacts on NSAs within 1 mile of a noise emitting permanent aboveground facility during Project operation.
Noise – Construction	Temporary noise from construction of the Project would overlap with noise from other construction projects, which would be limited to areas within 0.25 mile of Project construction, and 0.5 mile for HDD locations.
Air Quality – Construction and Operation	Temporary impacts on air quality, including fugitive dust, would be largely limited to areas within 0.25 mile of active construction. A 0.25-mile buffer for air quality impacts due to operation was evaluated due to the minimal emissions generated during Project operation since no new stationary sources are proposed.

We also conclude that the limited nature of socioeconomic impacts associated with the BXP would not greatly alter the socioeconomic environment or conditions in the Project area, and would therefore contribute to minimal to no cumulative effects on housing or public services when considering the other projects listed in appendix B.10-1. However, there is the possibility for cumulative impacts related to traffic.

There would be increased traffic on area roads associated with the proposed Project. Other projects, such as the James A. Rhodes Airport expansion and various road and bridge improvement projects, could also increase traffic in the area. The extent of the cumulative

impact (if any) would depend almost entirely on the timing of Project activities, which cannot be definitively determined at this time. Columbia would implement traffic mitigation measures as discussed in section B.6, has developed a *Traffic Control Plan,* and would be required to submit a *Heavy Haul Route Study* for our approval prior to construction. We conclude that with implementation of the mitigation and plans developed by Columbia that the Project's effects upon traffic in combination with the other projects would result in minimal cumulative effects.

As noted in section B.7, cultural resource sites within or along (such as historic sites) the proposed Project area that would be eligible for listing on the NRHP either would be unaffected or avoided. Therefore, we conclude that the Project would not impact cultural resources and thus would not contribute to any cumulative impacts on cultural resources.

Where the impacts may migrate or affect areas outside of designated work areas include construction air emissions, noise impacts, visual impacts, wildlife impacts, and stream sedimentation or turbidity, and aquatic resources.

In addition, and at the request of the USFS, we considered certain potential cumulative impacts on resources within the WNF.

In addition to the geographic relationship between the BXP and other projects in the area, we also considered temporal relationships. If the Commission were to authorize the Project, and if construction were to begin in mid or late 2019, work (including a majority of right-of-way reclamation) would not be completed until about late 2020 at the earliest. At least 2 years of restoration monitoring would follow (up to about 2022 or beyond, in areas where restoration was problematic); longer-term potential impacts would occur such as those related to changes in forest age and forest fragmentation. Therefore, this cumulative impact analysis considers projects constructed within the past 2 years and current and other reasonably foreseeable projects that may be constructed within the geographic scope of analysis up through about 2022 for most likely effects, but for years into the future for consideration of changes to forest age and forest fragmentation.

10.1 Other Projects within the Geographic Scope of Analysis

Appendix B.10-1 identifies other projects or actions within the geographic scope of analysis for the BXP. We identified these projects through scoping and independent research, as well as information provided by Columbia. Independent research included the use of desktop analysis of available aerial photography, files at the FERC, information available on public websites, as well as internet searches for projects within the geographic limits identified in table B.10-1 above. The approximate locations of the projects (those that were able to be identified through research) in relation to the BXP are shown in figure B.10-1 with project identification numbers that can be cross-referenced to appendix B.10-1 overlaid on color-coded watersheds. Resources affected along with estimates for specific impacts by watershed, where available, are listed in appendix B.10-1.

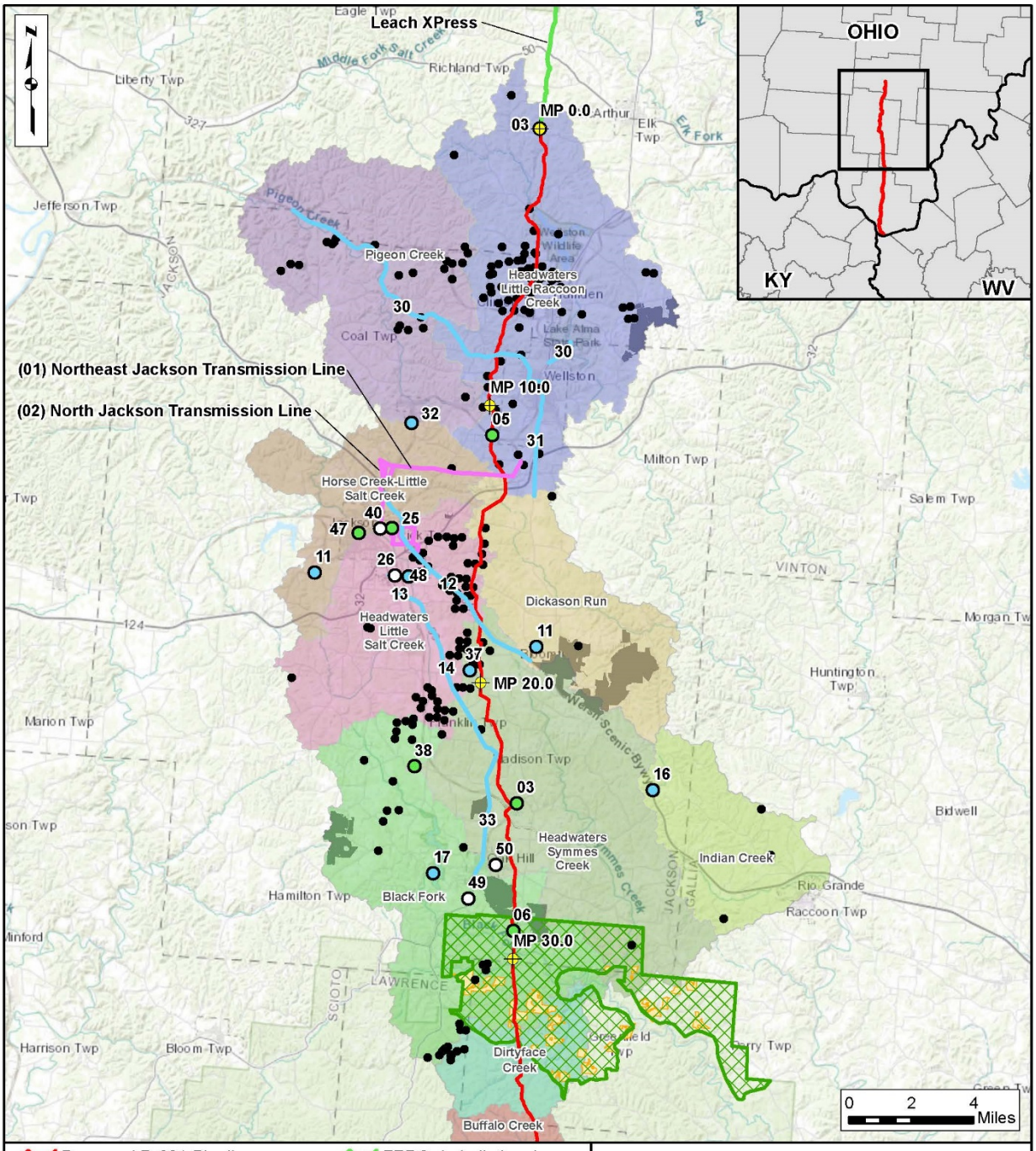


Figure B.10-1

Buckeye XPress Project

Projects Contributing to Cumulative Impacts
(Sheet 1 of 2)

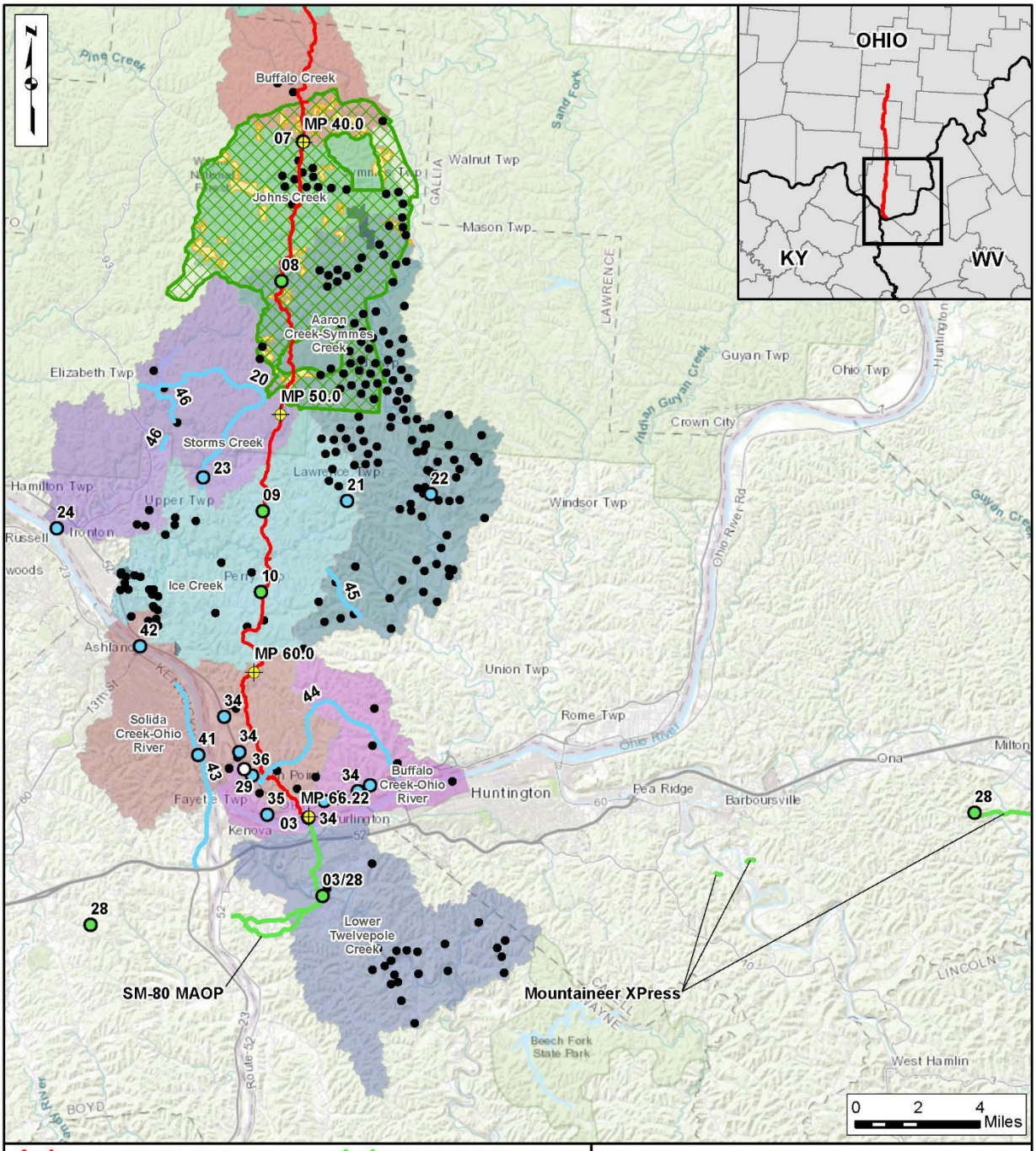


Figure B.10-1

Buckeye XPress Project

Projects Contributing to Cumulative Impacts
(Sheet 2 of 2)

The BXP proposed R-801 pipeline route, abandonment activities, and the addition of the regulation run at the existing Ceredo CS would be within 17 HUC-12 watersheds. Table B.10-2 lists all the watersheds crossed by the BXP and these other projects, the size of the watershed in acres, as well as the acres affected by other projects considered in this analysis within each watershed and the acres that would be affected by the BXP within each watershed. The 17 HUC-12 watersheds represent a combined total 384,065 acres (about 600 square miles). The BXP would account for about 1,532 acres (0.4 percent) of impacts within these watersheds during construction, while other projects within the same watersheds account for 4,268.6 acres (1.1 percent) of impact.

TABLE B.10-2
Affected HUC-12 Watersheds Affected by the Buckeye XPress Project (During Construction)

Activity	Acres a/	Percent of Watershed
Watershed: Headwater Little Raccoon Creek	**38,379**	
Other Identified Projects	29.6	0.1
BXP	237.5	0.6
Watershed: Pigeon Creek	**29,591**	
Other Identified Projects	0.0	0.0
BXP	2.4	0.01
Watershed: Horse Creek-Little Salt Creek	**14,742**	
Other Identified Projects	63.4	0.4
BXP	1.5	0.01
Watershed: Dickason Run	**17,422**	
Other Identified Projects	7.3	0.04
BXP	47.6	0.3
Watershed: Headwaters Little Salt Creek	**21,562**	
Other Identified Projects	61.7	0.3
BXP	87.1	0.4
Watershed: Headwaters Symmes Creek	**36,125**	
Other Identified Projects	57.73	0.2
BXP	262.2	0.7
Watershed: Indian Creek	**13,970**	
Other Identified Projects	0.0	0.0
BXP	22.1	0.2
Watershed: Black Fork	**31,604**	
Other Identified Projects	647.78	2.0
BXP	115.6	0.4

TABLE B.10-2

Affected HUC-12 Watersheds Affected by the Buckeye XPress Project (During Construction)

Activity	Acres a/	Percent of Watershed
Watershed: Dirtyface Creek	**8,612**	
Other Identified Projects	424.33	4.9
BXP	54.9	0.6
Watershed: Buffalo Creek	**11,239**	
Other Identified Projects	473.74	4.2
BXP	122.8	1.1
Watershed: Johns Creek	**14,514**	
Other Identified Projects	1,090.5	7.5
BXP	96.9	0.7
Watershed: Aaron Creek-Symmes Creek	**37,333**	
Other Identified Projects	631.1	1.7
BXP	97.8	0.3
Watershed: Storms Creek	**23,803**	
Other Identified Projects	10.4	0.04
BXP	45.5	0.2
Watershed: Ice Creek	**24,987**	
Other Identified Projects	0.9	0.0
BXP	158.5	0.6
Watershed: Solida Creek-Ohio River	**21,919**	
Other Identified Projects	504.0	2.3
BXP	144.8	0.7
Watershed: Buffalo Creek-Ohio River	**12,444**	
Other Identified Projects	76.9	0.6
BXP	27.8	0.2
Watershed: Lower Twelvepole Creek	**25,819**	
Other Identified Projects	89.9	0.3
BXP	11.8	0.04
Total Acreage of HUC-12 Watersheds	**384,065**	
Acreage affected by the Buckeye XPress Project	**1,532**	
Acreage affected by Other Projects	**4,268.64**	

a/ Includes estimated values.

Note: The "other identified projects" for each watershed are those listed and described in appendix B.10-1.

We have identified eight types of projects that would potentially cause a cumulative impact when considered with the BXP. These project types include:

- FERC-jurisdictional natural gas interstate transportation projects;
- other energy projects, including power plants or electric transmission lines;
- silviculture projects;
- commercial/residential/industrial and other development projects;
- oil and gas wells;
- mining operations;
- non-jurisdictional projects/facilities related to the BXP; and
- transportation projects.

These projects are described below. A discussion of resource-specific cumulative impacts follows.

FERC-jurisdictional Natural Gas Interstate Transportation Projects

There are four FERC-regulated natural gas projects within proximity to the BXP. All of these projects have received FERC authorization, with some still in construction, others completed and already operational, or postponed due to market conditions. These projects include the Leach XPress Project (LXP) (CP15-514), Mountaineer XPress Project (MXP) (CP16-357), the Tennessee Gas Pipeline Company Abandonment and Capacity Restoration Project (ACRP) (CP15-88), and the Columbia Gas Transmission SM-80 MAOP Restoration Project (SM-80) (CP15-549). Each FERC-jurisdictional interstate transportation project within the geographic scope of analysis for BXP is listed in appendix B.10-1.[42]

Leach XPress Project

In September 2016, the FERC issued the FEIS for Columbia's LXP, and it was subsequently approved by the Commission. The project was constructed and then placed into service in January 2018. The LXP involved the construction and operation of two new looping natural gas pipelines, and abandonment of an existing pipeline. The LXP's pipeline facilities totaled 160.7 miles of pipe and added about 143,000 horsepower (hp) of compression to transport up to 1.5 bcf/day of natural gas. Columbia Gas also abandoned 28.2 miles of the existing Line R-501 in Fairfield, Hocking, and Vinton Counties, Ohio.

[42] Additional details regarding each project can be obtained through our website at www.ferc.gov by utilizing our eLibrary system and the docket number given above for each project.

The LXP disturbed a total of 3,161.6 acres of land during construction. Of this, operations required 987.7 acres (consisting of 926.3 acres for the permanent pipeline facilities and 61.4 acres for aboveground facilities). The remaining 2,173.9 acres of disturbed land was restored and allowed to revert to its pre-construction use. Because the LXP connects to the northern end of the BXP, several components of the LXP are within the geographic scope of the BXP within the Headwater Little Raccoon Creek HUC-12 Watershed (LXP – McArthur RS and R-801 Loop); Headwater Symmes Creek HUC-12 Watershed (LXP – Oak Hill CS); Buffalo Creek-Ohio River HUC-12 Watershed (LXP – BM-111 Loop and LXP – Burlington RS); and Lower Twelvepole Creek HUC-12 Watershed (LXP – Ceredo CS). Resources affected along with estimates for specific impacts by watershed, where available, are listed in appendix B.10-1.

Mountaineer XPress Project

Columbia's MXP application was filed with the FERC on April 29, 2016. The project consists of about 170 miles of pipeline of various diameters, three new compressor stations, modifications to three existing compressor stations, and two regulating stations in West Virginia. Per the MXP FEIS, approximately 3,647 acres of land were affected during construction and 1,077 acres during operation of the MXP. The primary purpose 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 2.7 bcf/day. Both the BXP and MXP involve modifications at the existing Ceredo CS in the Lower Twelvepole Creek HUC-12 watershed. The FERC issued the FEIS for the MXP (and associated Gulf XPress) in July 2017, and it was subsequently approved by the Commission. Construction of the MXP began in February 2018 and based on the Construction Status Report dated March 11, 2019, aboveground facilities are 95 to 100 percent structurally complete, and pipeline backfill is 90 to 100 percent complete with restoration ongoing (50 to 100 percent complete). Restoration activities are proposed to resume in Spring 2019. The FERC has so far granted authorization to commence service for various pipeline and aboveground facilities in early 2019.

Abandonment and Capacity Restoration Project

In February 2015, Tennessee Gas Pipeline Company, LLC (TGP) filed an application with the FERC for its ACRP, seeking authorization to abandon, construct, modify, and operate natural gas pipeline facilities in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Ohio. The ACRP was approved by FERC in 2017; however, in response to a motion filed by TGP in October 2018 that it was no longer pursuing the project, the Commission vacated the authorizations for the ACRP. Therefore, this project will not be discussed further.

SM-80 MAOP Restoration Project

On September 2, 2015, Columbia requested authorization to abandon, construct, operate, and maintain natural gas pipeline facilities for the SM-80 MAOP Restoration Project in Wayne County, West Virginia.

The FERC approved the project in August 2016. As of February 11, 2019, the project's construction is 99 percent complete, with about 1 percent of final grading and restoration outstanding. Columbia was granted authorization to place the project into service in November 2017.

The SM-80 involved abandoning a 3.3-mile-long segment of the existing Line SM-80 that had experienced increased residential growth. Columbia also replaced the segment by constructing and operating 3.9 miles of 30-inch-diameter pipeline that was tied in with the existing Line SM-80 pipeline. The replacement pipeline allowed that segment of Line SM-80 to operate at its original MAOP.

A total of 42.2 acres of land were affected during construction, while 6.3 acres will be affected during operation within the Lower Twelvepole HUC-12 watershed, shared with the BXP (see appendix B.10-1). The SM-80 ranges 0.2 to 2.8 miles from the BXP near MP 66.2.

Other Energy Projects

Several electric transmission line and substation projects are also proposed within the shared geographic scope of the BXP. The City of Jackson, Ohio, proposed the upgrade of the North Jackson Transmission Line and the Northeast Jackson Transmission Line.

The North Jackson Transmission Line is about 2 miles from the BXP and will involve upgrades along 4 miles of transmission line in in Jackson County, Ohio. The project includes rebuilding about 3 miles of transmission line in the current right-of-way. The remaining 1 mile will require construction in new areas and new easements. The project will use several structure types including steel single pole and H-frame structures that will be about 90 feet tall and would affect 18.2 acres of land within the Horse Creek-Little Salt Creek HUC-12 watershed. Anticipated completion of this project is summer 2019 (AEP Transmission, 2018a).

The Northeast Jackson Transmission Line project is located in the Headwater Little Raccoon Creek HUC-12 Watershed and intersects the BXP. The project involves the upgrade of about 5 miles of 138 kilovolt transmission line, also in Jackson County, and includes building in the current right-of-way. The project was anticipated to be completed in late 2018, but is currently delayed due to a proposed route adjustment and associated pending approval from the Ohio Power Siting Board (AEP Transmission, 2018b).

In addition, in 2017, AEP also proposed the construction of the 2-acre Ironman 138-kilovolt substation in Jackson County, 2.8 miles from the BXP. Construction began in fall 2017 and was completed in 2018. Impacts associated with this substation were in the Horse Creek-Little Salt Creek HUC-12 watershed.

Public Land Management Plans

The WNF is currently undertaking a revision process for its *Land and Resource Management Plan* (Forest Plan) that should culminate in an USFS EIS and a revised Forest Plan ready for implementation in approximately 2021. A Forest Plan guides all natural resource management activities on the National Forest for 10 to 15 years (USDA, 2006b). It describes desired resource conditions, resource management practices, levels of resource production and management, and the availability of suitable land for resource management. The purpose of a Forest Plan is to provide management direction to ensure that ecosystems are capable of providing a sustainable flow of beneficial goods and services to the public and is developed in partnership with other agencies, non-governmental organizations, and the public.

While a Forest Plan provides a programmatic framework concerning future management of the National Forest, it does not authorize, fund, or implement any site-specific activities. Because the revision process is still in the early stages and there is no proposed action for what management direction might be contained in the next Forest Plan, it is, therefore, unclear how the revised Forest Plan for the WNF will affect overall management of the WNF within the Project area at this time.

Silviculture Projects

As part of its mission, the USFS proposes future forest management activities, such as the Sunny Oaks Project, in the WNF. These activities may include prescribed burns, the construction of new roads, modifications to existing roads, timber harvesting, and manual timber stand improvements. The Sunny Oaks Project is currently in the comment consideration phase. Implementation is expected to begin in August 2019.

This Sunny Oaks Project is east of State Route 93, west of State Route 141, north of the community of Aid and south of the community of Oak Hill, and intersects the BXP. About 25,000 acres of the WNF are in the Sunny Oaks Project area, which comprises parts of Jackson, Gallia, and Lawrence Counties. The proposed project will occur in several of the watersheds in which the BXP occurs (from MPs 28.6 to 32.7, 38.7 to 47.3, and 48.4 to 49.3), including Headwaters Symmes Creek, Black Fork Creek, Dirty Face Creek, Buffalo Creek, Johns Creek, Aaron Creek-Symmes Creek, and Storms Creek.

The proposed activities associated with the project include harvests, timber stand improvements, and construction activities that would be staggered across a period of many years (potentially up to 20 years) so that all of this activity would be spread out over time

and space, thereby reducing effects (USDA, 2018). Details of the proposed activities are below:

- Harvest forests. This would include clearcut (1,675 acre) and shelterwood (1,160 acres) methods. This proposal includes timber harvest that would create some temporary openings greater than 40 acres in size. The larger harvests are proposed in order to respond to the need to create young, brushy forest;
- Timber stand improvements. Prescribed burning of about 2,000 to 4,000 acres per year in areas with or without timber harvest across the project area. Manual girdling/felling or treating with herbicides of competing trees could also be done to achieve similar outcomes as fire. These treatments would be repeated periodically in order to reach and then maintain the desired condition;
- Tree planting. Natural regrowth could be supplemented with planted trees;
- Create new roads: An estimated 10 miles of permanent roads would be newly constructed. These would be for USFS administrative purposes only and closed to the public;
- Reconstruct existing roads. An estimated 17 miles of existing roads would be reconstructed;
- Create log landings and skid roads;
- Create fire lines. Fire lines are linear areas cleared of vegetation that are used to keep prescribed fire in the intended burn areas. Existing roads or cleared areas would be used when practical, but there is likely the need to build additional lines. New lines can be constructed manually with hand tools, or with equipment like bulldozers or tractors; and
- Adaptive management. This project decision will be open to modification if conditions change in the case of unforeseen events or results such as new insects or diseases, weather events, or inadequate regrowth.

Commercial, Residential, and Industrial Developments

Several industrial and commercial projects have been identified as occurring within the same geographic scope as the BXP. No residential development projects were identified within the BXP's geographic scope.

The Jackson County Development Corporation approved the construction of a new warehouse facility along McCarty Lane in Jackson, Ohio. The approved Jackson Logistics Center is owned by the Ohio South Central Railroad and is situated on 5.5 acres (Jackson County Economic Development Partnership, 2018). The 50,000 square-foot building is

proposed in the same Headwaters Little Salt Creek HUC-12 watershed as the Project and is 2.5 miles from the BXP, at about MP 18.0. The timing and extent of disturbance are not known at this time. Jackson County is also proposing a planned expansion of the James A. Rhodes Airport runway. The project is currently in the planning phase, and no construction has been scheduled. Additional details regarding the timing and extent of impacts are not known at this time. The planned airport expansion project is 0.1 mile from the BXP, at about MP 19.0, and would be in the Headwaters Symmes Creek HUC-12 watershed.

The Lawrence Economic Development Corporation manages the Point Industrial Park in South Point, Ohio. The site is home to recent and future industrial and commercial development. Construction of the park is ongoing. The most recent completion of construction was the Harbison-Walker manufacturing facility, which was completed in August 2018. The park is a 504-acre former Superfund site that has been remediated and approved for development. As of March 2018, which was the latest update available, about 300 acres were still available for lease. The Point Industrial Park is 0.5 mile from the BXP, at about MP 62.0 and is in the Solida Creek-Ohio River HUC-12 watershed.

Bellisio Foods, a manufacturer of frozen foods, is currently expanding its facility in Jackson County, Ohio. Expansion of the facility will affect about 26 acres within the Horse Creek-Little Salt Creek HUC-12 watershed. The project is about 3.2 miles from the BXP, at about MP 14.0. The Oak Hill Sewer Plant is also currently being upgraded and will affect 1.5 acres within the Black Fork Creek HUC-12 watershed, and will be about 1.5 miles from the BXP. It is anticipated that these construction projects will be concluded before the construction of the BXP and should therefore not largely contribute to cumulative impacts.

Oil and Gas Exploration and Production

Oil and gas exploration and production includes drilling wells, building access roads, installing gathering lines, and constructing compressor stations and processing plants. Oil and gas exploration, production, and gathering are not under the jurisdiction of the FERC; but those activities are regulated by individual states.

Information on oil and natural gas wells in proximity to the BXP was obtained from the WVDEP (2018) and the ODNR Division of Oil and Gas Resources (ODNR, 2018).

According to the West Virginia Geological and Economic Survey, the oil and gas production for Wayne County, West Virginia in 2016 (WVGES, 2018) was 1,035 active gas wells and produced approximately 4,175,875 thousand cubic feet (Mcf). In addition, there were 105 active oil wells producing 14,917 blued barrels. Within the HUC-12 watersheds shared by the BXP, there are 22 active wells in the Lower Twelvepole Creek watershed and one active well in the Buffalo Creek-Ohio River watershed.

The ODNR Division of Oil and Gas Resources (ODNR, 2018) reports that in 2016 there were 398 active oil wells in the counties that would be crossed by the BXP, producing a total of 34,305 blued barrels and 668 active gas wells producing approximately 431,617 Mcf. Active oil and gas wells account for about 26,342 acres in Ohio and West Virginia within the HUC-12 watersheds shared with the BXP.

As stated in section B.1, 14 active oil or natural gas wells were identified within 0.25 mile of the proposed BXP Replacement Project Area and one active well was identified within a BXP work area. The well is in the southeastern corner of a proposed staging area (SA-027-B) at MP A38.3 in Lawrence County, Ohio.

Seven active wells are within 0.25 mile of the proposed BXP Abandonment Project area.

NiSource Gas is currently in the process of conducting gas line replacements of distribution lines into residential homes and mainlines within the City of Jackson, Ohio. The projects involve the construction of new, permanent facilities, as well as the upgrading of existing facilities. The acreage and nature of the impacts associated with the upgrades are unknown at this time, but would occur in the Horse Creek-Little Salt Creek and Headwaters Little Salt Creek HUC-12 watersheds, about 3.9 miles from the BXP.

Mining Operations

Within southeast Ohio, coal has been extracted using surface mining techniques and from underground mines. Both types of mining operations are within the counties crossed by the BXP. Currently, production of coal is ongoing only in Vinton and Jackson Counties in the BXP area (ODNR, 2018). Although information was not available for all mines that could be within the HUC-12 watersheds, there are four known active mines within 0.25 mile of the BXP work areas, as noted in section B.1.

Non-jurisdictional Project-related Facilities

Occasionally, projects proposed at FERC have associated facilities that do not come under FERC's jurisdiction. These non-jurisdictional facilities may be integral to the project (e.g., a gas-fueled power plant at the end of a jurisdictional pipeline) or they may be minor, non-integral components of the jurisdictional facilities that would be constructed and operated as a result of the project.

Non-jurisdictional facilities associated with the BXP include the electrical connections to specific cathodic protection system installations (see table A-10). At this time, engineering design for proposed electrical connections is in progress and would be coordinated with either AEP or the Buckeye Rural Electric Cooperative (the electric utility provider). These are generally low voltage wires that do not require a large area for construction. Final acreages of impacts on resources are not available at this time;

however, these electrical facilities would be installed within the following HUC-12 shared watersheds: Headwaters Little Raccoon Creek, Black Fork, Buffalo Creek, Johns Creek, Aaron Creek-Symmes Creek, and Ice Creek.

Transportation Projects

The ODOT is overseeing multiple ongoing and proposed infrastructure projects in the geographic scope for the BXP (see appendix B.10-1). The extent of the ODOT projects are limited to work on existing infrastructure. The exact locations and sizes for many transportation projects are not currently available; however, they involve work at multiple locations. All of the transportation projects were considered minor as they were generally localized road improvements rather than larger road projects encompassing many miles. An estimated total of less than 30 acres of resources would be affected by transportation and road improvement projects within the geographic scope of the BXP. Transportation patterns and traffic flow could also be impacted by these projects.

10.2 Cumulative Impacts on Specific Environmental Resources

The potential impacts that we consider as part of our cumulative review pertain to soils; groundwater, surface water, and wetlands; vegetation, wildlife, fisheries, and aquatic resources; land use, recreation, special interest areas, and visual resources; and air quality and noise. For each environmental resource, the potential direct and indirect impacts associated with the projects are discussed in relation to the cumulative effects that may occur between the proposed BXP and the projects listed in appendix B.10-1. As noted and explained above, we determined that further assessments of cumulative impacts for geological resources, socioeconomics, and cultural resources were not warranted.

In many cases, such as for transportation, oil and gas, commercial and industrial developments, and some FERC-regulated projects (e.g., the LXP), resource-specific impact data were lacking for projects by HUC-12 watershed. Where HUC-12 watershed resource-specific data were available, they were used in the cumulative impact analysis.

Soils

Cumulative effects on soils would be limited primarily to the combined impacts of projects that would intersect the BXP or concurrent activities along the same route as the BXP. The Northeast Jackson Transmission Line and the Sunny Oaks Project would intersect the BXP. The purpose of the Northeast Jackson Transmission Line project is to improve the electric transmission infrastructure in southern Ohio. The 5-mile transmission line would be re-built within existing right-of-way. AEP may also be supplementing existing easements to accommodate for a 100-foot right-of-way corridor. The transmission line re-build would intersect the BXP at about MP 11.8. Construction procedures and the use of BMPs would help ensure that soil disturbance from installation of utility line structures, access installation and/or improvements, and use of heavy machinery would be

limited to areas of existing right-of-way. The Sunny Oaks Project proposes harvests, timber stand improvements, and construction activities that would be staggered across a period of potentially 20 years. The estimated harvest acreage is about 2,900 acres (about 1,675 acres of clearcut and 1,160 acres of shelterwood cuts). Timber stand improvements are also proposed of about 2,000 to 4,000 acres per year, in areas with or without timber harvest across the project area (USDA, 2018). The project also includes the construction of 10 miles of new roads and the reconstruction of 17 miles of existing roads. About 28.14 acres of the BXP, including access roads and temporary workspaces, would intersect with the proposed harvest areas of the Sunny Oaks Project.

The activities associated with the Sunny Oaks Project are expected to have a temporary, but direct impact on soils as a result of heavy machinery for tree felling and harvesting, as well as road construction. However, standards and guidelines in the WNF Forest Plan (USDA, 2006) along with standard timber contract clauses are designed to limit impacts on soils. The soil stabilization and revegetation requirements included in BXP's Plan and the FERC's Plan would prevent or minimize any indirect impacts caused by the BXP. Because the direct effects would be highly localized and limited primarily to the period of construction, cumulative impacts on soils would primarily occur if other projects, such as transportation projects, are constructed at the same time and place as the BXP. However, it is anticipated that any adverse impacts on sensitive resources resulting from the other projects considered in our analysis would be required to implement similar BMPs as the BXP through project design and the USFS permitting processes. Projects that require significant grading could also have temporary or permanent direct impacts on soils, although the duration and effect of these projects would be minimized by the implementation of erosion control and restoration measures. Consequently, we conclude that the cumulative effect on soils of the Northeast Jackson Transmission Line and the Sunny Oaks Projects along with the BXP would be minor.

Water Resources

Construction and operation of the BXP would likely result in short-term impacts on water resources (see section B.2). These impacts, such as increased turbidity and sedimentation, would return to baseline levels over a period of days or weeks following construction.

Groundwater

The occurrence of water wells and springs in the vicinity of the BXP is described in section B.2.

Construction activity and groundwater use by the LXP, MXP, SM-80, and the McCarty Lane Warehouse are completed or would be completed prior to the commencement of BXP construction, therefore groundwater recharge would likely have already occurred or be occurring. Most other projects listed in appendix B.10-1 would

have a limited likelihood to significantly affect groundwater resources with the exception of oil and gas well exploration and production. All of the major projects in the geographic scope would be required to obtain water use and discharge permits and would implement their various SPRPs as mandated by federal and state agencies.

There is potential for the BXP to contribute to a cumulative impact on groundwater, depending on the timing of construction of the projects identified in appendix B.10-1.

Of the projects identified in appendix B.10-1, there is only one project (the James A. Rhodes Airport expansion) within the same HUC-12 watershed as the proposed permanent groundwater well that would be constructed as part of the BXP. However, expansion of the airport runway is unlikely to require permanent groundwater withdrawals.

In consideration of available information for other projects, and the protective measures proposed by the BXP, we have not identified any significant cumulative impacts on groundwater resources that would result from construction and operation of the identified projects and the BXP. In addition, related construction activities, including groundwater withdrawal and hazardous material disposal and handling, would be done in accordance with all permit requirements, thereby further reducing the cumulative effect of the BXP on groundwater resources.

Surface Water

The BXP pipeline route would cross 335 waterbodies, of which 125 are perennial. No major waterbodies would be crossed by the Project. Waterbodies would be crossed using various techniques, such as wet open-cut methods, dry-crossing methods, and trenchless crossing methods (such as conventional bore and HDD). The pipelines would be installed below scour depth.

The other active FERC-regulated projects have already crossed multiple waterbodies (LXP - 27 waterbodies; and the SM-80 - 8 waterbodies) within the HUC-12 watersheds comprising the geographic scope based on our review of mapping. No waterbody crossings were identified for the MXP, North Jackson and Northeast Jackson Transmission lines, or the James A. Rhodes Airport expansion project within the shared HUC-12 watersheds. Waterbody crossings associated with the WNF management activities in the HUC-12 geographic scope are unknown at this time; however, standards and guidelines in the WNF Forest Plan (USDA, 2006) along with standard timber contract clauses are designed to limit impacts to waterways. The use of protective measures in the FERC Procedures, such as fueling buffer restrictions, maintenance of flow rates during use of dry-crossing methods, time requirements to complete in-stream waterbody wet open-cut crossings (typically 48 hours or less), and stream and riparian area restoration, would limit the potential for most cumulative impacts on waterbodies associated with the FERC-regulated projects to a relatively short timeframe.

The footprint of land disturbance, which serves as a proxy for runoff-attributed sedimentation and turbidity, for the BXP and other identified projects combined by watershed, is listed on table B.10-2 above. The BXP accounts for 1,532 acres of (0.4 percent) of these watersheds, while other projects within the same watersheds account for 4,268.6 acres (1.1 percent) of the watersheds affected during construction of the BXP. Table B.10-2 also indicates a percentage of each watershed that may be disturbed by all of the various projects. The maximum level of combined watershed disturbance would be approximately 3 percent (Solida Creek-Ohio River watershed), but almost all other (except for the Buffalo Creek Watershed) estimated watershed disturbance levels would be below 1 percent. This maximum assumes that all project-related disturbance is progressing concurrently, which is unlikely.

The other projects listed in appendix B.10-1 are within watersheds crossed by the proposed BXP, and some of these other projects could result in impacts on surface waters. Thus, similar to the preceding discussion, there is the potential that cumulative impacts could result if these other projects were constructed at about the same time along the same waterbody (or upstream tributaries) as the BXP. However, the BXP would not contribute to long-term cumulative impacts on waterbodies because the potential impacts would be short-term. Also, other energy projects, transportation projects, residential projects, and non-jurisdictional pipeline projects would likely be required to install and maintain BMPs similar to those proposed by the BXP as required by federal, state, and local permitting requirements so as to minimize impacts on waterbodies. Any projects crossing Waters of the United States would have to obtain permits from the COE. In addition, the Sunny Oaks Project would have to abide by the USFS clear-cutting requirements, which would also include BMPs for minimizing waterbody impacts. Consequently, the cumulative effect on surface waterbody resources would be minor.

Wetlands

Construction of the Replacement component of the Project would affect 4.5 acres of wetlands during construction and 1.1 acres during operation. The Abandonment component of the Projects would result in 1.5 acres of temporary impacts. During operation of the Project, emergent and scrub-shrub wetlands would be returned to their pre-construction condition, use, and function. For unavoidable wetland impacts Columbia has proposed compensatory mitigation and restoration of impacted wetlands.

An estimated total of 0.1 acre of wetlands was permanently affected by other FERC-regulated projects within the geographic scope of the BXP. This includes wetland impacts that resulted from construction of the LXP and SM-80. Due to inclusion of mandatory best management practices, no wetland impacts are expected to result from forest management activities associated with the Sunny Oaks project. We were unable to find quantitative data for the extent of impacts on wetlands from non-FERC-regulated projects, but we assume that some level of impacts would occur. The available information is presented in appendix B.10-1.

The nature of the projects identified in appendix B.10-1 generally make them subject to environmental review and are expected to be constructed in compliance with federal, state, and/or local permitting requirements, including restoration, mitigation, and the installation of erosion and sediment controls, which would minimize cumulative impacts on wetlands. Given the relatively small total of wetland acres affected by the combination of the BXP and other projects listed in appendix B.10-1, we conclude that cumulative impacts on wetlands within the HUC-12 watersheds when considered with the projects identified in this analysis would not be significant.

Vegetation

In the case of the BXP, vegetation would be cleared from the right-of-way during construction and then restored during operations of the Project. Construction of the BXP would affect about 1,391 acres of vegetated lands, including agriculture (mostly pasture), forest, open land, and wetlands. Of this total, about 741 acres are forest. With the exception of forest clearing, impacts on vegetation from construction of the BXP would be short-term. Therefore, we consider impacts on forest as the only vegetation impact for which the projects could contribute cumulatively.

The Northeast Jackson and North Jackson Transmission Lines would affect (i.e., modify the vegetation type from forest to scrub-shrub and/or herbaceous during construction and operation) 15.2 acres and 12.1 acres of forest, respectively, within the shared HUC-12 watersheds. The LXP affected 20.7 acres of forest within the Headwater Little Raccoon Creek, Black Fork Creek, Buffalo Creek-Ohio River, and Lower Twelvepole Creek HUC-12 watersheds. The SM-80 resulted in 16.8 acres of forested impacts within the BXP affected HUC-12 watersheds. The USFS's Sunny Oaks Project would alter stand age and structure on about 2,900 acres of forest during harvests, within the WNF (USDA, 2018).

The BXP would result in the clearing of 90.9 acres of interior forest. In addition, the construction of the BXP Replacement would convert 544.6 acres of interior forest, left standing adjacent to one or both sides of the cleared corridor, to forest edge habitat. While it is not clear how much additional interior forest habitat would be affected by the other FERC-jurisdictional and non-jurisdictional projects within the common HUC-12 watersheds due to a lack of available data, we assume that at least some impacts on this vegetation type would occur. Constructing the BXP, as well as the other linear such as the Sunny Oaks Project (and possibly non-linear projects) would create a new, cleared corridor (or site) in areas of interior forest where the rights-of-way would not be collocated with existing linear corridors and would widen existing corridors where collocation is achieved. Clearing or fragmentation of interior forests creates more edge habitat and smaller forested tracts, which can impact characteristics of vegetation communities including their suitability for wildlife, such as some migratory bird species. The removal of interior forest could also result in the conversion of forest area to a different vegetation type and provide avenues for the introduction of non-native invasive species. The Bluegrass Ridge Special

Area in the WNF, discussed in section B.3, could be permanently affected by the new R-801 pipeline corridor. However, we include below in section C a recommendation that Columbia submit an impact avoidance, minimization, or mitigation plan for this habitat developed in coordination with the WNF.

For all the other projects contributing cumulative impacts on vegetation, we are not able to quantify specific impacts on forested vegetation. In the absence of available resource impact data for these projects, we present these impacts as generic impacts on vegetation. Footprint data for other projects within the same watersheds, which may be used as a proxy for generalized vegetation impacts, can be used to account for estimated acreages and percentages. Based on the data presented in table B.10-2, and assuming that the watersheds are generally vegetated, we estimate that 0.6 percent of the vegetation within the subject watersheds would be affected by construction of the various projects. However, in general these impacts would be largely temporary as most of the disturbed areas (except where permanent structures are built) would revert to vegetated cover. In some cases, such as along restored pipeline rights-of-way, forested vegetation could be converted to grassy vegetation either long-term or permanently. We expect that non-jurisdictional projects would be held to similar standards as the FERC-jurisdictional projects for restoration and revegetation by other federal, state, and local permitting agencies.

Oil and gas development and commercial/industrial development projects would also likely be required to implement mitigation measures designed to minimize the impacts on vegetation, and revegetate disturbed soils, thereby minimizing the degree and duration of the impacts of these projects. The ODNR states that the counties crossed by the BXP are in the unglaciated portion of Ohio and have an average forest cover of 67 percent (ODNR Forestry, 2018). Thus, cumulative impacts on vegetation resulting from nearby projects considered along with the BXP are expected to be minor, considering the limited area affected within the geographic scope and the large amount of undisturbed vegetation, including forests, remaining in each watershed (see table B.10-2). These impacts represent a negligible proportion of forest converted or lost, when compared to the abundant forest cover in the region. According to the ODNR Division of Forestry, 31 percent of Ohio is forested and 8.1 million acres in Ohio are in tree cover (ODNR Forestry, 2018).

Forest management activities undertaken by the USFS, such as the Sunny Oaks Project discussed above, are anticipated to take place in the WNF. It is anticipated that any adverse impacts resulting from the Sunny Oaks Project would be regulated through project design and BMPs. We note that forest management, including timber harvesting, is part of the specific mission of the USFS; thus, tree removal is typically considered a positive outcome and not a deleterious side effect of another project. For example, one of the purposes of the Sunny Oaks Project is to create and regenerate young oak and hickory forest in these areas as well as to fulfill a wildlife need for high-density, small stem tree cover. The Sunny Oaks Project should therefore have an overall beneficial effect on

vegetation in the area. In addition, the other projects would take the required precautions and impact avoidance, minimization, and mitigation measures in accordance with federal, state, and local regulations and permitting. For these reasons, we conclude that the cumulative effect to vegetation would occur, but would not be significant.

Wildlife, Fisheries, and Federally Listed Threatened or Endangered Species

Wildlife

Construction and restoration activities associated with the BXP may result in limited mortality of individuals for less mobile wildlife species unable to move out of the way of equipment. More mobile species would be expected to relocate to similar adjacent habitat during construction and restoration. After the Project is restored and construction areas revegetated, except for aboveground facilities, we would expect species to return to the right-of-way. Construction of the BXP would affect 1,527.7 acres of wildlife habitat during construction and 486.5 acres during operation (i.e., vegetated lands), including agricultural lands, forest, open land, and wetlands.

We consider that vegetation, as discussed above and in section B.3.1, is a generalized proxy for wildlife habitat. The overall footprint of the BXP in combination with the other identified projects within the defined geographic scope would result in the disturbance of thousands of acres of wildlife habitat, including forested habitat that would either recover over the long-term in temporary workspaces or that would be converted to herbaceous or scrub-shrub habitat in the permanent right-of-way. However, there are about 384,065 acres of land area, much of which provides habitat for wildlife, within the HUC-12 watersheds comprising our geographic scope, and only 0.4 percent of that area would be disturbed by the BXP and only 1.5 percent would be disturbed by the BXP combined with other projects. The resulting herbaceous vegetation and adjacent edge areas would provide habitat for numerous wildlife species more suited to human-caused modifications, and they would replace certain forest-dwelling species, for example migratory bird species, due to habitat modification.

Clearing of the construction rights-of-way for the BXP and other nearby projects would result in loss, modification, and fragmentation of wildlife habitat. The effect of workspace clearing in forested habitats on forest-dwelling wildlife species would be longer-term or permanent, because forested lands could take decades to return to pre-construction condition in areas used for temporary workspace, and would be converted to a different habitat type on the permanent rights-of-way and where aboveground facilities are constructed. Reduction in forest or interior forest habitat and associated habitat fragmentation would also affect nesting success and/or increase nest predation, and allow access by predators along new corridors through forested habitat. This may result in the cumulative loss of individuals of small mammal species, amphibians, reptiles, nesting birds, and non-mobile species. Once the areas temporarily affected are restored and

revegetated, some wildlife displaced during construction of any of the projects would return. Furthermore, the successional nature of temporary workspaces allowed to regrow and the permanently altered habitats of the maintained right-of-way may attract and provide habitat in the long-term to additional species of plants and animals that would not otherwise have been found in the area.

Given the large amount of wildlife habitat that would remain undisturbed within the geographic scope, the measures that Columbia would use to minimize impacts, (such as the active revegetation of impacted areas), specialized measures for migratory birds, combined with the BMPs that the other identified projects would implement, we conclude that the BXP, combined with the other identified projects, would not have a significant cumulative impact on wildlife.

Fisheries and Aquatic Resources

As noted above in the discussion for surface water, the BXP, other FERC-regulated projects, and other projects would affect numerous waterbodies within the geographic scope that provide habitat for fish, mussels, and other aquatic organisms. The BXP would cross 335 total waterbodies, of which 125 crossings are perennial waterbodies that provide habitat for fish and aquatic resources. Columbia would reduce impacts on waterbodies that contain fisheries by following the measures outlined in its Procedures and ECS; crossing during state-determined waterbody work windows; using dry-crossing techniques at selected locations, and expediting work at waterbodies crossed via wet-crossing techniques, thereby minimizing sedimentation and turbidity; and removing and relocating fish and mussels in the areas dewatered by the dry-crossing procedure. Cumulative impacts on fisheries and aquatic resources could occur if other projects occur within the same segment of a waterbody and have similar construction timeframes as the proposed BXP or that could result in permanent or long-term impacts on the same or similar habitat types.

The other active FERC-regulated projects have already crossed multiple waterbodies (LXP - 27 waterbodies; and the SM-80 - 8 waterbodies) within the HUC-12 watersheds comprising the geographic scope based on our review of mapping. We assume that these waterbodies contain fisheries and aquatic resources for the purpose of this analysis, because fisheries-specific data were generally not available for the other projects on a HUC-12 basis.

The LXP shares the Headwaters Little Raccoon Creek with the BXP. Watershed data available for the LXP was reported at the HUC-8 level, therefore it is unknown how many LXP waterbody crossings occurred within the same watershed as the BXP. Overall, the LXP crossed a total of 983 freshwater waterbodies in Ohio, Pennsylvania, and West Virginia. The MXP and SM-80 share the Lower Twelvepole Creek watershed with the BXP. Overall, the MXP crossed 381 minor waterbodies, 109 intermediate waterbodies, and 7 major waterbodies. It is unknown how many of these crossings occurred within the shared HUC-12 watershed.

No streams within the SM-80 area were classified as coldwater habitat. Twelvepole Creek has a 2-mile section of stocked trout approximately 11 miles upstream of the SM-80 area. As with the MXP, it is unknown how many waterbodies were crossed within the HUC-12 watershed shared by the BXP.

These FERC-regulated projects either are not currently contributing to additional sedimentation impacts as they are already restored and vegetation in the area surrounding the impacted streams is re-established, or would be restored where final, supplemental revegetation is ongoing, prior to construction of the BXP.

Construction of the remaining projects identified in appendix B.10-1 and the BXP could result in cumulative impacts on waterbodies and fisheries from sedimentation and turbidity, habitat alteration, streambank erosion, fuel and chemical spills, water depletions, entrainment or entrapment due to water withdrawals or construction crossing operations, and blasting if constructed in the same waterbody in a similar timeframe. Most of the projects in the geographic scope are or will be completed before the start of BXP construction and would also be designed so as to minimize impacts on waterbodies, and thus on fisheries and aquatic resources, as much as possible. Any waterbodies that could not be avoided would be mitigated through implementation of BMPs and restoration practices in accordance with the respective federal, state, and local permitting agencies. Further, we expect that the ODNR would require any other applicable projects constructed in the geographic scope to adhere to state timing windows for construction within waterbodies containing sensitive fish species. However, until permits and authorizations are finalized, the extent of avoidance, minimization, and mitigation is speculative and we have not used this information to determine significance.

Cumulative impacts on waterbodies (and therefore fisheries and aquatic resources) would be temporary and mostly limited to construction activities associated with the projects. As such, none of these impacts are expected to be cumulatively significant because of their temporary nature. The ensuing operations of the proposed BXP would not result in any cumulative impacts unless maintenance activities occur in or near streams at the same time/location as other (non-related) project work.

Federally Listed Threatened and Endangered Species

The BXP may affect but is not likely to adversely affect the Indiana bat, northern long-eared bat, pink mucket, snuffbox mussel, and running buffalo clover. As stated in section B.4, because Columbia is a permittee of the Columbia Pipeline Group MSHCP for MSHCP species, Section 7 consultation has been completed for Project activities for MSHCP-covered species[43] within the covered lands. The MSHCP was developed in coordination with the FWS, the FERC, the National Park Service, and the USFS. Lands

[43] The running buffalo clover is not a covered species.

covered under the MSHCP include lands that fall within 0.5 mile (2,640 feet) on either side of the centerline of a Columbia pipeline or existing ancillary company structure or building.

The LXP is in areas where the Indiana bat, northern long-eared bat, snuffbox mussel, and running buffalo clover may be found, such as within the Headwater Little Raccoon Creek, Black Fork Creek, Buffalo Creek-Ohio River, and Lower Twelvepole Creek HUC-12 watersheds. As stated in the LXP final EIS, the FWS concurred that the LXP was not likely to adversely affect these species. Several other bat and mussel species, including the northern long-eared bat, pink mucket, and snuffbox mussel, are within the MXP project area. According to the biological opinion issued by the FWS for the MXP on September 18, 2018, the MXP did not adversely affect the snuffbox mussel. The SM-80 was determined to be not likely to adversely affect any federally listed species.

Cumulative effects on federally listed plants, wildlife, and aquatic species would be most likely to occur where projects would result in permanent or long-term loss of habitat types important to wildlife. These include oil and gas development, transportation projects, commercial and industrial development projects, and non-jurisdictional project-related facilities listed in appendix B.10-1. Construction activities such as right-of-way and other workspace clearing and grading would result in loss of vegetation cover and soil disturbance, alteration of wildlife habitat, displacement of wildlife species from the construction zone and adjacent areas, mortality of less mobile species, and other potential indirect effects as a result of noise and lighting created by construction and human activity in the area. Overall impacts would be greatest where projects are constructed in the same timeframe and area as the proposed projects or that have long-term or permanent impacts on the same or similar habitat types.

The species discussed in section B.4 of this EA could potentially be affected by construction and operation of other projects occurring within the same area as the BXP. Columbia and all other companies would consult or have already completed consultations (via FERC and the FWS), as required, with the FWS regarding federally listed species. Section 7 of the ESA specifically requires "major federal actions" to have separate ESA consultations, so the impacts on all federally listed and proposed species within the geographic scope of the identified projects will be assessed. Different projects in the same geographic area requiring ESA consultation would be assessed (or, for completed projects, have already been assessed) and permitted by the same FWS office(s), thereby promoting awareness, consistency, and permitting requirements. Further, because protection of threatened, endangered, and other special status species is part of the various state permitting processes or resource reviews, cumulative impacts on such species would be or have already been considered and reduced or eliminated through conservation and mitigation measures identified during those relevant processes and consultations. For example, the other projects would likely also be or have already been required to conduct tree clearing within the recommended timeframe for listed bat species and construct dry crossings of waterbodies containing listed mussel species. Consequently, we conclude that

projects in the geographic scope in combination with BXP would have minor cumulative effects with regard to special status species.

Land Use, Recreation, Special Interest Areas, and Visual Resources

Projects with permanent aboveground components, such as buildings, residential projects, and roads, and aboveground electric transmission lines would generally have greater impacts on land use than the operational impacts of a pipeline (including non-jurisdictional gathering lines for oil and gas development). Pipelines are generally buried and thus allow for most uses of the land following construction. The clearing of forest does have permanent land use and visual impacts, with land use conversion to herbaceous and shrub vegetation within the permanent operational easement of pipelines. Otherwise, pipeline projects typically only have short-term impacts on most land uses.

The projects listed in appendix B.10-1 combined have disturbed or would disturb 4,268.6 acres of land (out of a total of approximately 384,065 acres in the combined geographic scope) affecting a variety of land uses. Again, we use total disturbance by projects as a proxy for impacts on land uses.

Construction of the BXP would disturb about 239 acres of prime farmland soils. To reduce impacts on soils, and curtail erosion, the Columbia would follow the measures outlined in its ECS, which incorporates the FERC Plan and Procedures, which includes installation of erosion control devices, topsoil segregation, soil decompaction, and revegetation.

A review of available data for the FERC-jurisdictional projects listed in appendix B.10-1 shows that an estimated 1,432 acres of prime farmland have been affected by these projects. Projects contributing to these cumulative impacts include the MXP (estimated 320 acres of prime farmland), and the SM-80 (estimated 53 acres of prime farmland) and the LXP (estimated 941 acres of prime farmland). While quantitative data for the amount of total prime farmland soils affected by the remaining projects within the HUC-12 watersheds were not available, we consider these impact acreages to be relatively small overall and unlikely to contribute to cumulative impacts.

The BXP could result in cumulative impacts on recreation and special interest areas if other projects affect the same areas or feature at the same time. The BXP would cross or be near several recreation and special interest areas, including government owned or managed lands. None of the FERC-regulated projects have crossed the same recreation and special interest areas as the BXP. Therefore, there would be no cumulative impacts on these resources.

The BXP's cumulative impact on recreation and trails on the WNF would be relatively minor since the majority the proposed R-801 pipeline would be collocated with existing corridors and the construction disturbance would be temporary.

Visual resources represent the aesthetic quality of the landscape as perceived subjectively by the viewer. Visual impacts were assessed by the amount of contrast construction and operation of facilities would create against the original background. Landscapes are rarely pristine, and visual quality may be modified by existing infrastructure, including other pipelines, powerlines, highways, railroads, houses, commercial buildings, farmsteads, and fencing. Further, the quality of the view would be influenced by the time span of the view, and surrounding topography and vegetation.

Aboveground facilities, including compressor stations, would have the most impact on a visual setting. The BXP includes only minor modifications at an existing compressor station. Within this context, wells and residential developments listed in appendix B.10-1 would have the greatest cumulative impact on visual resources. The primary visual impact of pipelines and oil and gas production would occur from the conversion of forested land to scrub-shrub or herbaceous vegetation types. The BXP would add incrementally to this impact, but the overall contribution would be relatively minor given that the majority of projects would be buried pipeline and because the R-801 pipeline would be collocated with existing corridors for approximately 51 percent of the route. Existing vegetation around the BXP's aboveground facilities would shield surrounding areas from visual impacts. Additionally, disturbed areas would be revegetated as appropriate.

The impact of oil and gas development activities on land use, recreation, special interest areas, and visual resources varies widely depending on the location of specific facilities and access roads. For the projects within the visual geographic scope, visual impacts may be locally noticed; however, generally they would not be inconsistent with the existing visual character of the area. In many cases, views of the facilities and pipeline right-of-way against the landscape background are from highways, with viewers moving at speed, reducing the time of the view. Those views may also be shielded by topography, perspective (angled crossings would typically be less visible than perpendicular crossings), and vegetation. Revegetation as required by federal and state agencies would reduce visual impacts for most projects. Permanent visual impacts would occur in developed areas where permanent structures (e.g., houses, buildings, guardrails) remain.

Given that the BXP's contribution to cumulative impacts on land use, recreation, special interest areas, and visual resources would mostly be limited to the construction phase (except as noted above) and would be short-term, we conclude that cumulative impacts on these resources, when considered with the other projects included in our analysis, would not be significant.

Air Quality and Noise

Air Quality

The BXP would be in four counties in Ohio and one county in West Virginia that are designated as attainment or unclassifiable for all criteria pollutants. As discussed in section B.8.1 of this EA, a portion of Gallia County, Ohio is classified as an SO_2 maintenance area, but not where the Project is proposed. Columbia would minimize potential impacts on air quality caused by construction by adhering to applicable federal and state regulations to minimize emissions as described in section B.8.1. Operation of the pipeline would result in minimal fugitive emissions from incidental leaks or releases from valves, pumps, and flanges.

Other projects/actions within the geographic scope (see appendix B.10-1) would involve, or have already involved, the use of heavy equipment during construction that would generate emissions of air contaminants and fugitive dust during construction. Construction of the FERC-regulated projects identified is completed; therefore, there would be no contributions from these projects to construction emissions. Additionally, when completed, the residential, commercial, and industrial developments, in addition to the oil and gas projects in the geographic scope would increase air emissions through increased traffic and operation of industrial equipment. The combination of these effects would cumulatively add to air impacts in the area.

Project emissions from construction equipment would be primarily restricted to daylight hours for these projects and would be minimized through applicable equipment emission standards and by mitigation measures, such as using properly maintained vehicles and commercial gasoline and diesel fuel products with specifications to control pollutants. Because BXP construction emissions would be short-term, intermittent, and highly localized (essentially limited to within 0.25 mile of the activity), cumulative impacts would depend on the type and location of other construction activities occurring at the same time. The majority of these effects would be mitigated by the large geographical area over which the various projects are located and the fact that the BXP collectively would be constructed in phases over about 2 years. Emissions during construction for both the BXP and the other projects would be temporary and would be minimized by mitigation measures described above.

The contribution of the BXP during construction to the cumulative effect of all foreseeable projects would be temporary. The other projects listed in appendix B.10-1 have varying construction schedules and would take place over a relatively large geographic area. For these reasons, we conclude that construction of the BXP in combination with other projects would not result in significant cumulative impacts on air quality. Further, emissions resulting from operation from the BXP would be de minimis and therefore have negligible contribution to cumulative impacts.

Noise

The proposed BXP could contribute to cumulative noise impacts if noise is generated at the same time as other projects within the geographic scope, such as for generalized construction equipment, blasting, and HDD activities. However, the impact of noise is highly localized and attenuates quickly as the distance from the noise source increases; therefore, cumulative impacts are unlikely except if one or more of the projects listed in appendix B.10-1 are constructed at the same time and within 0.25 mile of the BXP, thus affecting the same NSAs. Several of the projects identified in appendix B.10-1 are either already completed or would be completed by the time construction activities associated with the BXP would commence.

Based on the schedule and proximity of some of the other projects listed in appendix B.10-1, including non-jurisdictional facilities, transportation projects, and the silviculture projects, to the BXP construction locations, there could be some cumulative noise impacts. However, because the majority of noise impacts associated with the projects would be limited to the period of construction and most construction activities would occur during daytime hours and be intermittent rather than continuous, the proposed contribution from the BXP in addition to other projects to cumulative noise impacts would primarily be for only short periods of time when and if the construction activities are taking place concurrently at a given location. We note that Columbia committed to installing noise controls or other mitigation (such as offering temporary hotel accommodations) at areas where noise limitations cannot be met and where 24-hour construction may be required such as at HDD locations. Thus, even if other projects are producing noise simultaneously with the BXP, any "above threshold" noise levels attributable to Columbia's activities would already be mitigated for, which would also reduce the possibility or magnitude of any cumulative impact.

There are no new or modified compressor station units associated with the BXP. We did not identify any other major stationary sources of long-term noise impacts within the geographic scope for the BXP that would affect their associated NSAs. Based on the analyses conducted and mitigation measures proposed, we conclude that the BXP along with other projects in the geographic scope would not result in significant cumulative noise impacts on residents or the surrounding communities.

Climate Change

Climate change is the variation in climate (including temperature, precipitation, humidity, wind, and other meteorological variables) over time, whether due to natural variability, human activities, or a combination of both, and cannot be characterized by an individual event or anomalous weather pattern. For example, a severe drought or abnormally hot summer in a particular region is not a certain indication of climate change. However, a series of severe droughts or hot summers that statistically alter the trend in average precipitation or temperature over decades may indicate climate change. Recent

research has begun to attribute certain extreme weather events to climate change (USGCRP, 2018).

The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP), composed of representatives from 13 federal departments and agencies.[44] The Global Change Research Act of 1990 requires the USGCRP to submit a report to the President and Congress no less than every 4 years that "1) integrates, evaluates, and interprets the findings of the Program; 2) analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and 3) analyzes current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years." These reports describe the state of the science relating to climate change and the effects of climate change on different regions of the United States and on various societal and environmental sectors, such as water resources, agriculture, energy use, and human health.

In 2017 and 2018, the USGCRP issued its *Climate Science Special Report: Fourth National Climate Assessment*, Volumes I and II (Fourth Assessment Report) (USGCRP, 2017; 2018, respectively). The Fourth Assessment Report states that climate change has resulted in a wide range of impacts across every region of the country. Those impacts extend beyond atmospheric climate change alone and include changes to water resources, transportation, agriculture, ecosystems, and human health. The United States and the world are warming; global sea level is rising and acidifying; and certain weather events are becoming more frequent and more severe.

These changes are driven by accumulation of GHGs in the atmosphere through combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture, clearing of forests, and other natural sources. These impacts have accelerated throughout the end of the 20th and into the 21st century (USGCRP, 2018).

The report presents information on potential impacts from climate change by resource type and by geographical region. Although climate change is a global concern, for this cumulative analysis, we will focus on the cumulative impacts of climate change in the Northeast (includes West Virginia) and Midwest (includes Ohio) regions. The USGCRP's report notes the following observations of environmental impacts that may be attributed to climate change in the Northeast and Midwest regions of the United States.

[44] The USGCRP member agencies are: USDA, Department of Commerce, Department of Defense, Department of Energy, Department of Health and Human Services, Department of the Interior, Department of State, USDOT, EPA, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and U.S. Agency for International Development.

Northeast Region:

- "Heat waves, coastal flooding, 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";
- "Infrastructure will be increasingly compromised by climate-related hazards, including sea level rise, coastal flooding, and intense precipitation events"; and
- "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."

Midwest Region:

- "In the next few decades, longer growing seasons and rising carbon dioxide levels will increase yields of some crops, though those benefits will be progressively offset by extreme weather events. Though adaptation options can reduce some of the detrimental effects, in the long-term, the combined stresses associated with climate change are expected to decrease agricultural productivity";
- "The composition of the region's forests is expected to change as rising temperatures drive habitats for many tree species northward. The role of the region's forests as a net absorber of carbon is at risk from disruptions to forest ecosystems, in part due to climate change";
- "Increased heat wave intensity and frequency, increased humidity, degraded air quality, and reduced water quality will increase public health risks";
- "The Midwest has a highly energy-intensive economy with per capita emissions of greenhouse gases more than 20 percent higher than the national average. The region also has a large and increasingly utilized potential to reduce emissions that cause climate change. Extreme rainfall events and flooding have increased during the last century, and these trends are expected to continue, causing erosion, declining water quality, and negative impacts on transportation, agriculture, human health, and infrastructure"; and
- "Climate change will exacerbate a range of risks to the Great Lakes, including changes in the range and distribution of certain fish species, increased invasive species and harmful blooms of algae, and declining

beach health. Ice cover declines will lengthen the commercial navigation season."

At this time, neither West Virginia nor Ohio have adopted specific GHG reduction targets or climate goals.

The FERC staff has presented the direct and indirect GHG emissions associated with construction and operation of the projects and the potential impacts of GHG emissions in relation to climate change. The GHG emissions associated with construction and operation of the BXP are discussed in section B.8.1. Furthermore, the clearance of 732 acres of forest for the BXP right-of-way is estimated to result in a one-time release of about 96,112 metric tons of CO_2, plus an additional loss of about 461 metric tons per year of CO_2 sequestration capacity.

Construction and operation of the Project would increase the atmospheric concentration of GHGs in combination with past and future emissions from all other sources and contribute incrementally to future climate change impacts. Currently, there is no universally accepted methodology to attribute discrete, quantifiable, physical effects on the environment to the BXP's incremental contribution to GHGs. We have looked at atmospheric modeling used by the EPA, National Aeronautics and Space Administration, the Intergovernmental Panel on Climate Change, and others and we found that these models are not reasonable for project-level analysis for a number of reasons. For example, these global models are not suited to determine the incremental impact of individual projects, due to both scale and overwhelming complexity. We also reviewed simpler models and mathematical techniques to determine global physical effects caused by GHG emissions, such as increases in global atmospheric CO_2 concentrations, atmospheric forcing, or ocean CO_2 absorption. We could not identify a reliable, less complex model for this task and we are not aware of a tool to meaningfully attribute specific increases in global CO_2 concentrations, heat forcing, or similar global impacts on project-specific GHG emissions. Similarly, it is not currently possible to determine localized or regional impacts from GHG emissions from the BXP.

Absent such a method for relating GHG emissions to specific resource impacts, we are not able to assess potential GHG-related impacts attributable to this Project. Additionally, we have not been able to find any GHG emission reduction goals established either at the federal level or by the states of Ohio or West Virginia. Without either the ability to determine discrete resource impacts or an established target to compare GHG emissions against, we are unable to determine the significance of the Project's contribution to climate change.

Wayne National Forest

The southern half of the Replacement component (12.6 miles) would cross through the WNF proclamation boundary and across tracts managed by the USFS. Construction of

the R-801 pipeline would impact a total of 229.9 acres in the WNF, including the pipeline right-of-way and access roads. Operation of the pipeline would affect a total of 86.9 acres in the WNF, including the permanent right-of-way easement and permanent access roads.

The current 2006 Forest Plan uses management areas to define where different management activities and vegetation emphases are to be applied and provides management direction for resources on a forest-wide basis. Forest-wide direction includes standards/guidelines for managing several resources including, but not limited to, watershed health; aquatic and riparian resources; wildlife and plants; endangered, threatened, and sensitive species; and vegetation. The WNF staff and Columbia would identify mitigation measures that are deemed necessary by the USFS to accomplish goals and objectives of the Forest Plan.

None of the FERC-jurisdictional projects evaluated for the cumulative impacts analysis are or were within the WNF. Forest management activities undertaken by the USFS, such as the Sunny Oaks Project discussed above, are anticipated to take place in the WNF in the future, although none (outside of the Sunny Oaks Project) are proposed at this time. Adverse impacts on sensitive resources within the WNF resulting from any other types of projects considered in our analysis would be avoided or minimized through project design, BMPs, and USFS permitting processes as specified in the final COM Plan. Therefore, we conclude that the cumulative impacts associated with the BXP, when combined with other known or reasonably foreseeable projects in the geographic scope, would be adequately minimized for the WNF.

10.3 Conclusion

Construction of the BXP, in addition to other projects within the same watersheds or other defined geographic scopes crossed by the Project, would have cumulative impacts on a range of environmental resources, as discussed above. We provided information about Project-related impacts and mitigation measures for specific environmental resources where available, and were able to make some general assumptions about other projects identified in appendix B.10-1. For the federal projects and for projects with a federal permitting nexus, there are laws and regulations in place that protect waterbodies and wetlands, threatened and endangered species, and historic properties, and limit impacts from air and noise pollution. Federal land-managing agencies, such as the USFS, have requirements in their Management Plans to protect resources on their lands. We only have limited information about potential or foreseeable private projects in the region. For some resources, there are also state laws and regulations that apply to private projects as listed in appendix B.10-1. Given the Project's BMPs and design features, mitigation measures that would be implemented, federal and state laws and regulations protecting resources, and permitting requirements, we conclude that when added to other past, present, and reasonably foreseeable future actions, the BXP would not have significant adverse cumulative impacts on environmental resources within the geographic scope affected by the other identified projects.

C. ALTERNATIVES

The routing of the currently proposed Replacement component alignment reflects modifications to the originally considered route that Columbia incorporated during the pre-filing and application review process as well as post-application route modifications proposed in its October 2018 supplemental filing. The supplemental filing documented adoption of route modifications to avoid safety zones associated with the Rhodes Airport, for engineering and safety reasons at the existing Oak Hill CS, and for various resource or landowner concerns. These modifications were based on discussions with landowners, land managing agencies, Project engineers, and FERC staff regarding avoidance or minimization of impacts on sensitive resources; to reduce or eliminate engineering, constructability, and safety concerns; and/or to avoid or minimize conflicts with existing land uses. These route modifications, developed and adopted by Columbia over time as part of the ongoing review process, are considered part of the proposed Replacement component and their associated environmental consequences were included in our environmental analysis in section B.

In accordance with NEPA and Commission policy, we evaluated alternatives to the Project to determine whether they would be environmentally preferable and/or technically and economically feasible to the proposed action, while still meeting the Project's objectives. These alternatives included the no-action alternative, system alternatives, pipeline route alternatives, route variations, and abandonment options. The evaluation criteria used for developing and reviewing alternatives were:

1. ability to meet the Project's stated objective;
2. technical and economic feasibility, and practicality; and
3. significant environmental advantage over the proposed action.

In addition and expanding upon the inclusion of the "practicality" criteria above, Section 28(p) of the *Mineral Leasing Act of 1920* (which guides the actions of the USFS) provides that "[i]n order to minimize adverse environmental impacts and the proliferation of separate rights-of-way across federal lands, the utilization of rights-of-way in common shall be required to the extent practical." As discussed throughout this EA, the Project would cross federal lands within the WNF. We interpret "practical" to be defined as likely to succeed or be effective as well as useful or suitable for a particular purpose or situation. Further practicality considerations include engineering and technological compatibility, safety, cost, and size of Project footprint.

Our analysis of alternatives is based on Project-specific information provided by Columbia, affected landowners, and other concerned parties; comments received during Project scoping; publically available information; our consultations with federal and state agencies; and our own research regarding the siting, construction, and operation of natural gas transmission facilities and their impacts on the environment (i.e., our alternatives

analysis are comment and resource driven). Each alternative was considered to the point, as applicable, where it was clear that the alternative could not meet one of the three evaluation criteria stated above or it was recommended for the Commission's consideration for inclusion as part of Certificate conditions (if granted). To ensure a consistent environmental comparison and to normalize the comparison factors, we generally use desktop sources of information (e.g., publically available data, geographic information system data, aerial imagery). As a result, some of the information presented in this section relative to the Project may differ slightly from information presented in section B, which is based on Project-specific data derived from field surveys and engineered drawings. Our environmental analysis and this evaluation consider quantitative data (e.g., acreage or mileage) and uses common comparative factors, such as total length, amount of collocation, and land requirements. We also consider whether new landowners, not previously proposed to be affected by the Project and without an opportunity to provide comments early in the process, would be impacted by adoption of a route alternative.

For competing interests and impacts resulting from a plausible alternative (i.e., effects on the natural environment versus effects on the human environment), we also consider other relevant factors and disregard or eliminate non-relevant or non-significant factors.

The alternatives were reviewed against the evaluation criteria in the sequence presented above. The first consideration for including an alternative in our analysis is whether it could satisfy the stated Project purpose. If not, the alternative cannot be considered as an acceptable replacement for the Project (or portion of the Project).

The Commission received comments during scoping suggesting that electricity generated from solar panels, wind farms, other renewable energy sources, and/or energy conservation could eliminate the need for the Project. As stated previously, the BXP is designed to replace aged existing natural gas pipeline infrastructure that is currently providing delivery to existing customers. Columbia would also increase transportation capacity in anticipation of future need. The generation of electricity from renewable energy sources is a reasonable alternative for a review of power generating facilities, and states or federal entities that are contemplating new fossil-fuel based power plants may decide to consider alternate forms of energy for a comparison of overall impacts and benefits. However, authorizations related to how the markets will meet demands for electricity are beyond the scope of this EA and not before the Commission.

Therefore, because the purpose of the BXP is to upgrade portions of an aging existing natural gas system and transport natural gas, and because the generation of electricity from renewable energy sources or the gains realized from increased energy efficiency and conservation are not transportation alternatives, they cannot function as a substitute for the Project. These other actions cannot meet the purpose for the Project and are thus not considered or evaluated further in this analysis.

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

Alternatives that would not meet the Project's objective or were not feasible were not brought forward to a detailed level of environmental review. Determining if an alternative provides a significant environmental advantage requires a comparison of the effects on each resource and an analysis of effects on resources that may or may not be common to both the proposed Project and the considered alternative. The determination is then balanced with the overall impacts and all other relevant considerations. In comparing the impacts between different resources, we also consider the degree of impact anticipated on each resource. Ultimately, an alternative that results in equal or minor advantages in terms of environmental impact would not compel us to shift the impacts from the current set of landowners to a new set of landowners.

1. No-Action Alternative

If the Commission were to deny Columbia's application, the Project would not be built and the environmental impacts identified in this EA would not occur. The purpose of the no-action alternative is to consider the consequences of not building the proposed Project. Under this alternative, Columbia would not replace aging pipeline infrastructure originally built in the 1940s, needed to maintain existing natural gas service on its R-System (BXP Replacement) as required by USDOT regulations. Concerns regarding the safety and reliability of the aged pipeline system would not be addressed. In addition, Columbia would not provide increased capacity along its R-System designed to meet anticipated future demand in the Appalachian shale region (Expansion Element). As a result, the objectives of the Project would not be met and the benefits would not be realized.

Under the no-action alternative, other natural gas transmission companies might propose to construct similar, new facilities to meet the demand for new service. Such actions could result in impacts similar to or greater than the BXP, and might not meet the Project's purpose and need within the proposed timeframes and/or provide adequate or timely service to Columbia's existing customers. Columbia would overlap the R-801 pipeline construction right-of-way by up to 25 feet in multiple segments with its existing right-of-way totaling about 3 miles. This overlap would potentially decrease impacts compared to a new pipeline that simply abutted an existing right-of-way. Columbia's customers include local distribution companies (i.e., Columbia Gas of Ohio and Aspire Energy of Ohio), which collectively have 20 metered delivery points served by Columbia in the counties crossed by the Project. If other natural gas transmission companies

constructed new facilities, they would also need to connect with these distribution companies to fulfill the Project purpose. Because the impacts associated with other natural gas transmission companies would not likely offer a significant environmental advantage over the BXP, we are not recommending the no-action alternative.

2. System Alternatives

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

Our analysis of system alternatives includes an examination of existing and proposed natural gas systems that currently or could eventually serve the markets targeted by the BXP, and considers whether those systems would meet the proposed Project's objectives while offering an environmental advantage over the Project. This section includes a discussion of existing natural gas pipeline systems and proposed pipeline systems that extend from the general Project area to target markets.

For a system alternative to be viable, it would be capable of:

- transporting up to 275 million cubic feet (MMcf) of natural gas per day from the Majorsville Processing Plant Point of Receipt in Marshall County, West Virginia, to Columbia's Ohio mainline system;
- transporting natural gas to the Leach point of delivery and Columbia Gas Transmission Pool point of delivery via the Ceredo CS in Wayne County, West Virginia, for transportation south to markets and Columbia-owned interconnect points; and
- be able to offer a significant environmental advantage over the BXP.

Further, as noted above, Columbia already delivers natural gas at multiple locations along its R-System in the counties crossed by the Project. As listed in appendix A-2, the BXP would allow for continued safe and reliable natural gas deliveries to the Cities of Wellston, Hamden, Jackson, Oak Hill, and South Webster, among other delivery points. As such, implementation of system alternatives outside of the existing R-System area could result in service interruptions at multiple locations.

In addition to Columbia's existing systems, including the R-System and other regional Columbia pipelines, we considered the below changes to Columbia's proposed R-801 pipeline construction method as well as a conceptual modification to its pipeline diameter. Further, there are four other existing systems that are in the region of the BXP and thus have at least some potential to transport natural gas in this area. These existing and proposed systems are discussed below and are depicted in appendix C-1.

2.1 Existing Columbia Systems

We initially considered two R-System alternatives in the area of the proposed R-801 pipeline to accomplish the Project's Replacement component objectives. The first option would add 20,000 horsepower of compression at the existing Oak Hill CS, construct two new compressor stations, and construct an estimated 87 miles of looping/replacement pipeline along Columbia's R-System. The second option would add 6,353 hp of compression at the existing Summerfield CS in Noble County, Ohio (about 75 miles northeast of the BXP area), modify the Ceredo CS, and replace about 62 miles of the R-501 pipeline. Given the similar or greater lengths of pipeline required for the two options compared to the proposed R-801 pipeline (66.1 miles) and the need for additional compression, which is not required for the BXP, we conclude that neither option would offer a significant environmental advantage compared to the BXP, and thus they were not evaluated further.

We also assessed two other Columbia-related system alternatives: T-System/SM-80 System and MXP. Neither of these system alternatives would be in the immediate vicinity of the existing R-501 and R-500 pipelines or the proposed R-801 pipeline, so deliveries of natural gas to local existing customers would require additional lateral pipelines and/or other new infrastructure. The T-System/SM-80 System alternative would require about 5,000 hp of additional compression (which is not required for the BXP) and about 103 miles of new loop pipeline compared to 66.1 miles of pipeline for the BXP. Thus, this alternative would not offer a significant environmental advantage compared to the BXP, and was not evaluated in detail.

The MXP (FERC Docket No. CP16-357) was authorized by the Commission on December 29, 2017. Because more than 96 percent of the MXP's capacity is already subscribed, Columbia estimated that an additional minimum of 58 miles of new loop pipeline (mileage based on preliminary conceptual routing and desktop data sources) and approximately 7,780 hp of compression would be needed to transport the volumes associated with the BXP. Further, construction of the MXP system alternative would require segments of the pipeline to be removed from service during construction for multiple disconnections and reconnections caused by looping segments, thereby impacting Columbia's existing customers. Generally, the BXP and the MXP system alternative would be constructed in similar areas, with similar terrain and construction challenges, and impacting similar environmental resources. While implementation of the MXP system alternative may potentially have a somewhat shorter length of pipeline (depending upon

the results of more detailed engineering and field surveys), if this alternative were to be pursued, the likely environmental impacts from the required pipeline looping in combination with additional compression and associated air emissions would be similar to the BXP. For these reasons, this option would not offer a significant environmental advantage compared to the BXP, and we do not recommend it.

2.2 Proposed Columbia Systems

Lift and Lay Method

The "lift and lay" method discussed in section A.4.1 is another potential Columbia system-related alternative. While not a traditional system alternative in that existing infrastructure, such as pipeline segments, would largely be utilized, it is a system alternative that the existing permanent rights-of-way for the existing (and proposed to be abandoned) R-501 and R-500 pipelines could be used (along with additional construction right-of-way and extra workspaces) to excavate and remove the existing pipelines and replace them in the same trench with a new pipeline.

As noted in section A.4.1, 0.3 mile of the proposed R-801 pipeline from MP 64.1 to 64.2 and from MP 65.9 to 66.2 would be installed within the existing R-500 trench through the "lift and lay" method. This technique would be used at these two locations due to residential encroachment and to avoid direct impacts on the adjacent residences. This work would result in a 3-week loss of natural gas service via pipeline to the City of South Point, but this outage would be mitigated by coordinating the timing with the City and by temporarily providing replacement natural gas with compressed natural gas tanks.

Implementation of the "lift and lay" method along the entire length of the existing R-501 and R-500 pipelines would be constrained by Columbia's adjacent existing R-601 and R-701 pipelines and foreign pipelines within the same corridor, reducing the amount of available workspace. In addition, construction of a total of 8.2 miles (16 existing corridor segments) would be further constrained by steep vertical or side slopes, thereby adding another obstacle to safe and suitable conditions for construction. These 16 segments would be generally well-spaced along the pipeline length, limiting the utility of this method in each of the three proposed construction spreads. This would make including this method impractical in each of the major portions of the Replacement component area. Finally, Columbia estimated that the existing R-501 and R-500 pipelines would need to be taken out of service for approximately 8 months while the "lift and lay" process was completed, thereby interrupting service and deliveries for multiple receipt points and cities. While this construction method would reduce impacts from those discussed in section B of this EA, for the reasons listed above, the "lift and lay" method along the whole length or along an entire construction spread of the proposed R-801 pipeline is not feasible or practicable, and we are not recommending it.

Replacement Element Alternative

Range Resources-Appalachia, LLC (Range) filed a motion to intervene in the BXP proceedings on April 30, 2018. Among other issues, Range asserted that the BXP was not needed as demonstrated by a lack of binding agreements supporting the BXP Expansion Element and that Range could turnback 100 MMcf/day of firm natural gas transportation capacity to Columbia in lieu of the BXP. Determination of the need of the BXP is beyond the scope of this EA and will ultimately be determined by the Commission. However, even if Range did turnback 100 MMcf/day that would only affect a portion of Columbia's proposed Expansion Element of 275 MMcf/day and presumably would not affect the Replacement Element, given Columbia's existing customers and deliveries. Further, if Range did turnback 100 MMcf/day, Columbia could potentially reduce the diameter of its proposed pipeline to somewhat less than 36 inches, but even a 30-inch-diameter pipeline would still require a construction right-of-way equal or similar to the proposed size, and environmental impacts would be similar. For those reasons, we do not consider Range's turnback offer as a viable system alternative to the BXP.

The Commission will consider Project need and binding agreements for natural gas when it decides whether to issue a Certificate for the BXP in whole or in part. Because the Commission's decision regarding that matter is not known at this time, in the interest of prudency, we assessed a conceptual alternative (the Replacement Element Alternative) that would eliminate the upsizing of the BXP associated with the Expansion Element and would be a same-diameter replacement (i.e., 24-inch-diameter).

Under this conceptual alternative, the replacement of the R-500 and R-501 pipelines with the R-801 pipeline would occur along the same route with the same aboveground facilities, extra workspaces, access roads, staging areas, and contractor yards. This conceptual alternative would not have a consistent diameter with the existing 36-inch-diameter R-801 Loop; therefore, the system would need additional pig launchers and receivers to maintain internal pipeline inspections and cleanings. The Replacement Element Alternative would generally affect the same resources, such as forest, waterbodies, and wetlands as well as the WNF as described in section B. An assumption of this alternative is that the necessary amount of 24-inch-diameter pipe could be obtained by Columbia in time to meet the Project's schedule.

Based on guidance for the width of pipeline construction rights-of-way, based in part on pipe diameter, we considered that the construction right-of-way could be reduced by about 15 feet (INGAA, 1999). Given that the BXP's proposed construction right-of-way would be 125 feet wide, the reduction to 110 feet would represent a 12 percent decrease in acreage affected for the Replacement Element Alternative, from 1,532 acres to a conceptual 1,348 acres. This estimated 12 percent decrease in Replacement component impacts could be applied to resources, such as forest (from 741 acres to 652 acres), the WNF (from 246 acres to 217 acres), wetlands (from 14 acres to 12 acres), and agricultural land (from 239 acres to 210 acres). Individual resources, such as waterbodies, wells,

sensitive habitats, cultural resources sites, and residences would still be affected in a manner as proposed by Columbia, albeit at a reduced level or with an increased buffer distance between the disturbance and the resource. We assume that the permanent right-of-way for the Replacement Element Alternative would be the same width, 50 feet, as the proposed permanent right-of-way.

While we make no judgement regarding the BXP need, we conclude that if the Commission did decide that the Expansion Element was contrary to FERC policy, or otherwise rejected the portion of the BXP identified as the Expansion Element, and that instead only the BXP Replacement Element (i.e., 24-inch-diameter pipeline) was in the public interest, then the Replacement Element Alternative would be feasible, practical, and would entail less environmental impacts than the 36-inch-diameter BXP. However, as stated in sections B and D, neither the BXP Replacement nor Abandonment components would significantly affect the environment, and this alternative would not meet the Project's stated purpose of providing an additional 275 MMcf/day of capacity to Columbia's system.

2.3 Other Pipeline Systems

There are four existing systems in the region of the BXP and thus have potential to transport the supply of natural gas near the Project region. The Texas Eastern Transmission, TGP, Rockies Express, and Rover Pipelines all currently transport natural gas in eastern Ohio. Based on analyses of desktop data sources, the Texas Eastern (estimated at least 92 miles of lateral or looping pipeline plus new compression), TGP (estimated minimum of 146 miles of lateral or looping pipeline plus new compression), Rockies Express (estimated minimum of 130 miles of lateral pipeline plus compression), and Rover (at least 160 miles of pipeline plus compression) system alternatives would entail substantially greater impacts than the BXP. For these reasons, these systems are not evaluated in greater detail, and we conclude that these options would not offer a significant environmental advantage compared to the BXP.

3. Route Alternatives and Variations

Early in the development of the BXP, Columbia considered a pipeline route that was largely collocated with existing linear facilities, including its own R-System pipelines. The originally proposed route for R-801 submitted to the FERC in August 2017 was approximately 80 percent collocated, but the route was subsequently refined and adjusted based on surveys, engineering review, stakeholder input, and field studies. Columbia stated that it routed the current proposed location of the R-801 pipeline to maximize the extent of collocation, but also in consideration of the required adjustments. As currently proposed, about 51 percent, or about 34 miles, of the proposed R-801 pipeline route would be adjacent to existing pipeline corridors, electric transmission lines, or other linear infrastructure.

Columbia continued to evaluate and consider route adjustments after submittal of its application. However, the starting and end points for the proposed R-801 pipeline are fixed locations due to delivery points along the R-System that serve existing customers. The starting point would be the McArthur RS (end of the existing R-801 Loop pipeline) in Vinton County, Ohio, proceeding south with the ending point at the Burlington RS (start of the existing BM-111 and BM-111 Loop pipelines) in Lawrence County, Ohio. Thus, the range of alternatives we consider below is focused on routes that are still able to use these fixed end points.

We evaluated route alternatives and route variations as compared to Columbia's proposed route to determine whether their implementation would be preferable. We have defined route alternatives as being greater than 1 mile in length for the purposes of this analysis. Route variations are defined as less than 1 mile in length and typically deviate from the proposed route to a lesser degree than a route alternative. Such variations are often designed to avoid specific environmental resources, landowner concerns, or engineering constraints. The variations typically remain within the same general area as the proposed route and may avoid certain localized features, such as a home or wetland.

Our assessment of the environmental consequences of the Project revisions, already incorporated by Columbia into its proposed route, are included as part of our environmental analysis of the proposed Project in section B and are generally not repeated here. However, in some cases, based on comments received and/or our own assessments, we considered whether the originally planned routing was preferable to the route that Columbia eventually proposed. Such cases are included in our evaluation of alternatives below.

3.1 Route Alternatives

We considered 10 route alternatives where the proposed route of the R-801 pipeline deviates from nearby existing R-System pipelines or other existing linear corridors. Three of the 10 alternatives (Nos. 3, 6, and 8) would affect WNF lands. Deviations from existing corridors are listed in appendix A-4c.

Generally, a shorter pipeline length and/or increased pipeline collocation with existing linear corridors tends to decrease overall environmental impacts. However, two additional alternatives (not included in the 10 mentioned above) that were developed to avoid crossing of the WNF clearly did not offer a significant environmental advantage compared to the proposed R-801 pipeline (e.g., they were much longer than the proposed route and therefore were not practical) to the extent that they did not warrant detailed analysis. These two alternatives are depicted in appendices C-2a and C-2b. The purpose of considering these two alternatives was to consider whether routes that would completely avoid the WNF were practical. These alternatives include:

- the Wayne National Forest Avoidance Alternative – West (about 20 miles longer than the corresponding segment of the proposed route); and

- the Wayne National Forest Avoidance Alternative – East (about 5 miles longer than the corresponding segment of the proposed route).

Because the basic components of these two route alternatives would clearly be substantially greater and would not offer a significant environmental advantage when compared to the proposed R-801 pipeline route, we did not evaluate these alternatives in greater detail and they are not considered further. The other 10 route alternatives did offer at least some environmental advantages, were about the same length or shorter than the proposed route, and would generally increase the level of collocation. These route alternatives are evaluated below.

Route Alternative 1

Route Alternative 1 (see figure C-1) would deviate from the proposed route near the James A. Rhodes Airport, near MP 17.7, and would be collocated with Columbia's existing R-501/R-601 pipelines. Neither the proposed route in this area or Route Alternative 1 would cross WNF lands. The alternative would rejoin the proposed route at MP 21.9, and was evaluated because collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-1.

Route Alternative 1 would be 0.2 mile longer than the proposed route and would affect a designated Category 3 wetland, but would be more collocated with existing linear (Columbia's existing R-501/R-601 pipelines) infrastructure by 2.0 miles and affect 6.9 less acres overall during construction. The alternative would not affect forested wetlands (1.1 acres less than the proposed route through this same segment). Route Alternative 1 also would affect 2.0 fewer acres of upland forest and 10.6 fewer acres of interior forest.

However, Route Alternative 1 would affect 1.4 acres more of emergent wetlands, one more perennial waterbody, five additional intermittent/ephemeral waterbodies, one additional pond, six more landowner parcels, one more residence within 50 feet of the construction work area, and 0.7 additional mile of shallow bedrock (possibly resulting in an increased need for blasting). As noted above, Route Alternative 1 would have certain environmental advantages compared to the proposed route, but by comparing the number, type, and degree of advantages, we consider that on balance the suite of advantages for Route Alternative 1 would be minor. For these reasons, we conclude that Route Alternative 1 would not offer a significant environmental advantage when compared to the corresponding segment of the proposed route.

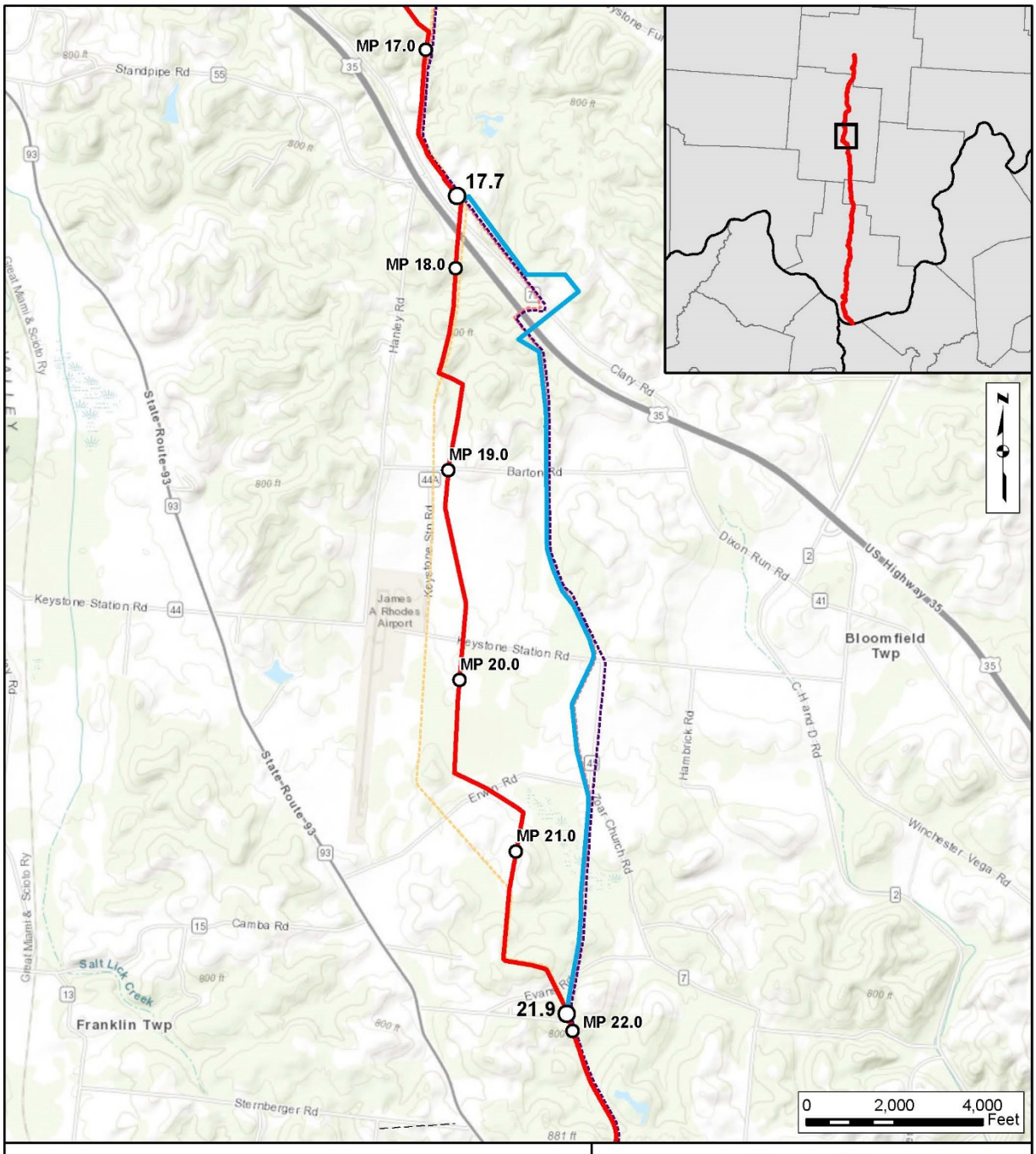


Figure C-1

Buckeye XPress Project

Route Alternative 1

The following is a list of notes that correspond to information contained in tables C-1 through C-10, C-12, and C-13.

- Data provided for the proposed route and the route alternative are based on the same publically available electronic mapping data.
- Right-of-way requirements are based on a nominal 125-foot wide construction right-of-way and a 50-foot wide permanent right-of-way.
- The source for wetlands is: U.S. Fish and Wildlife Service National Wetland Inventory Data (https://www.fws.gov/wetlands/Data/State-Downloads.html). Wetland information provided in this dataset may not be consistent with information provided in the Multi-Resolution Land Characteristics Consortium dataset provided below.
- The source for waterbodies is: U.S. Geologic Survey National Hydrography Dataset (https://nhd.usgs.gov/).
- The source for cultural resources is: National Park Service (https://www.nps.gov).
- The source for land use is: Multi-Resolution Land Characteristics Consortium – National Land Cover Database 2011 (https://www.mrlc.gov/nlcd11_data.php). Wetland information provided in this dataset may not be consistent with information provided in the U.S. Fish and Wildlife dataset provided above.
- The source for federal land is: U.S. Forest Service (https://data.fs.usda.gov/geodata/edw/index.php).
- Vertical slopes crossed by the centerline are considered steep if they are greater than 30 percent.
- Side slopes are considered steep if they are greater than 30 percent.
- The source for shallow bedrock is: Natural Resources Conservation Service General Soil Map (STATSGO2; https://sdmdataaccess.sc.egov.usda.gov).
- Landslide potential information provided represents areas that may be most susceptible to slope failure based on the presence of steep slopes (greater than 30 percent) and the presence of red bed-containing Conemaugh Group bedrock units.

TABLE C-1
Route Alternative 1 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 1
Total length	miles	3.9	4.1
Type of right-of-way			
New right-of-way	miles	2.5	0.6
Collocated with existing pipeline right-of-way	miles	1.5	3.5
Right-of-way requirements			
Construction right-of-way	acres	73.1	66.2
Permanent right-of-way	acres	23.8	24.7
Wetlands			
Emergent	acres	0.4	1.8
Forested	acres	1.1	0
Total wetland impacts	acres	1.5	1.8
Waterbodies			
Perennial	number	0	1
Intermittent/ephemeral	number	4	9
Ponds/lakes	number	0	1
Land use (Construction Right-of-way)			
Forested	miles	2.0	2.0
	acres	37.2	35.2
Interior Forest	acres	19.1	8.5
Agricultural	acres	29.6	27.4
Open	acres	2.1	0
Wetland	acres	0	0.6
Residential	acres	4.2	2.8
Landowner parcels	number	19	25
Residences			
Within 50 feet of construction work area	number	0	1
Surface and Subsurface Terrain			
Steep vertical slopes	miles	0	<0.1
Shallow bedrock	miles	0.4	1.1
Landslide potential	miles	0	0.1

a/ Data for the following environmental factors are not presented in this table because both values were zero: Collocation with other existing rights-of-way; Scrub-shrub wetlands; Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; National forests; State forest/parks and Wildlife management areas; Trails and Recreation areas; and Steep side slopes.

Route Alternative 2

Route Alternative 2 (see figure C-2) would deviate from the proposed route at MP 18.5 near the James A. Rhodes Airport and would be collocated with Columbia's existing R-701 pipeline. Neither the proposed route in this area or Route Alternative 2 would cross WNF lands. Route Alternative 2 would rejoin the proposed route at MP 21.2. This alternative was evaluated because collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-2.

Route Alternative 2 would be 0.1 mile shorter than the proposed route, and would be more collocated with existing linear (Columbia's existing R-701 pipeline) infrastructure by 2.4 miles and affect 4.8 less acres overall during construction. Route Alternative 2 also would affect 2.9 acres less of interior forest.

However, Route Alternative 2 would affect 2.2 acres more of forested wetlands and 1.8 acres more of total wetlands. The alternative also would affect 2 more intermittent/ephemeral waterbodies, 3.0 acres more of upland forest, 4 more landowner parcels, and about 0.1 mile more of shallow bedrock (possibly resulting in an increased need for blasting). As noted above, Route Alternative 2 would have certain environmental advantages, but by comparing the number, type, and degree of advantages, we consider that on balance the suite of advantages for Route Alternative 2 would be negligible. For these reasons, we conclude that Route Alternative 2 would not offer a significant environmental advantage when compared to the corresponding segment of the proposed route.

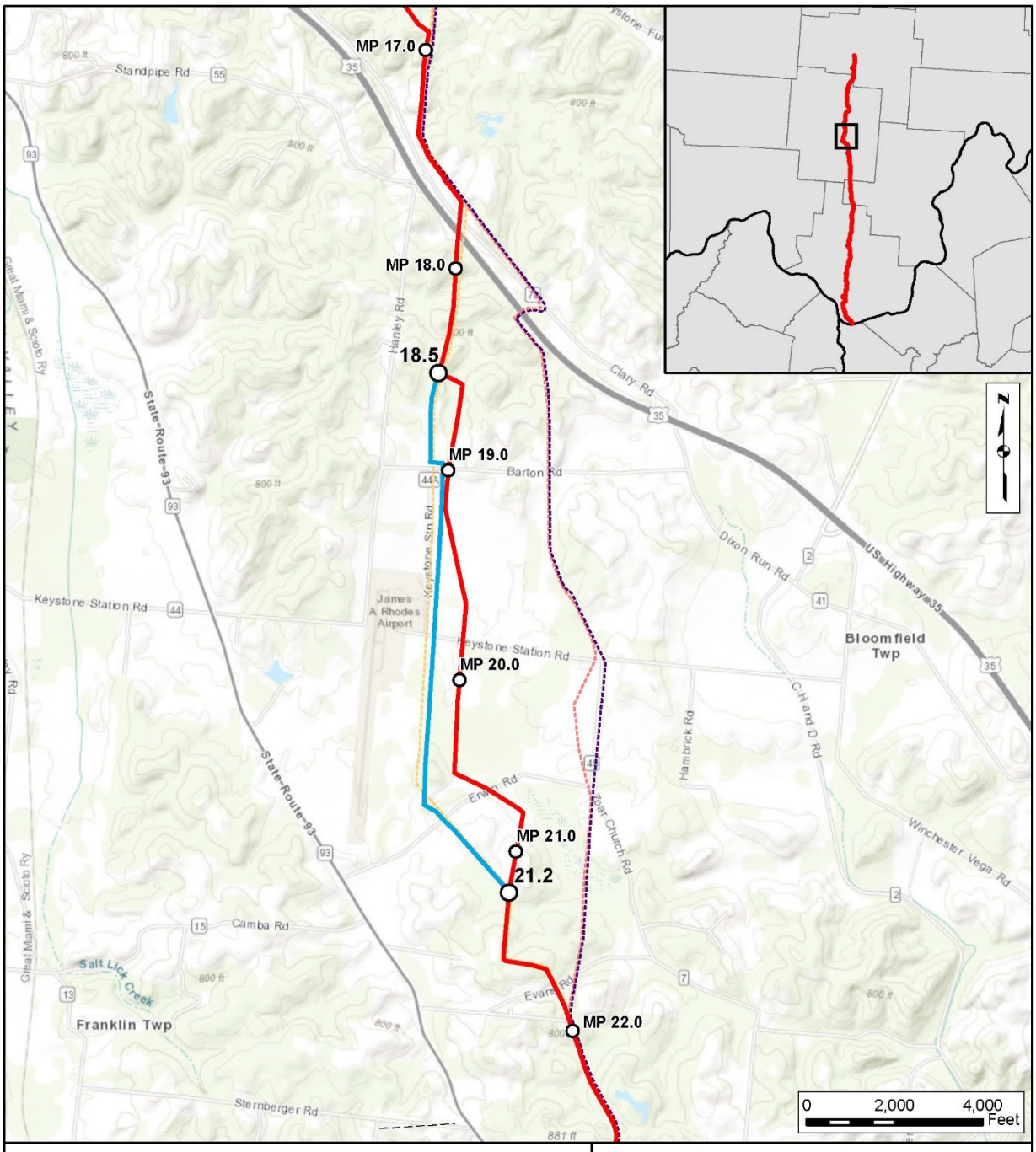


Figure C-2

Buckeye XPress Project

Route Alternative 2

TABLE C-2
Route Alternative 2 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 2
Total length	miles	2.5	2.4
Type of right-of-way			
New right-of-way	miles	2.5	<0.1
Collocated with existing pipeline right-of-way	miles	<0.1	2.4
Right-of-way requirements			
Construction right-of-way	acres	43.0	38.2
Permanent right-of-way	acres	15.1	14.8
Wetlands			
Emergent	acres	0.3	0
Forested	acres	1.1	3.3
Total wetland impacts	acres	1.5	3.3
Waterbodies			
Intermittent/ephemeral	number	2	4
Land use (Construction Right-of-way)			
Forested	miles	0.8	1.0
	acres	12.4	15.4
Interior Forest	acres	4.1	1.2
Agricultural	acres	27.3	21.0
Open	acres	2.1	0.6
Residential	acres	1.2	1.2
Landowner parcels	number	12	16
Surface and Subsurface Terrain			
Shallow bedrock	miles	<0.1	0.2

a/ Data for the following environmental factors are not presented in this table because both values were zero: Collocation with other existing rights-of-way; Scrub-shrub wetlands; Perennial, Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Wetland land use; Residences within 50 feet of construction work area; National forests; State forest/parks and Wildlife management areas; Trails and Recreation areas; and Steep vertical slopes, Steep side slopes, and Landslide potential.

Route Alternative 3

Route Alternative 3 (see figure C-3) would deviate from the proposed route near MP 49.4 and would rejoin the proposed route at MP 54.9. Both the proposed route in this area and Route Alternative 3 would cross WNF lands; however, neither would affect waterbodies or wetlands on WNF lands. This alternative was evaluated because collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-3.

Route Alternative 3 would be 0.2 mile longer than the proposed route (thereby affecting about 3 more acres during construction), but would be more collocated with existing linear infrastructure (mostly Columbia's existing R-701 pipeline along with another foreign pipeline corridor) by 4.5 miles. The alternative would also affect 11.7 acres less of forest, 3.1 fewer acres of interior forest, and 1.2 miles less of shallow bedrock (thereby potentially reducing the need for blasting). This alternative would also affect 0.8 mile less of the WNF.

Route Alternative 3 would affect two perennial waterbodies (both outside the WNF) compared to 0 for the proposed route, 29 additional landowner parcels, and five more residences within 50 feet. Columbia also stated that residential encroachment near State Highway 141 and restricted workspaces and severe side slopes north of Neds Fork Road (caused by the presence of the existing R-701 pipeline and another existing foreign pipeline) would cause substantial constructability and safety issues for implementation of Route Alternative 3. We confirmed that there is substantial residential encroachment near Route Alternative 3 along State Highway 141 and steep side slopes north of Neds Fork Road.

Route Alternative 3 would provide several environmental advantages compared to the proposed route, including a reduced crossing length of 0.8 mile on WNF lands (along with 0.8 mile less impact on WNF forested land). However, these advantages are collectively counterbalanced by reduced impacts on landowners, residences, and waterbodies for the proposed route. For these reasons, we conclude that this alternative would not offer a significant environmental advantage when compared to the corresponding segment of the proposed route. Additionally, constructability and safety concerns associated with Route Alternative 3 would make Route Alternative 3 not practical.

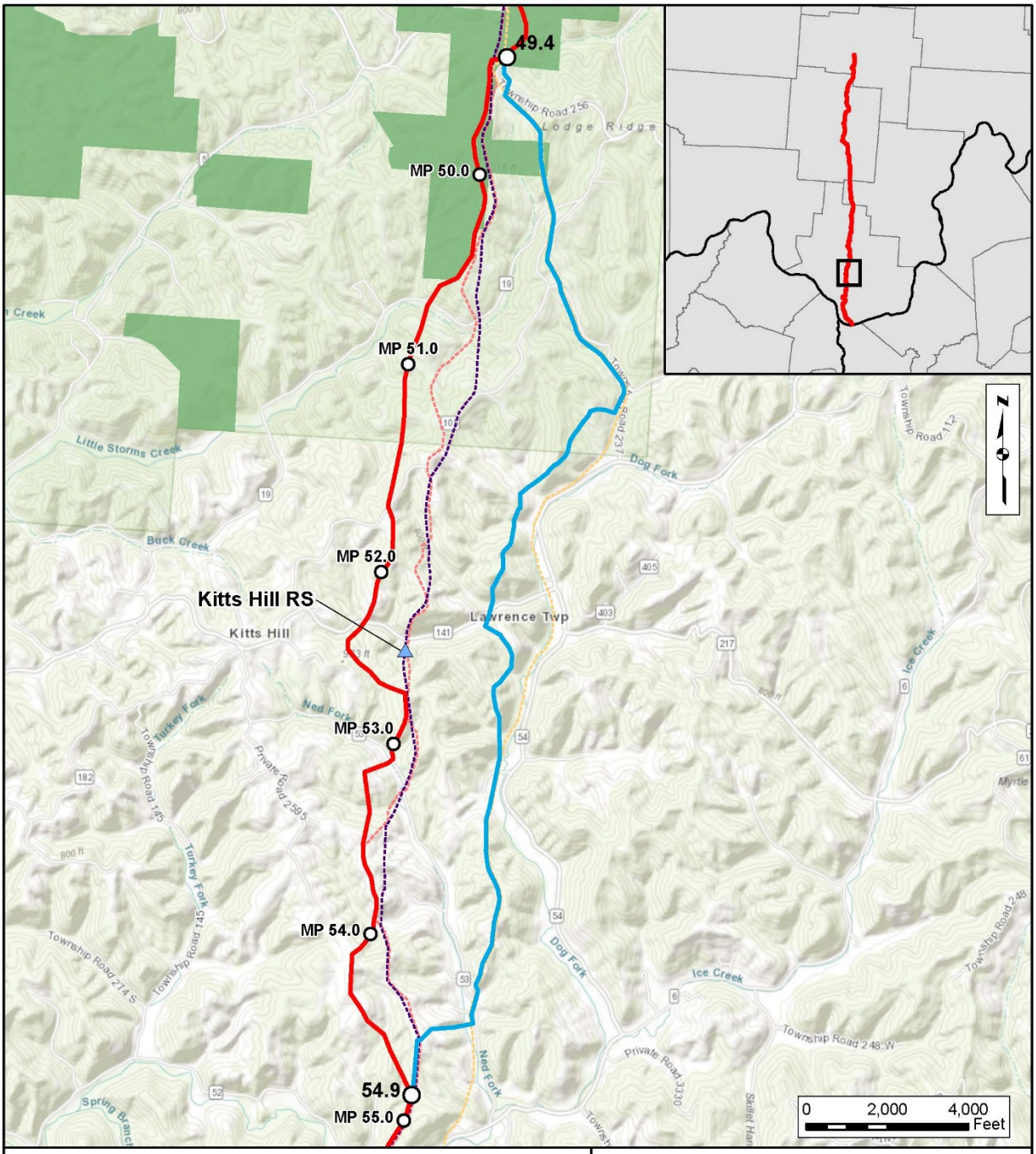


Figure C-3

Buckeye XPress Project

Route Alternative 3

TABLE C-3
Route Alternative 3 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 3
Total length	miles	5.5	5.7
Type of right-of-way			
New right-of-way	miles	4.9	0.4
Collocated with existing pipeline right-of-way	miles	0.6	5.1
Collocated with other existing rights-of-way	miles	0	0.1
Right-of-way requirements			
Construction right-of-way	acres	83.4	86.4
Permanent right-of-way	acres	33.4	34.6
Waterbodies			
Perennial	number	0	2
Intermittent/ephemeral	number	7	7
Land use			
Forested	miles	4.1	3.3
	acres	61.1	49.4
Interior Forest	acres	16.8	13.7
Agricultural	miles	1.0	1.4
Open	miles	0.1	0.7
Wetland	miles	<0.1	0
Residential	miles	0.3	0.3
Landowner parcels	number	37	66
Residences			
Within 50 feet of construction work area	number	4	9
Federal land			
National forests	miles	1.0	0.2
Surface and Subsurface Terrain			
Steep vertical slopes	miles	0.3	0.4
Steep side slopes	miles	0.3	0.3
Shallow bedrock	miles	4.6	3.4
Landslide potential	miles	5.5	5.1

a/ Data for the following environmental factors are not presented in this table because both values were zero: Emergent, Scrub-shrub, and Forested wetlands; Ponds/lakes and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; State forest/parks and Wildlife management areas; and Trails and Recreation areas.

Route Alternative 4

Route Alternative 4 (see figure C-4) would deviate from the proposed route near MP 57.5 and would rejoin the proposed route at MP 62.0. Neither the proposed route in this area nor Route Alternative 4 would cross WNF lands. This alternative was evaluated because it would be shorter than the proposed route and collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-4.

Route Alternative 4 would be 0.8 mile shorter than the proposed route (thereby affecting 11.5 less acres during construction) and would be more collocated with existing linear infrastructure by 1.6 miles. The alternative would also affect 15 less acres of forest, 14.7 less acres of interior forest, 0.7 mile less of shallow bedrock, and 0.6 mile less of areas susceptible to landslides.

However, Route Alternative 4 would affect two additional perennial waterbodies, 10 additional residences within 50 feet of the work area, and 0.2 mile more of steep side slopes. Columbia also stated that residential encroachment near County Road 243 and the intersection with Little Ice Creek-Possum Hollow Road would cause substantial constructability issues for implementation of Route Alternative 4. The constructability issues include 13 residences within 50 feet of the Route Alternative 4 route that would limit needed workspace. Construction in this area would cause inconvenience during construction for numerous residents. Further, collocation of Route Alternative 4 with an existing foreign pipeline would triple the amount of side slope construction required compared to the proposed route. The advantages that Route Alternative 4 would provide are collectively counterbalanced by reduced impacts on landowners, residences, and waterbodies for the proposed route, in addition to the constructability concerns associated with Route Alternative 4. For these reasons, we conclude that Route Alternative 4 would not offer a significant environmental advantage when compared to the corresponding segment of the proposed route.

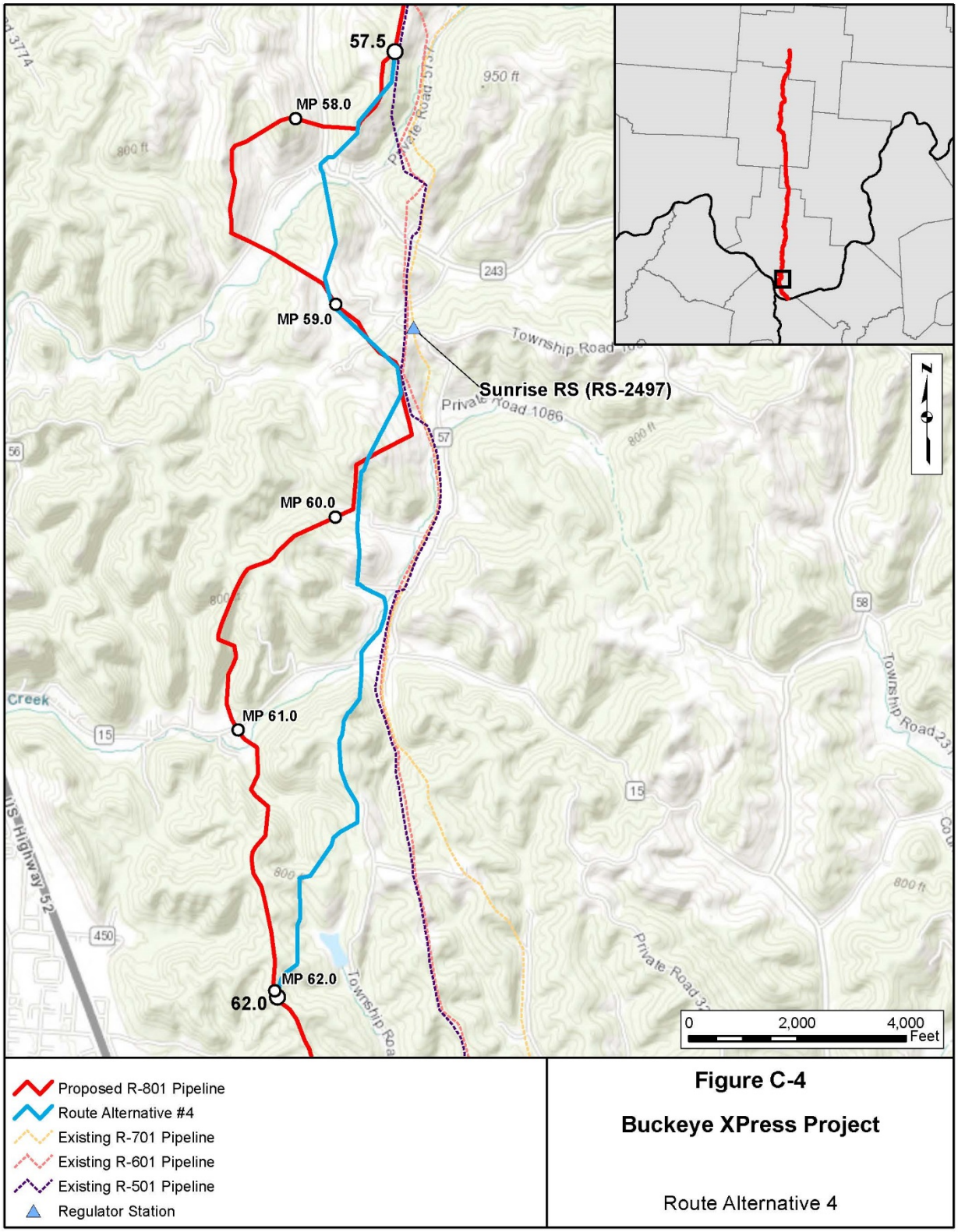


Figure C-4

Buckeye XPress Project

Route Alternative 4

TABLE C-4
Route Alternative 4 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 4
Total length	miles	4.6	3.8
Type of right-of-way			
New right-of-way	miles	4.0	1.7
Collocated with existing pipeline right-of-way	miles	0.3	2.1
Collocated with other existing rights-of-way	miles	0.2	0
Right-of-way requirements			
Construction right-of-way	acres	69.1	57.6
Permanent right-of-way	acres	27.6	23.0
Waterbodies			
Perennial	number	2	4
Intermittent/ephemeral	number	1	1
Land use			
Forested	miles	3.4	2.5
	acres	52.3	37.5
Interior Forest	acres	27.1	12.4
Agricultural	miles	0.9	0.9
Open	miles	0.1	0.2
Residential	miles	0.1	0.1
Landowner parcels	number	39	41
Residences			
Within 50 feet of construction work area	number	3	13
Surface and Subsurface Terrain			
Steep vertical slopes	miles	0.4	0.3
Steep side slopes	miles	0.1	0.3
Shallow bedrock	miles	3.0	2.3
Landslide potential	miles	4.4	3.8

a/ Data for the following environmental factors are not presented in this table because both values were zero: Emergent, Scrub-shrub, and Forested wetlands; Ponds/lakes and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Wetland land use; National forests; State forest/parks and Wildlife management areas; and Trails and Recreation areas.

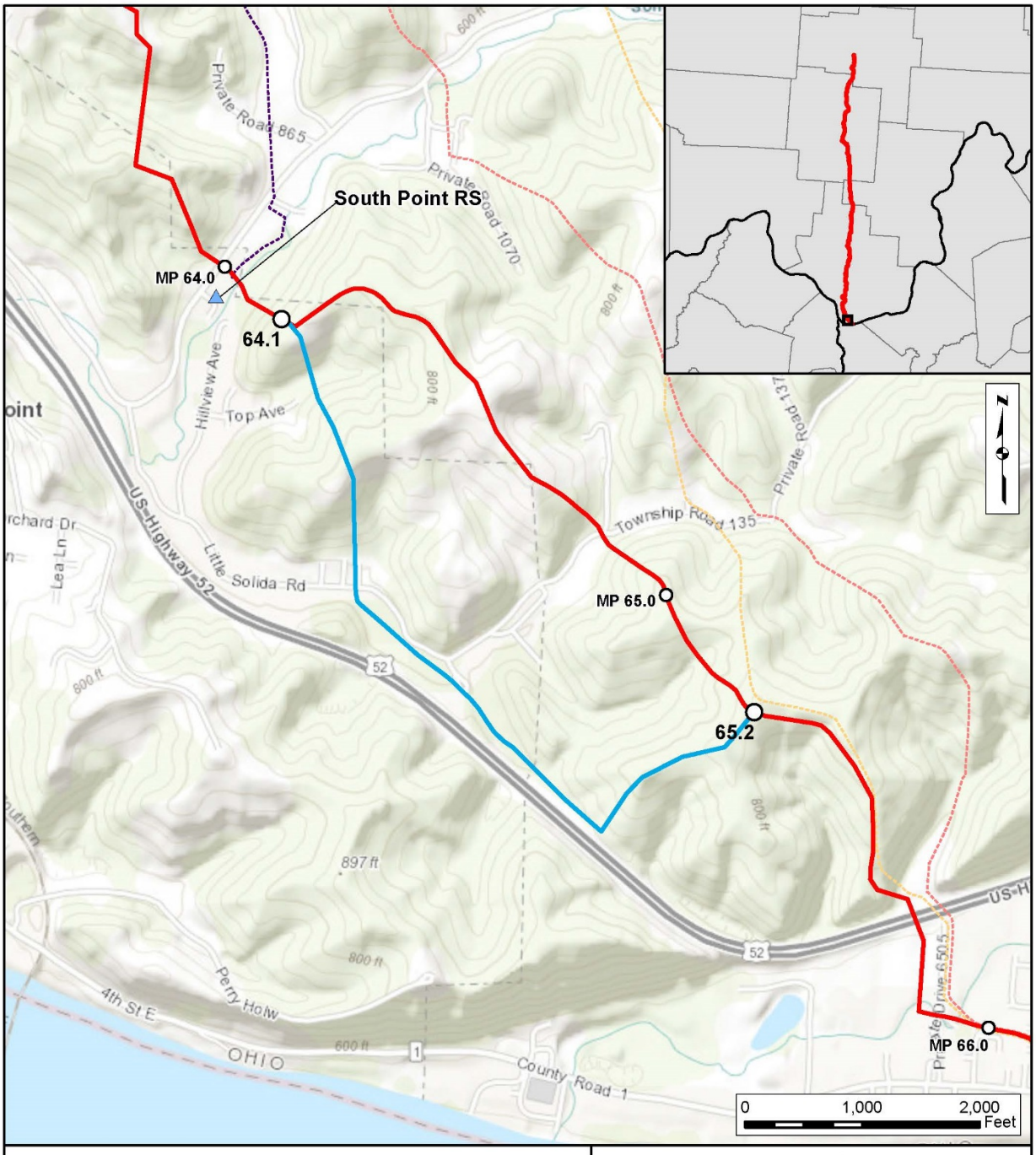
Route Alternative 5

Route Alternative 5 (see figure C-5) would deviate from the proposed route near MP 64.1 and would rejoin the proposed route at MP 65.2. Neither the proposed route in this area or Route Alternative 5 would cross WNF lands. This alternative was evaluated because collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-5.

Route Alternative 5 would be 0.3 mile longer than the proposed route (thereby affecting 3.6 more acres during construction), but would be more collocated with existing linear infrastructure by 1.0 mile. The alternative would affect 2.7 fewer acres of forest, 3.7 acres less of interior forest, and 0.8 fewer mile of shallow bedrock.

However, Route Alternative 5 would affect 13 additional landowners, five additional residences within 50 feet of the work area, and 0.3 mile more of areas with elevated landslide potential. Columbia stated that implementation of Route Alternative 5 would require a difficult construction process along Little Solida Road due to an adjacent waterbody that parallels the northeastern side of the alternative and steep topography along the southwestern side affecting and constraining the amount of available workspace at that location.

Route Alternative 5 would provide several environmental advantages compared to the proposed route, including reduced impacts on upland forest, interior forest, and shallow bedrock, but these advantages are collectively counterbalanced by reduced impacts on landowners, residences, and landslide-prone areas for the proposed route, and constructability concerns associated with Route Alternative 5. For these reasons, Route Alternative 5 would not offer a significant environmental advantage when compared to the corresponding segment of the proposed route.



Proposed R-801 Pipeline
Route Alternative #5
Existing R-701 Pipeline
Existing R-601 Pipeline
Existing R-501 Pipeline
Regulator Station

Figure C-5

Buckeye XPress Project

Route Alternative 5

TABLE C-5
Route Alternative 5 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 5
Total length	miles	1.1	1.4
Type of right-of-way			
New right-of-way	miles	1.1	0.3
Collocated with existing pipeline right-of-way	miles	0	1.0
Right-of-way requirements			
Construction right-of-way	acres	16.9	20.5
Permanent right-of-way	acres	6.7	8.2
Waterbodies			
Perennial	number	1	1
Land use			
Forested	miles	1.0	0.9
	acres	16.1	13.4
Interior Forest	acres	8.0	4.3
Agricultural	miles	0	0.1
Residential	miles	0	0.4
Landowner parcels	number	9	22
Residences			
Within 50 feet of construction work area	number	1	6
Surface and Subsurface Terrain			
Steep vertical slopes	miles	0.1	0.2
Shallow bedrock	miles	1.1	0.3
Landslide potential	miles	1.1	1.4

a/ Data for the following environmental factors are not presented in this table because both values were zero: Collocation with other existing rights-of-way; Emergent, Scrub-shrub, and Forested wetlands; Intermittent/ephemeral, Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Open and Wetland land use; National forests; State forest/parks and Wildlife management areas; Trails and Recreation areas; and Steep slide slopes.

Route Alternative 6

Route Alternative 6 (see figure C-6) would deviate from the proposed route near MP 33.8 and would rejoin the proposed route at MP 35.2. Both the proposed route in this area and Route Alternative 6 would cross WNF lands. This alternative was evaluated because it would be shorter than the proposed route, and collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-6.

Route Alternative 6 would be 0.2 mile shorter than the proposed route (thereby affecting about 3 less acres during construction) and would be more collocated with existing linear infrastructure by 0.8 mile. The alternative would also affect 5 fewer acres of forest and 9.9 acres less of interior forest.

However, Route Alternative 6 would affect 0.3 mile more steep side slopes. Columbia stated that Route Alternative 6 would require crossing a difficult area near Hoadley Road where heavy recreational vehicle use has resulted in washouts and stream channel migration over the existing R-System pipelines, posing a pipeline safety risk in this area. Route Alternative 6 would provide several environmental advantages compared to the proposed route including reduced impacts on upland forest and interior forest and a reduced crossing length of 0.1 mile on WNF lands (along with 0.2 mile less impacts on forest on WNF lands). Neither the proposed route nor Route Alternative 6 would affect wetlands on WNF lands, and two waterbodies each would be crossed on WNF lands for both options. For these reasons, including consideration of the constructability and pipeline safety issue described above, Route Alternative 6 would not be practical and would not offer a significant environmental advantage when compared to the corresponding segment of the proposed route.

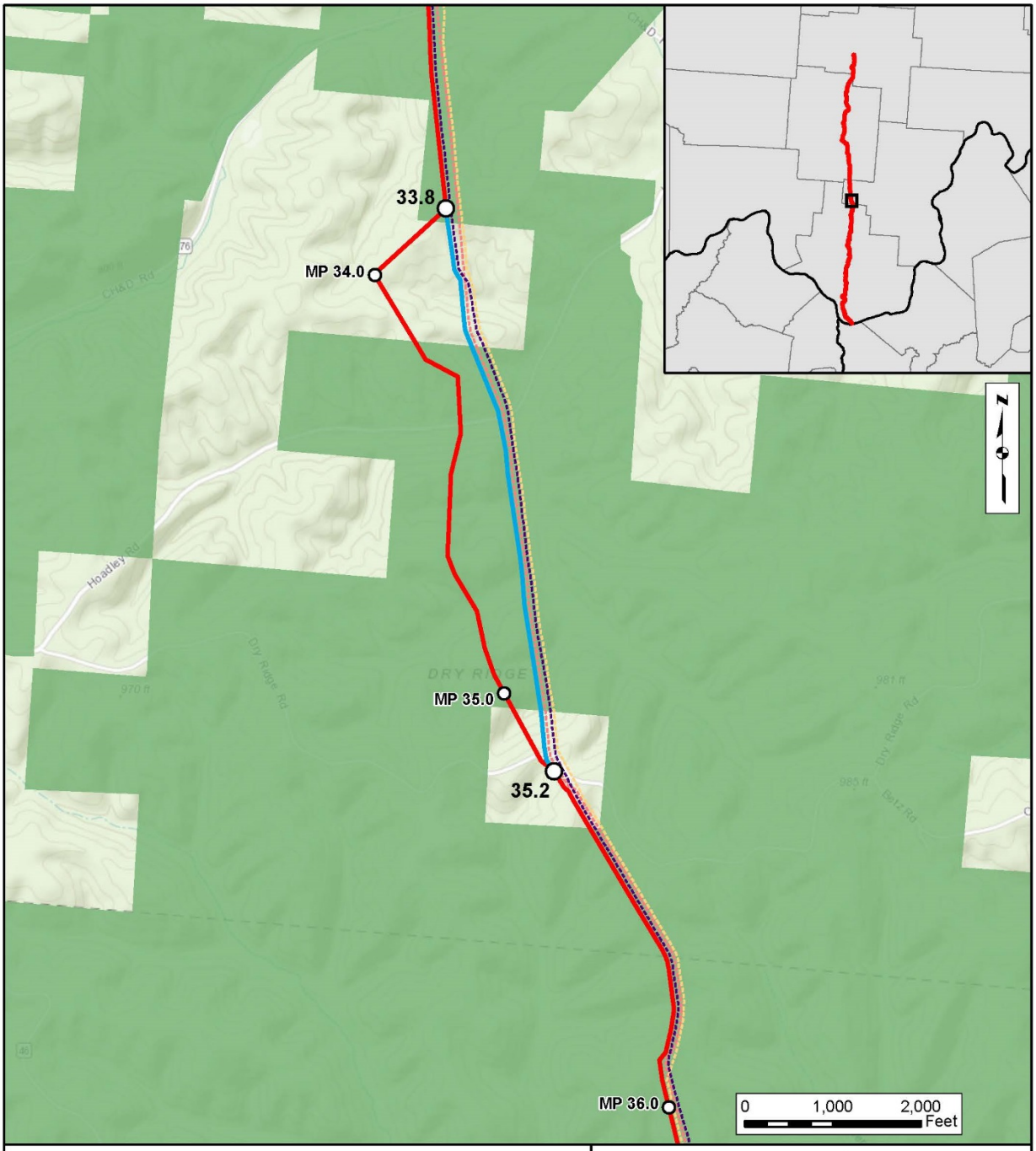


Figure C-6

Buckeye XPress Project

Route Alternative 6

TABLE C-6
Route Alternative 6 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 6
Total length	miles	1.4	1.2
Type of right-of-way			
New right-of-way	miles	1.0	0
Collocated with existing pipeline right-of-way	miles	0.2	1.2
Collocated with other existing rights-of-way	miles	0.2	0
Right-of-way requirements			
Construction right-of-way	acres	21.4	18.8
Permanent right-of-way	acres	8.6	7.5
Wetlands			
Emergent	acres	0	0.01
Total wetland impacts	acres	0	0.01
Waterbodies			
Intermittent/ephemeral	number	2	2
Land use			
Forested	miles	1.3	1.0
	acres	19.4	14.4
Interior Forest	acres	13.5	3.6
Open	miles	0.1	0.2
Residential	miles	0.1	0.1
Landowner parcels	number	9	10
Federal land			
National forests	miles	0.9	0.8
Surface and Subsurface Terrain			
Steep vertical slopes	miles	0.1	0.1
Steep side slopes	miles	0.0	0.3
Shallow bedrock	miles	1.4	1.2
Landslide potential	miles	0.8	0.6

a/ Data for the following environmental factors are not presented in this table because both values were zero: Scrub-shrub and Forested wetlands; Perennial, Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Agricultural and Wetland land use; Residences within 50 feet of construction work area; State forest/parks and Wildlife management areas; and Trails and Recreation areas.

Route Alternative 7

Route Alternative 7 (see figure C-7) would deviate from the proposed route near MP 14.8 and would rejoin the proposed route at MP 18.1. Neither the proposed route in this area nor Route Alternative 7 would cross WNF lands. This alternative was evaluated because it would be shorter than the proposed route and collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-7.

Route Alternative 7 would be slightly (0.1 mile) shorter than the proposed route (thereby affecting about 2 less acres during construction) and would be more collocated with existing linear infrastructure by 1.1 miles. The alternative would also affect 3 less residences within 50 feet of workspaces.

Route Alternative 7 would affect 0.2 more acreage of wetlands and two additional ponds. Implementation of Route Alternative 7 would result in a fifth pipeline on one landowner's property and potential R-801 minor route adjustments at this particular landowner's subject property would not be feasible due to nearby homes, roads, a strip mine, and other existing pipelines. Potential route adjustments at this property would also entail crossing of two additional Columbia pipelines, an existing petroleum pipeline, and Jackson County's water main. For these reasons, Route Alternative 7 would present several constructability challenges while not offering a significant environmental advantage when compared to the corresponding segment of the proposed route, nor is it feasible or practical.

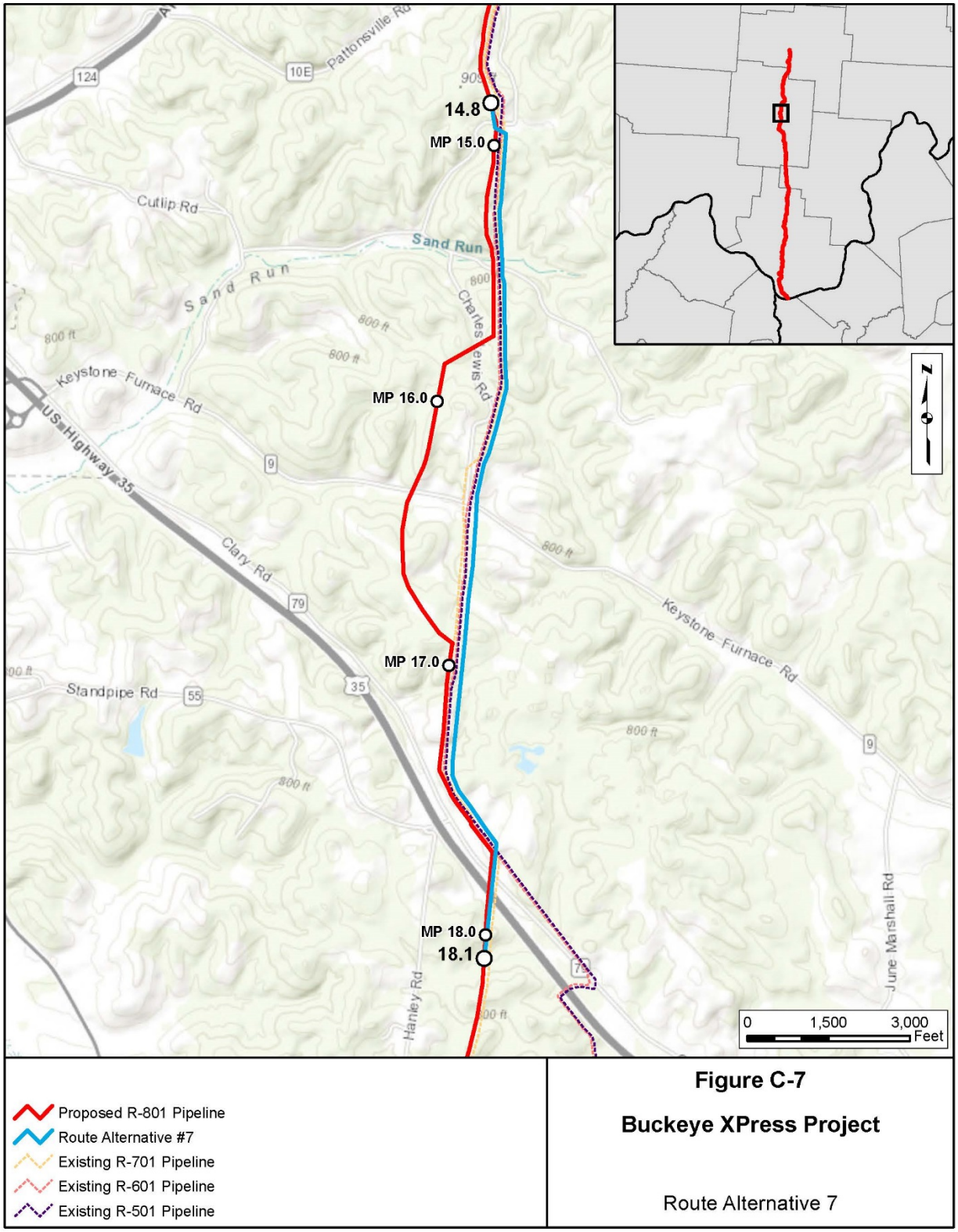


Figure C-7

Buckeye XPress Project

Route Alternative 7

TABLE C-7
Route Alternative 7 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 7
Total length	miles	3.2	3.1
Type of right-of-way			
New right-of-way	miles	1.3	0
Collocated with existing pipeline right-of-way	miles	2.0	3.1
Collocated with other existing rights-of-way	miles	0	0
Right-of-way requirements			
Construction right-of-way	acres	49.0	46.6
Permanent right-of-way	acres	19.6	18.7
Wetlands			
Scrub-shrub	acres	0	0.2
Total wetland impacts	acres	0	0.2
Waterbodies			
Intermittent/ephemeral	number	4	3
Ponds/lakes	number	0	2
Land use			
Forested	miles	2.7	2.6
	acres	41.2	39.1
Interior Forest	acres	16.2	15.1
Agricultural	miles	0.2	0.3
Residential	miles	0.3	0.2
Landowner parcels	number	26	26
Residences			
Within 50 feet of construction work area	number	3	0
Shallow bedrock	miles	3.2	3.1
Landslide potential	miles	0.1	0.1

a/ Data for the following environmental factors are not presented in this table because both values were zero: Emergent and Forested wetlands; Perennial and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Open and Wetland land use; National forests; State forest/parks and Wildlife management areas; Trails and Recreation areas; and Steep vertical slopes and Steep side slopes.

Route Alternative 8

Route Alternative 8[45] (see figure C-8) would deviate from the proposed route near MP 47.9 and would rejoin the proposed route at MP 49.0. Both the proposed route in this area and Route Alternative 8 would cross, and be entirely within, WNF lands, and as such the data presented apply fully to the WNF. This alternative was evaluated because it would be shorter than the proposed route and collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-8.

The USFS noted that the proposed R-801 route in this area would cross the Bluegrass Ridge Special Area from about MPs 47.4 to 48.5. In particular, the proposed route would affect a high value oak barren community within the Bluegrass Ridge Special Area. This area also contains rare plant species, such as juniper sedge, bigtree plum, Virginia ground cherry, Cumberland sedge, and Carolina thistle.

Route Alternative 8 would be slightly (0.1 mile) shorter than the proposed route (thereby affecting about 1 less acre during construction), would be more collocated with existing linear infrastructure by 0.7 mile, and would cross 0.1 mile less of the WNF. While both the proposed route and Route Alternative 8 would cross the Bluegrass Ridge Special Area, Route Alternative 8 would avoid the special area's most sensitive habitats and the high value oak barren community. The USFS requested that Route Alternative 8 be adopted for those reasons. Otherwise, the environmental comparison factors are largely similar or identical for both routes.

There are three existing pipelines in the area of Route Alternative 8 that Columbia notes would constrain available workspace due to steep side slopes on both sides of the existing pipelines. The construction and heavy equipment usage over the existing, active R-501 pipeline, which has known integrity issues due to age, presents a safety risk. Route Alternative 8 is upslope of the existing R-501 and R-701 pipelines in an area of a 35 percent side slope near MP A44.9. Winching of equipment and extensive cut and fill would be required on steep slopes, with the latter increasing the potential for landslides during construction and/or the post-construction period. The proposed route would not be constrained in this manner, thereby avoiding Columbia's concerns associated with Route Alternative 8.

[45] This alternative was identified as Route Alternative 12 in Columbia's application.

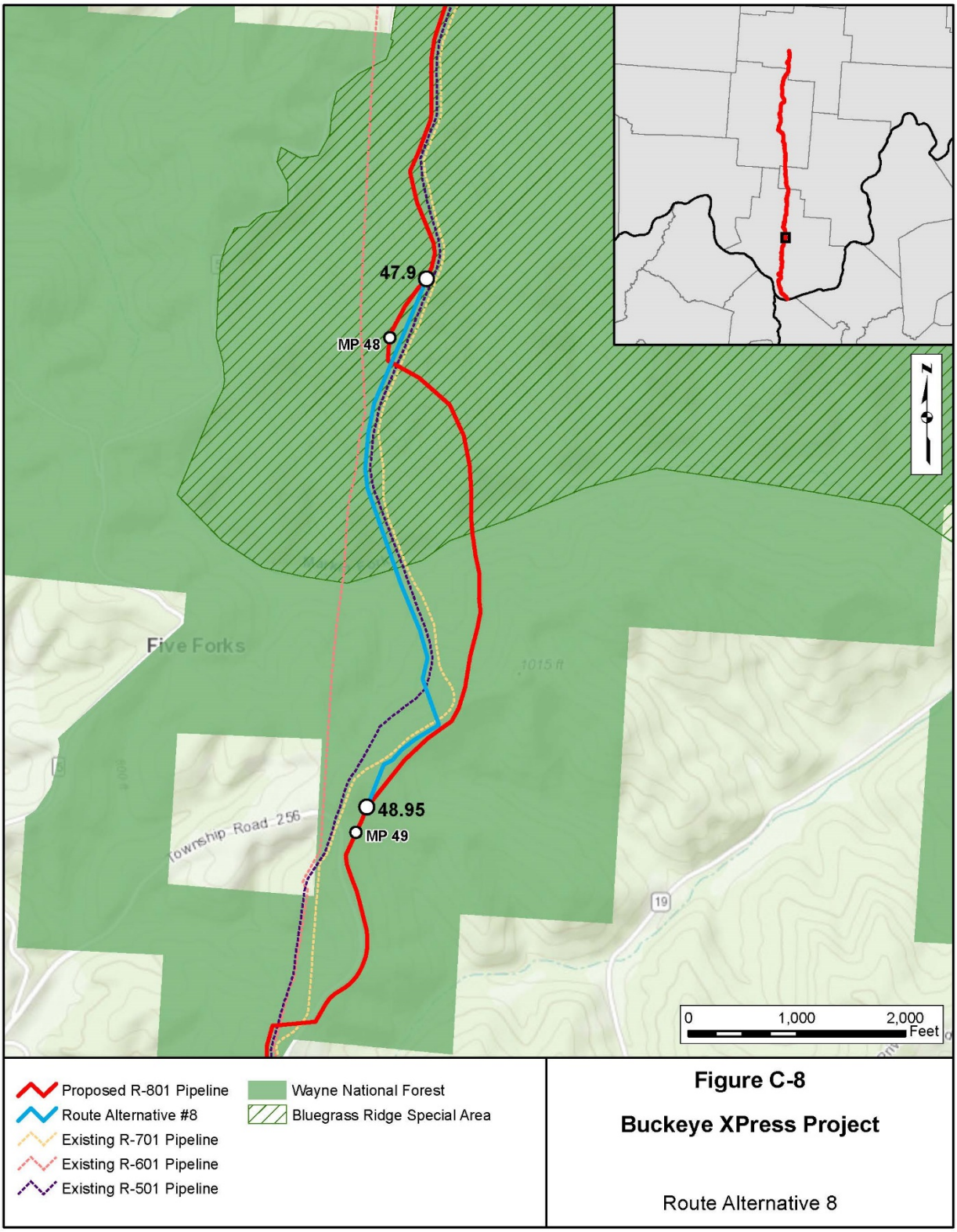


Figure C-8

Buckeye XPress Project

Route Alternative 8

TABLE C-8
Route Alternative 8 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 8
Total length	miles	1.1	1.0
Type of right-of-way			
New right-of-way	miles	0.7	0
Collocated with existing pipeline right-of-way	miles	0.3	1.0
Right-of-way requirements			
Construction right-of-way	acres	16.3	15.5
Permanent right-of-way	acres	6.5	6.2
Waterbodies			
Intermittent/ephemeral	number	1	1
Land use			
Forested	miles	1.1	1.0
	acres	16.6	15.7
Interior Forest	acres	15.9	15.0
Landowner parcels	number	2	3
Bluegrass Ridge Special Area	acres	5.3	5.7
Residences			
Federal land			
National forests	miles	1.1	1.0
Recreation			
Trails	number	3	1
Surface and Subsurface Terrain			
Steep vertical slopes	miles	0.1	0
Steep side slopes	miles	0.1	0.1
Landslide potential	miles	1.1	1.0

a/ Data for the following environmental factors are not presented in this table because both values were zero: Collocation with other existing rights-of-way; Emergent, Scrub-shrub, and Forested wetlands; Perennial, Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Agricultural, Open, Wetland, and Residential land use; Residences within 50 feet of construction work area; State forest/parks and Wildlife management areas; Recreation areas; and Shallow bedrock.

Adoption of Route Alternative 8 would increase collocation by 0.7 mile, avoid the most sensitive rare plant habitats within the Bluegrass Ridge Special Area, and would not affect any new landowners (as the owner for both the proposed route and the alternative route would be the USFS). However, Columbia has stated that Route Alternative 8 "is not a desirable alignment" and that "it represented significant constructability challenges and safety concerns." We have reviewed the alternative alignment and agree that there is a potential for engineering and/or safety issues associated with pipeline construction in this area, due to the steep slopes involved. While pipelines can be constructed in such terrain if necessary, extensive cut-and-fill on steep slopes can be very challenging, and the increased potential for landslides on steep slopes that contain other active pipelines could represent a safety issue. For these reasons, we conclude that Route Alternative 8 would not provide a significant environmental advantage and could provide constructability challenges and an increased safety risk when compared to the corresponding segment of the proposed route. Therefore, we conclude that the proposed route is the preferred alternative. However, the USFS must issue a SUP for the pipeline crossing in this area and has indicated initial support for Route Alternative 8 to minimize impacts on an oak barren community and potential impacts on several rare plant species. Therefore, in consideration of these factors and the USFS's request that the alternative be adopted, and to minimize impacts of the proposed route on an oak barren community and the Bluegrass Ridge Special Area, **we recommend that:**

- **Prior to construction within the WNF, Columbia should file a plan for review and approval by the Director of OEP, developed in coordination with and approved by the USFS, designed to avoid or minimize impacts on sensitive habitats in the Bluegrass Ridge Special Area to the extent feasible.**

If the USFS does require adoption of Route Alternative 8 to avoid these resources on federal land as a requirement of the SUP, we have completed the necessary environmental review of Route Alternative 8 above; and Columbia's adoption of this alternative under environmental recommendation 5 (see section D) would enable FERC to act expeditiously to approve this alternative.

Route Alternative 9

Route Alternative 9 (see figure C-9) would deviate from the proposed route near MP 53.8 and rejoin the proposed route at MP 54.9. Neither the proposed route in this area nor Route Alternative 9 would cross WNF lands. This alternative was evaluated because it would be shorter than the proposed route and collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-9.

Route Alternative 9 would be 0.1 mile shorter than the proposed route (thereby affecting about 1 less acre during construction) and would be more collocated with existing linear infrastructure by 0.8 mile. The alternative would also affect about 1 less acre of both forest and interior forest.

Except as noted above, the comparison parameters are generally similar or identical between the two routes. Although Route Alternative 9 would have several environmental advantages compared to the proposed route, such as 1.1 acres less impacts on forest and 1.2 acres less impacts on interior forest, these advantages are relatively minor. The alternative route would also have some minor disadvantages such as 0.1 mile more steep slopes affected. Further, this alternative would require significant cuts to side slopes that Columbia stated could cause instability and undermine the adjacent, existing R-601 pipeline. For these reasons, Route Alternative 9 would not offer a significant environmental advantage when compared to the corresponding proposed route segment nor is it practical.

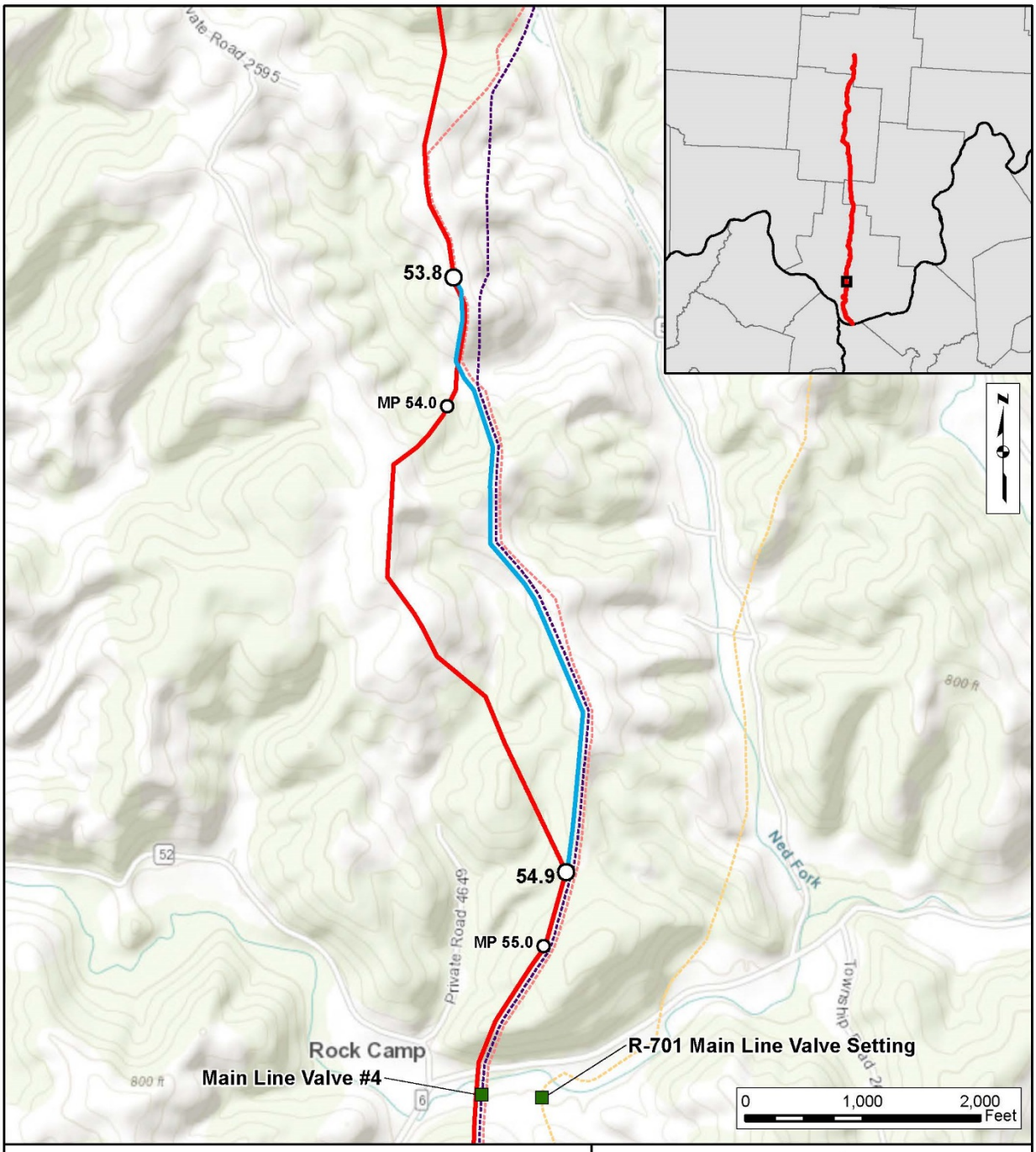


Figure C-9

Buckeye XPress Project

Route Alternative 9

TABLE C-9
Route Alternative 9 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 9
Total length	miles	1.1	1.0
Type of right-of-way			
New right-of-way	miles	0.9	0
Collocated with existing pipeline right-of-way	miles	0.2	1.0
Right-of-way requirements			
Construction right-of-way	acres	16.5	15.4
Permanent right-of-way	acres	6.6	6.2
Waterbodies			
Intermittent/ephemeral	number	3	2
Land use			
Forested	miles	0.5	0.5
	acres	8.5	7.4
Interior Forest	acres	1.6	0.4
Agricultural	miles	0.5	0.4
Open	miles	0.1	0.1
Wetland	miles	<0.1	0
Landowner parcels	number	5	6
Surface and Subsurface Terrain			
Steep side slopes	miles	0	0.1
Shallow bedrock	miles	1.0	1.0
Landslide potential	miles	1.1	1.0

a/ Data for the following environmental factors are not presented in this table because both values were zero: Collocation with other existing rights-of-way; Emergent, Scrub-shrub, and Forested wetlands; Perennial, Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Residential land use; Residences within 50 feet of construction work area; National forests; State forest/parks and Wildlife management areas; Trails and Recreation areas; and Steep vertical slopes.

Route Alternative 10

Route Alternative 10 (see figure C-10) would deviate from the proposed route near MP 62.0 and would rejoin the proposed route at MP 63.5. Neither the proposed route in this area or Route Alternative 10 would cross WNF lands. This alternative was evaluated because collocation with existing linear corridors would be increased. A comparison of environmental factors is presented in table C-10.

Route Alternative 10 would be the same length as the proposed route (thereby affecting about the same amount of land during construction) and would be more collocated with existing linear infrastructure by 0.7 mile. The alternative would also affect 2.5 less acres of forest and 3.2 acres less of interior forest. This alternative would require construction close to an existing electric transmission line, affect an unwilling landowner, and require substantial cut and fill construction along side slopes. Columbia stated that the electrical line could cause potential electrical interference issues with the proposed pipeline. We note, however, that natural gas pipelines are commonly routed adjacent to electrical transmission lines and that Route Alternative 10 would only affect 0.1 mile more of steep side slopes compared to the proposed R-801 route according to table C-10.

Route Alternative 10 would provide environmental advantages compared to the proposed route regarding upland forest and interior forest. Otherwise, the environmental comparison parameters are generally similar or identical for the two routes. While increasing collocation and reducing forest impacts are important considerations, the relatively modest magnitude of those advantages in this case does not warrant transferring of Replacement component impacts onto at least two newly affected landowners. For the reasons discussed above, Route Alternative 10 would not offer a significant environmental advantage when compared to the corresponding segment of the proposed route.

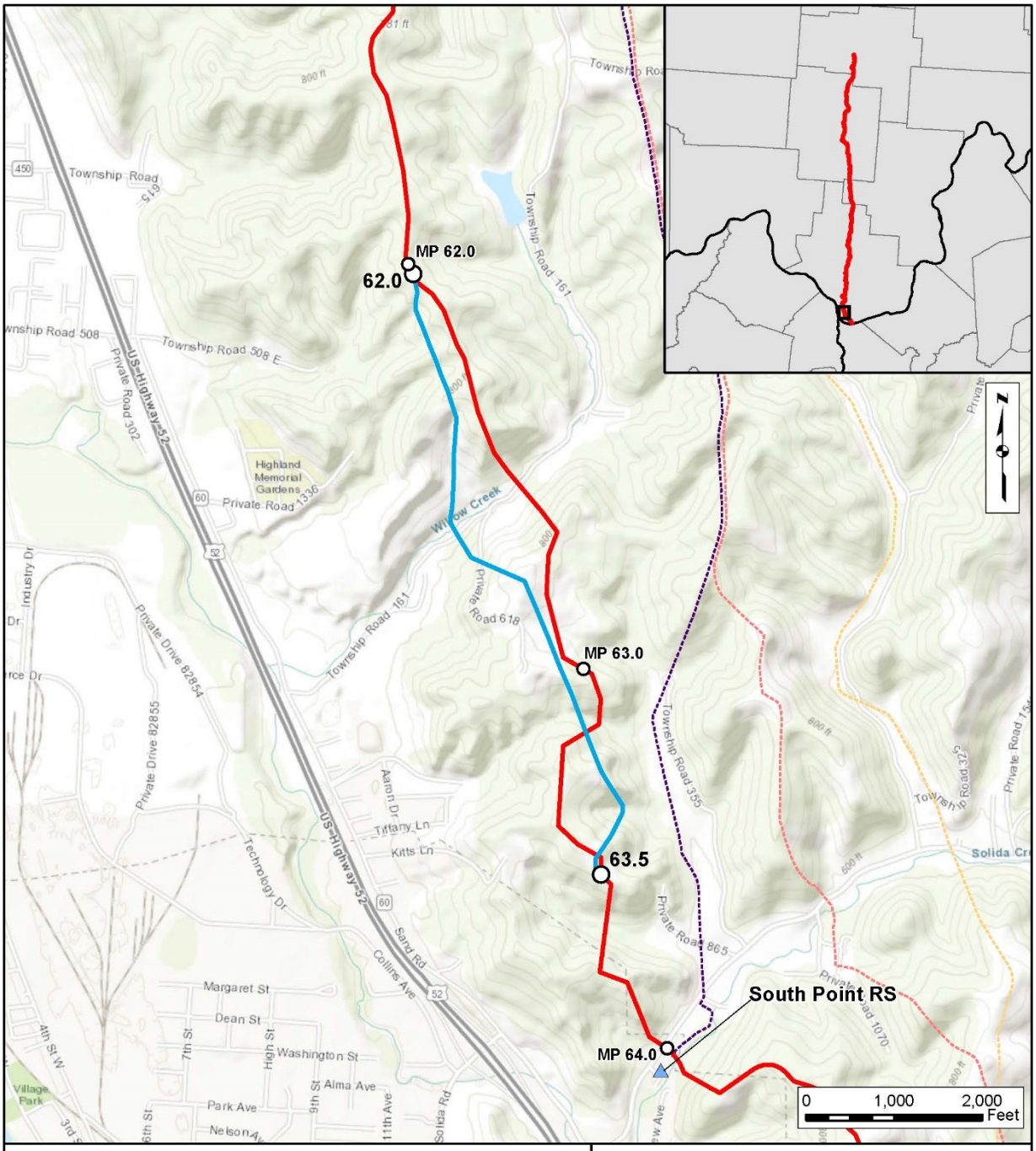

MP 62.0
62.0
MP 63.0
63.5
MP 64.0
South Point RS
Township Road 615
Township Road 508
Township Road 508 E
Township Road 161
Township Road 355
Township Road 322
US-Highway-52
Private Road 302
Private Road 1336
Private Road 618
Private Road 865
Private Road 1070
Private Drive 82854
Private Drive 82855
Highland Memorial Gardens
Willow Creek
Aaron Dr
Tiffany Ln
Kitts Ln
Technology Dr
Sand Rd
Collins Ave
Margaret St
Dean St
Washington St
Alma Ave
Park Ave
Nelson Ave
Village Park
Solida Rd
Solida Cr
0 1,000 2,000 Feet
Proposed R-801 Pipeline
Route Alternative #10
Existing R-701 Pipeline
Existing R-601 Pipeline
Existing R-501 Pipeline
Regulator Station
Figure C-10
Buckeye XPress Project
Route Alternative 10

TABLE C-10
Route Alternative 10 Comparison a/

Environmental Factor	Unit	Proposed Route	Route Alternative 10
Total length	miles	1.5	1.5
Type of right-of-way			
New right-of-way	miles	1.5	0.7
Collocated with other existing rights-of-way	miles	0	0.7
Right-of-way requirements			
Construction right-of-way	acres	23.0	22.1
Permanent right-of-way	acres	9.2	8.9
Waterbodies			
Perennial	number	1	1
Land use			
Forested	miles	1.3	1.1
	acres	19.4	16.9
Interior Forest	acres	13.2	10.0
Agricultural	miles	0.1	0.1
Open	miles	0.1	0.1
Residential	miles	0.1	0.1
Landowner parcels	number	17	16
Road Crossings	number	1	2
Residences			
Within 50 feet of construction work area	number	1	0
Surface and Subsurface Terrain			
Steep vertical slopes	miles	0.2	0.2
Steep side slopes	miles	0	0.1
Shallow bedrock	miles	1.5	1.5
Landslide potential	miles	1.5	1.5

a/ Data for the following environmental factors are not presented in this table because both values were zero: Collocation with existing pipeline right-of-way; Emergent, Scrub-shrub, and Forested wetlands; Intermittent/ephemeral, Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Wetland land use; National forests; State forest/parks and Wildlife management areas; and Trails and Recreation areas.

3.2 Route Variations and Landowner Routing Concerns

Minor route variations are relatively short deviations, less than 1 mile in length, and generally in close proximity to the proposed route. These variations are designed to avoid or further reduce impacts on specific localized resources, based on requests from potentially affected landowners, agencies, and other stakeholders.

During pre-filing and early route development, Columbia incorporated 57 route modifications into the originally considered BXP Replacement route based on topographic considerations and to avoid or minimize impacts on resources, such as roads, waterbodies, wetlands, cultural resources, homes, specifically identified landowner concerns, other pipelines, and other special sites, such as for Ohio's largest documented tree at MP 9.8. Two route variations were adopted to avoid NFS parcels of the WNF at MPs 36.5 and 37.8. Columbia adopted two additional variations in its October 2018 supplemental filing to avoid a sensitive environmental resource at MP 45.6 and due to a landowner request at MP 49.0. The route modifications adopted by Columbia are listed in appendices C-3a and C-3b.

We are aware of seven remaining private landowner routing concerns along the proposed R-801 route.[46] These concerns are listed in table C-11. We address two of the landowner routing concerns in more detail below. The other five we did not evaluate further, for the reasons given in the table.

[46] In addition, the USFS is still discussing with Columbia specific routing and buffer requirements on the WNF. See discussions in sections B.4 and B.7.

TABLE C-11
Private Landowner Routing Concerns

Tract Number	Nearest Milepost	Landowner Concern	Resolution Status
OH-JA-054-540	12.5 - 12.7	Landowner requested a reroute to avoid the future location of a planned new house and associated septic system (docket accession number 20190108-5000). Described in detail below.	Currently unresolved. Described in detail below.
OH-JA-065.000	12.8	Landowner expressed concern about the proximity of the pipeline to a proposed horse riding arena on the property.	Columbia stated that negotiations are in progress. Columbia proposes to install the pipeline via HDD between MPs 12.7 and 12.9 primarily to avoid surface impacts on State Highway 32, but thereby also avoiding impacts on the proposed horse riding arena. Additionally, the horse arena would be about 150 feet west of the pipeline route. Given these factors, we conclude that detailed evaluation of an alternative is not needed.
OH-JA-111.300	19.0	Landowner requested that the workspace be moved to the other side and that the proposed centerline be adjusted to be closer to the existing Marathon pipeline.	Columbia stated in a filing dated December 26, 2018, that negotiations are in progress and that the proposed route is acceptable to the landowner. However, a signed agreement has not yet been obtained. Columbia stated that shifting the pipeline route would affect more wetlands and a pond, and cause safety issues associated with laying “the pipe backwards.” Given these factors, we conclude that detailed evaluation of an alternative is not needed.
OH-JA-111.000	19.6	Landowner requested that the workspace be moved to the other side and that the proposed centerline be adjusted to be closer to the existing Marathon pipeline.	Columbia stated in a filing dated December 26, 2018, that a signed easement agreement had been obtained. Given these factors, we conclude that detailed evaluation of an alternative is not needed.

TABLE C-11
Private Landowner Routing Concerns

Tract Number	Nearest Milepost	Landowner Concern	Resolution Status
OH-JA-185.000; OH-JA-185.210	29.7	The landowner (OVCC) expressed concern about violation of the parcel's conservation easement and stringent deed restrictions, and disturbance of sensitive habitats. Described in detail below.	Described in detail below. We conclude that Columbia's commitments to utilize the protective dam-and-pump dry-crossing method at Black Fork Creek and Cambria Creek, reduce the size of temporary workspaces, and to accomplish revegetation in coordination with OVCC would adequately mitigate impacts at this parcel.
OH-LA-111.320.510	52.3	Landowner expressed concern about the proximity of the pipeline centerline to the garage (approximately 45 feet away) and decreased property value after the pipeline is installed.	Columbia stated in a filing dated December 26, 2018, that negotiations are in progress with the landowner's legal counsel and that the proposed route is acceptable to the landowner. Given these factors, we conclude that detailed evaluation of an alternative is not needed.
OH-LA-112.300	53.0	Landowner expressed concern about further development of the property being hindered, need for a heated shed with electrical connection to be removed, and the installation of another pipeline on the property.	Columbia stated that negotiations are in progress and that the landowner is agreeable to the proposed route and the need to build a new shed. Columbia stated that it would coordinate with the landowner regarding the requirements of the associated septic system. Given these factors, we conclude that detailed evaluation of an alternative is not needed.

Parcel OH-JA-054-540

The landowner of parcel OH-JA-054-540, who also owns parcel OH-JA-054-542, requested a reroute to avoid the future location of a planned new house and associated septic system.[47] The landowner is also concerned about land devaluation, bi-section of their property, noise and dust associated with the proposed Highway 32B HDD, and potential disruption of underground utilities and field drains. In our environmental information request dated January 10, 2019, we requested that Columbia consider and analyze options for this parcel. Columbia responded on January 15, 2019. The landowner filed additional information on February 13 and 21, 2019, reiterating the request for use of an alternative route and discussing communication issues with Columbia's land agents.

Columbia indicated that collocation with existing utilities (the R-501, R-601, and R-701 Columbia pipelines and the Marathon pipeline are all located in the nearby corridor) in this area would not be feasible due to housing development to the west of the proposed route as well as positioning for the proposed Highway 32 HDD (see figure C-11). We concur. We could not confirm that the landowner has applied for local building permits based on our communications with the Jackson County Planning Commission on January 9, 2019. We assessed the potential for broad routing options to the west of the proposed route, but concluded that the number and location of homes, the addition of more and newly affected landowners, more forest impacts, and potential issues associated with the constructability of the Highway 32 HDD rendered the options infeasible and/or less preferable environmentally. A conceptual routing option to the east avoiding the subject parcel would be about twice as long as the proposed route (an additional 0.6 mile), affect other landowners, require re-positioning of the Highway 32 HDD including increased HDD length, and likely introduce new issues associated with the HDD pullback section due to Keenan Road and Fairgreens Road.

An alternative that results in equal or minor advantages in terms of environmental impact would not compel us to shift the impacts from the current set of landowners to a new set of landowners. We did note that it may be possible to slightly adjust the route within parcel OH-JA-054-540 approximately 150 to 200 feet to the west closer to the property line, but not affecting the HDD exit point or temporary workspace needed for the HDD pullback section. Assuming such a minor route adjustment is technically feasible (an additional point of intersection would be required to approach the HDD exit point), then the bi-section of the parcel would be minimized, the route would be moved further away from the apparent house building site, and impacts associated with the HDD pullback section would be temporary. Impacts on three outbuildings or barns within the parcel and an existing 16-inch-diameter Aspire Energy pipeline could be possible with the above-mentioned route adjustment.

[47] The filings referenced in this section can be accessed via the FERC e-Library system at Accession Nos. 20190108-5000, 20190115-5254, 20190213-5000, and 20190221-5164.

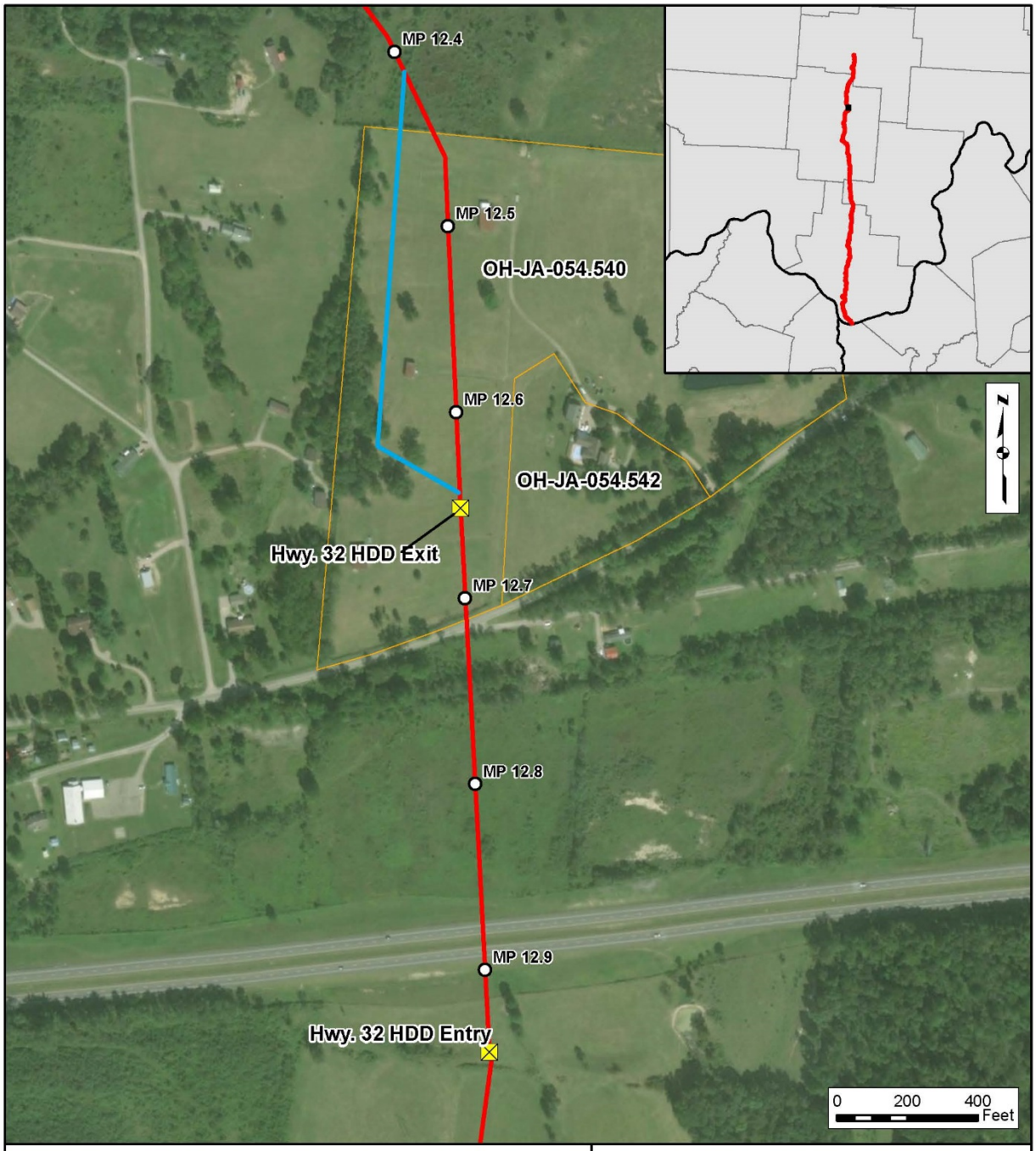


Figure C-11

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Landowner Routing Concern
Parcel OH-JA-054.540

The FERC Plan at section IV.A.1 allows for "minor field realignments and workspace shifts per landowner needs and requirements that do not affect other landowners or sensitive environmental resource areas." We encourage Columbia and the landowner to pursue consideration of this option if the Project is certificated. Property value is discussed in section B.6, and HDD noise and dust control are discussed in section B.8. Columbia would be required to repair any damaged utilities or field drains.

Parcels OH-JA-185.000 and OH-JA-185.210

The OVCC, which is the landowner of parcels OH-JA-185.000 and OH-JA-185.210, expressed concern about violation of the parcel's conservation easement and stringent deed restrictions, and disturbance of sensitive habitats including Category 3 forested wetlands, uplands that may contain rare plants, and aquatic habitats for mussels.[48] The OVCC's specific requests include: restrict temporary workspaces in forest and wetlands; maintain a buffer at waterbodies and wetlands; minimize impacts on Black Fork Creek and Cambria Creek, including analyses of trenchless techniques; and perform plantings of disturbed areas with Ohio-native species.

The OEPA also filed supporting letters noting that the parcels are subject to an OEPA Environmental Covenant, that the Replacement component would be outside of the existing pipeline easement, and that the OVCC used OEPA grant funds to purchase the property. The OEPA stated that the purpose of the covenant was "to protect the aquatic ecosystem resources." As discussed below, the OEPA is coordinating with the OVCC and Columbia regarding the potential for HDD, minimizing workspaces at wetlands and riparian zones, and post-construction plantings of trees and shrubs.

We requested that Columbia consider and analyze options for these parcels in our environmental information request dated January 10, 2019. Columbia responded on January 15, 2019, stating that negotiations are in progress and that the proposed route would be collocated with existing R-System pipelines across these parcels. We conclude that a reroute would still affect Black Fork Creek and/or Cambria Creek given their west to east orientations. The reroute would also affect wetlands, although at a different location, with different landowners, and likely not collocated as with the proposed route. An alternative that results in equal or minor advantages in terms of environmental impact would not compel us to shift the impacts from the current set of landowners to a new set of landowners. We note that our Procedures require that the construction right-of-way be reduced to 75 feet wide in wetlands; and Columbia is coordinating with the ODNR and the COE regarding impacts on and mitigation for Category 3 wetlands. Our Procedures also require limiting of right-of-way maintenance to allow a riparian strip 25 feet wide to revegetate (except that mowing may be conducted in a 10-foot-wide swath over the centerline). Columbia proposed to use the dam-and-pump dry-crossing method (more

[48] The filings referenced in this section can be accessed via the FERC e-Library system at Accession Nos. 20181210-0027, 20181226-5012, 20190115-5254, 20190325-5009, and 20190410-5105.

protective than the wet, open-cut method widely proposed by Columbia) at Black Fork Creek and Cambria Creek (including mussel removal and relocation). Finally, the FERC Plan requires Columbia to use seed mixes in accordance with written recommendations provided by landowners.

In response to our environmental information request, Columbia stated that there were risks and potential impacts associated with trenchless HDD (e.g., IR of drilling mud and noise affecting nearby residents) and conventional bore techniques (e.g., bore pit dewatering, streambed collapse, unintentional draining of the waterbody or wetland). Columbia filed additional information for the OVCC parcels on April 10, 2019, regarding HDD feasibility (including for two shorter HDDs or one longer HDD), reductions in workspaces, and post-construction restoration. The HDD feasibility assessment results indicated elevated risks for IRs for both scenarios and effects associated with the pullback section for the longer HDD requiring temporary closure of Gallia Blackforth Road (or completing the pullback in two sections, increasing the risk for the pipe to get stuck).

However, Columbia committed to removing and/or reducing temporary workspaces to minimize impacts on wetlands and riparian areas at six locations within the parcels. Further, Columbia committed to preparing a post-construction restoration plan, to be developed in coordination with the OVCC and OEPA, regarding planting of suitable vegetation within the R-801 temporary workspaces or alternately providing funding directly to OVCC so that revegetation efforts could proceed at OVCC's direction. Because much of the subject parcels that would be crossed by the proposed route is uplands and in pasture (see figure C-12), the route would be fully collocated with an existing pipeline, Columbia proposes to utilize the more protective dam-and-pump dry-crossing method at Black Fork Creek and Cambria Creek, and Columbia has committed to reducing temporary workspaces and to accomplishing revegetation in coordination with the OVCC, we conclude that Columbia's proposed methods are acceptable.

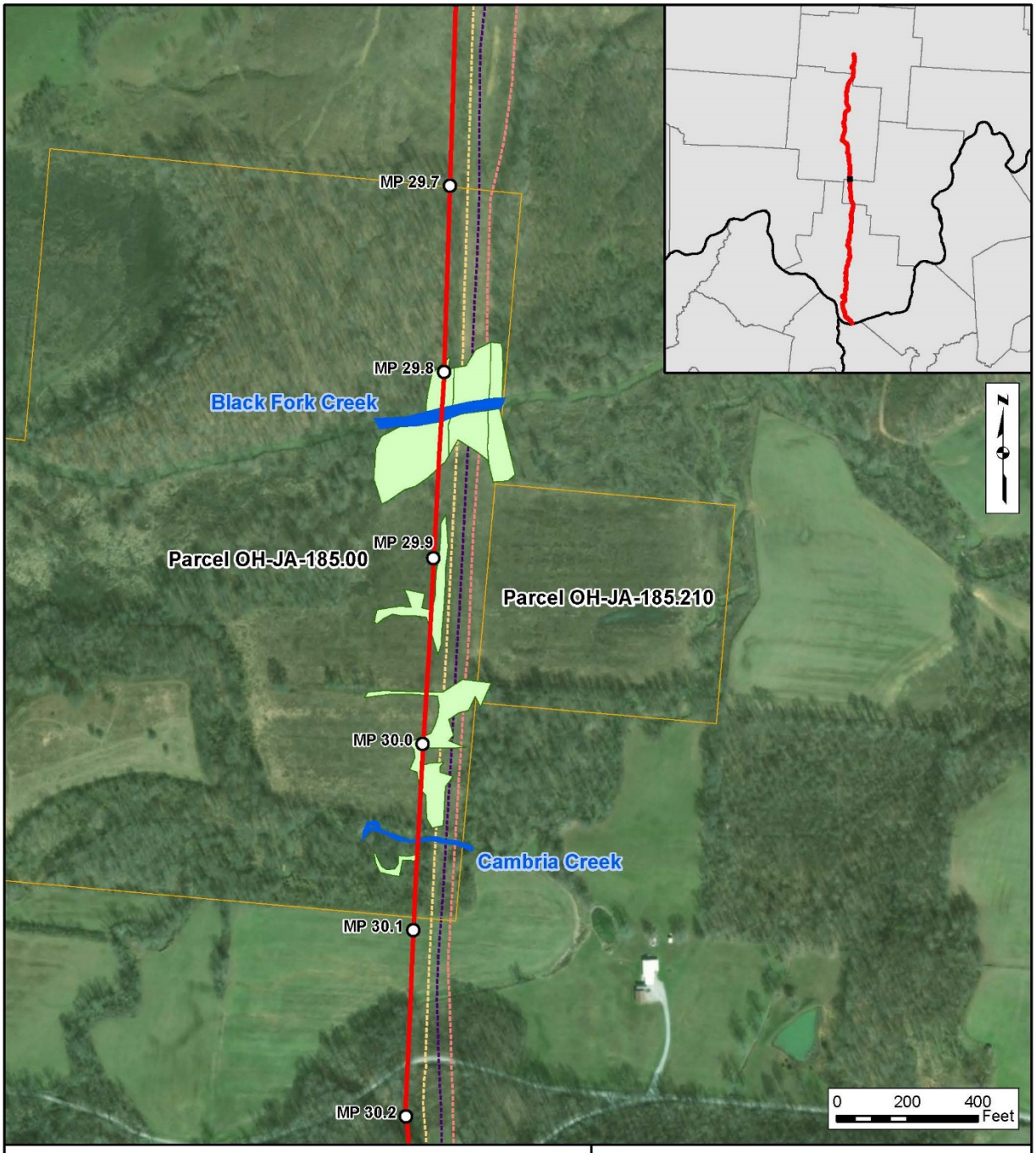

Figure C-12

Buckeye XPress Project

Landowner Routing Concern - OVCC
Parcels OH-JA-185.00 & OH-JA-185.210

4. Abandonment By Removal Alternatives

At the request of the USFS, we evaluated abandonment by removal alternatives for the existing R-501 pipeline that would expand the scope of pipeline removal activity beyond that as proposed by Columbia. Columbia has proposed limited removal activities as described in section A.7, including removal of certain MLVs, crossover pipes, aboveground facilities, and sections of exposed pipeline. However, a majority of the pipeline is proposed to be abandoned in place.

The effects upon the environment are typically much less for abandonment in-place for a pipeline compared to abandonment by removal, and most companies opt for in-place abandonment, based on the experience of the FERC staff. Removal of the approximately 62 miles of pipeline or other major segments of pipeline would entail a major construction effort with activities similar to full pipeline construction as described in section A: access road construction, vegetation clearing, earth disturbance and travel lane development, installation of erosion control devices, wetland and waterbody disturbance, followed by digging, cutting, removing, and hauling away of the pipe segments. The trench would then be backfilled, and the area restored and revegetated.

Disturbance associated with Columbia's proposed abandonment (i.e., majority in-place) would occur only in limited fashion to address site-specific issues as noted above. Columbia stated that it would address any future pipeline exposures that could be caused by erosion, changes in waterbody channel, or unauthorized activity, such as off-road vehicle use, as needed after being prioritized relative to safety considerations. The lift and lay alternative was discussed above.

We evaluated two additional R-501 pipeline abandonment by removal alternatives in more detail based on USFS input, including removing the entire 10.2-mile-long portion of the pipeline crossing the WNF (WNF Removal Alternative 1) and removal of those portions of the pipeline within the WNF where the R-501 is not collocated with other Columbia-owned existing pipelines (WNF Removal Alternative 2).

The USFS believes there could be benefits to removing these segments of pipeline, and requested an analysis of this option compared to Columbia's largely proposed abandonment in-place. While we conclude that removal of the proposed pipeline would result in greater environmental impacts, the USFS' input regarding potential impacts for both scenarios is summarized below.

The USFS identified potential impacts on geology and soils associated with increased (relative to the proposed action) pipeline removal alternatives that would be similar in nature to the impacts described above in section B.1 for pipeline installation, including increased risk of landslides, rutting, soil compaction, and water flowing down exposed trench following rainfall potentially causing flooding. The scale of such impacts would depend upon the degree of the selected pipeline removal effort. The USFS stated

that abandonment in place would "have limited disturbance on the soils at the work areas." However, the USFS also noted that with abandonment in-place, pipeline corrosion and collapse over time could alter the ground surface and surface or subsurface water flow patterns.

The USFS stated that abandonment by removal at four perennial waterbodies (Dirtyface Creek, unnamed tributary to Bakers Fork Buffalo Creek, unnamed tributary to Johns Creek, and Markin Fork) and three intermittent waterbodies (unnamed tributaries to Dirtyface Creek) "would be desirable" instead of abandonment in-place as proposed by Columbia. While acknowledging that it could be "challenging to remove the R-501 pipeline in several of these locations" due to its location between other existing pipelines, as well as impacts such as sedimentation and turbidity associated with pipeline removal similar to construction of the R-801 pipeline, the USFS stated that removal in the locations identified above would eliminate the risk of future pipe exposure and/or pipe collapse and possible resulting diversion of stream flow. The USFS noted that "the environmental benefits to waterways would be the assurance of the overall streambed integrity from removing the risk of a future pipe exposure due to the dynamic forces of streams (i.e., meandering and down cutting)." Impacts on individual waterbodies and wetlands for pipeline removal, as well as impact avoidance, minimization, and mitigation measures, would be generally similar in nature to construction of the R-801 pipeline as described in section B.2.

The USFS acknowledges that there would be environmental impacts on vegetation, wildlife, fisheries, and WNF RFSS habitat and individuals associated with pipeline removal. However, these impacts would be similar to those disclosed in sections B.3 and B.4 related to the construction of the R-801 pipeline. Removal of the pipeline would entail essentially the same activities as new pipeline construction. Vegetation would be re-established after pipeline removal. Heavy equipment usage could result in the spread of invasive species, but Columbia would implement its *Invasive Species Management Plan* and WNF-specific *NNIS Treatment Plan* as described in section B.3. The AMMs described in section B.4 would also minimize impacts on RFSS. As with the installation of the R-801 pipeline, the potential environmental impacts on vegetation, wildlife, fisheries, and RFSS could be mitigated through the use of the same measures as those described in this EA and as identified in the final COM Plan.

Regarding land use and visual resources, the USFS stated that potential removal of the pipeline would affect the Vesuvius Main Loop Horse Trail discussed in section B.5 and that "the trail may need to be temporarily closed or rerouted during the pipeline removal project, which would affect horse trail riders and the Elkins Creek Horse Camp" and "the section of removed pipeline may cause settling of soil or a depression where the trail crosses, which may present a hazard for horses and riders using the trail." The USFS also stated that abandoning the pipeline in-place could result in pipeline deterioration, settling, hazards, and potential temporary re-routing of the trail. Visual impacts from potential

removal "would be minimal and short-term, lasting one to two growing seasons" and "long-term effects to visuals would be minimal and similar to the existing R-601 and R-701 pipelines," according to the USFS.

Implementation of the removal alternatives could cause additional impacts related to cultural resources (however, we note that these same locations were likely disturbed during installation of the pipeline) and temporary increases of air emissions and noise levels, and could increase the cumulative impacts described in section B.10, but these impacts would be minimized, given the impact avoidance, minimization, and mitigation measures described in this EA and in the final COM Plan.

4.1 Wayne National Forest Removal Alternative 1

Our evaluation in this section is limited to a comparison of the Abandonment component options, but we recognize that there would be additional overall Project impacts associated with the proposed R-801 pipeline that comprises the BXP Replacement. The abandonment by removal process for WNF Removal Alternative 1 would be generally as described above in section A for the Abandonment component and would occur within an estimated 75-foot-wide construction right-of-way. The R-501 pipeline to be abandoned as proposed by Columbia would mostly (except for about 3.4 miles) be either collocated (i.e., would directly abut) with or closely parallel (less than 300 feet of separation) other existing Columbia pipelines (R-601 and/or R-701) within the WNF.

A comparison of the environmental effects of the proposed Abandonment component within the WNF (generally proposed abandonment in-place, with some site-specific removal activity) and the WNF Removal Alternative 1 is provided in table C-12.

TABLE C-12
Wayne National Forest Removal Alternative 1 a/

Environmental Factor	Unit	Proposed Abandonment In-Place b/	Removal Alternative 1
Total work area length, including areas only potentially affected by access c/	miles	2.4	10.2
Actual pipe removal segment length	feet	710	53,856
Actual pipe removal segment length	miles	0.1	10.2
Right-of-way requirements c/			
Construction right-of-way	acres	15.6	93.5
Permanent right-of-way	acres	0.3	0.3
Wetlands			
Total wetland impacts (PEM)	acres	<0.1	0.1
Waterbodies			
Perennial	number	0	1

TABLE C-12
Wayne National Forest Removal Alternative 1 a/

Environmental Factor	Unit	Proposed Abandonment In-Place b/	Removal Alternative 1
Intermittent/ephemeral	number	1	8
Land use			
Construction right-of-way			
Forested	miles	2.0	8.9
	acres	13.0	82.5
Interior Forest	acres	7.3	55.8
Agricultural	acres	0.4	2.4
Open	acres	1.6	6.3
Wetland	acres	0.0	0.3
Residential	acres	0.6	2.1
Recreation			
Trails	number	1	1
Surface and Subsurface Terrain			
Steep vertical slopes **d/**	miles	0.2	0.6
Steep side slopes **e/**	miles	0.1	0.3
Shallow bedrock	miles	0.2	1.5
Landslide potential **f/**	miles	1.9	7.3

a/ Data for the following environmental factors are not presented in this table because both values were zero: Scrub-shrub and Forested wetlands; Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Residences within 50 feet of construction work area; State forest/parks and Wildlife management areas; Recreation areas; and Roads impacted by construction.

b/ Data provided for the proposed abandonment in-place are based on the same publically available electronic mapping data used to analyze the removal alternative.

c/ Proposed abandonment in-place based on detailed design for activities on WNF lands only. Removal Alternative 1 based on preliminary desktop design for activities on WNF lands only. Permanent right-of-way impacts are associated with the existing Markin Fork VS.

d/ Slopes crossed by the centerline that are greater than 30 percent.

e/ Slopes greater than 30 percent.

f/ Information provided represents areas that may be most susceptible to slope failure based on the presence of steep slopes (greater than 30 percent) and the presence of red bed-containing Conemaugh Group bedrock units.

Abandonment in-place on WNF lands would affect 7.8 miles less of pipeline corridor, 10.1 miles less of ground disturbance, 77.9 less acres during construction, 7 fewer intermittent/ephemeral waterbodies, 69.5 fewer acres of forest, 48.5 fewer acres of interior forest, 1.5 acres less of residential land, 1.3 miles less of shallow bedrock, and 5.4 miles

less of areas with elevated landslide potential. None of the evaluated environmental parameters evaluated in table C-12 would favor the WNF Removal Alternative 1; however, the USFS stated that there were certain advantages for pipeline removal as indicated above.

We note that due to the prevalence of areas with elevated landslide potential, the risk for construction-induced slips would be increased with the WNF Removal Alternative 1. Additionally, if construction of the R-801 pipeline is completed and the pipeline placed into service prior to abandonment, as proposed, abandonment by removal would be immediately adjacent to active natural gas pipelines (existing R-601 and/or R-701, and the new R-801). Further, the removal work would be done in constrained workspaces (reduced by approximately 25 feet to a width of 50 feet in areas where removal activities would occur between two existing Columbia pipelines or between an existing Columbia pipeline and the newly constructed R-801 pipeline), posing a potentially increased safety hazard compared to the limited scope and length of the proposed action (which is typically on the outside of the existing right-of-way).

Columbia stated that abandonment by removal could not be completed concurrently with installation of the proposed R-801 pipeline due to workspace constraints and safety considerations. If abandonment by removal and installation of the R-801 pipeline were conducted concurrently, the existing, active pipeline would have to be taken out of service to address the workspace and safety issues. The WNF Removal Alternative 1 would also entail increased construction traffic within the WNF and for adjacent residents for several months beyond the two months as estimated for the proposed Abandonment component. It would also require the addition of more access roads. Based on the above, we conclude that WNF Removal Alternative 1 would not offer a significant environmental advantage when compared to the proposed action, but could be implemented with the abovementioned safety precautions, should the USFS require its adoption.

4.2 Wayne National Forest Removal Alternative 2

The basic process for abandonment by removal for the WNF Removal Alternative 2 would be generally as described above for the Abandonment component, except that the actual pipeline removal would be limited to the segment of the R-501 pipeline that is not collocated with existing Columbia pipelines nor would it be collocated with the proposed R-801 pipeline. A comparison of the environmental effects of the proposed Abandonment component within the WNF (generally proposed abandonment in-place, with 0.1 mile of abandonment by removal) and the WNF Removal Alternative 2 is provided in table C-13.

TABLE C-13
Wayne National Forest Removal Alternative 2 a/

Environmental Factor	Unit	Proposed Abandonment In-Place b/	Removal Alternative 2
Total work area length, including areas only potentially affected by access c/	miles	2.4	5.2
Actual pipe removal length	feet	710	10,935
Actual pipe removal length	miles	0.1	2.1
Right-of-way requirements c/			
Construction right-of-way	acres	15.6	55.0
Permanent right-of-way	acres	0.3	0.3
Wetlands			
Total wetland impacts (PEM)	acres	<0.1	0.1
Waterbodies			
Perennial	number	0	0
Intermittent/ephemeral	number	1	3
Land use			
Construction right-of-way			
Forested	miles	2.0	4.5
	acres	13.0	39.2
Interior Forest	acres	7.3	22.2
Agricultural	acres	0.4	5.8
Open	acres	1.6	6.4
Wetland	acres	0.0	0.2
Residential	acres	0.6	3.4

TABLE C-13
Wayne National Forest Removal Alternative 2 a/

Environmental Factor	Unit	Proposed Abandonment In-Place b/	Removal Alternative 2
Recreation			
Trails	number	1	1
Surface and Subsurface Terrain			
Steep vertical slopes **d/**	miles	0.2	0.3
Steep side slopes **e/**	miles	0.1	0.2
Shallow bedrock	miles	0.2	0.9
Landslide potential **f/**	miles	1.9	4.3

a/ Data for the following environmental factors are not presented in this table because both values were zero: Scrub-shrub and Forested wetlands; Ponds/lakes, and Major waterbodies (greater than 100 feet wide); Designated Critical Habitat for federally listed endangered or threatened species; National Historic Landmarks and NRHP-listed properties; Residences within 50 feet of construction work area; State forest/parks and Wildlife management areas; Recreation areas; and Roads impacted by construction.

b/ Data provided for the proposed in-place abandonment are based on the same publically available electronic mapping data used to analyze the removal alternative.

c/ Proposed in-place abandonment based on detailed design for activities on WNF lands only. Removal Alternative 2 based on preliminary desktop design for activities on WNF lands only. Permanent right-of-way impacts are associated with the existing Markin Fork VS.

d/ Slopes crossed by the centerline that are greater than 30 percent.

e/ Slopes greater than 30 percent.

f/ Information provided represents areas that may be most susceptible to slope failure based on the presence of steep slopes (greater than 30 percent) and the presence of red bed-containing Conemaugh Group bedrock units.

Abandonment in-place on WNF lands for WNF Removal Alternative 2 would affect 2.8 miles less of pipeline corridor, 2.0 miles less of direct removal activities, 39.4 fewer acres during construction, 2 fewer intermittent/ephemeral waterbodies, 26.2 fewer acres of forest, 14.9 fewer acres of interior forest, 2.8 acres less of residential land, 0.7 mile less of shallow bedrock, and 2.4 miles less of areas with elevated landslide potential. None of the evaluated environmental parameters in table C-13 would favor the WNF Removal Alternative 2; however, the USFS stated that there were certain advantages for pipeline removal as indicated above.

We note that due to the prevalence of areas with elevated landslide potential, the risk for construction-induced slips would be increased with the WNF Removal Alternative 2. The WNF Removal Alternative 2 would also entail increased construction traffic within the WNF and for adjacent, private residents, and would require the addition of more access roads (such as near MPs A34.4, A36.0, A36.3, and A43.0). We conclude that WNF Removal Alternative 2 would not offer a significant environmental advantage when

compared to the proposed action, but should the USFS require its adoption, we find that WNF Removal Alternative 2 would be acceptable. We acknowledge that the USFS will continue to coordinate with Columbia regarding WNF Removal Alternative 2 and/or potential removal of specific sections of pipe at discrete locations, which could be subject to additional permitting requirements.

4.3 Conclusion for the WNF Removal Alternatives

Given the scope of these activities on WNF lands and the associated effects upon the environment, which would occur only in limited fashion with the proposed abandonment in-place to address site-specific issues, we do not consider WNF Removal Alternative 1 or WNF Removal Alternative 2 to provide a significant environmental advantage. However, we acknowledge that the USFS has identified certain advantages for pipeline removal, as indicated above. Should the USFS require adoption of either removal alternative, we find that action to be acceptable.

5. Alternatives Conclusion

We reviewed alternatives to Columbia's proposal based on our independent analysis and comments received. Although many of the route alternatives appear to be technically feasible, no system alternatives provide a significant environmental advantage over the proposed Replacement component. We recommended that Columbia provide a plan documenting impact avoidance or minimization measures for the Bluegrass Ridge Special Area. We also conclude that increased abandonment by removal scenarios offer no significant environmental advantage, but we acknowledge that the USFS stated that there were certain advantages for pipeline removal as indicated above. Should the USFS require adoption of either removal alternative, we find that action to be acceptable. Based on these findings, we conclude that the proposed Project, as modified by our recommended mitigation measures and USFS requirements, is the preferred alternative and can meet the Project objectives.

D. STAFF CONCLUSIONS AND RECOMMENDATIONS

Based on the above environmental analysis, the staff has determined that approval of the Project would not constitute a major federal action significantly affecting the quality of the human environment. The staff recommends that the Commission Order contain a finding of no significant impact and include the mitigation measures listed below as conditions to the authorization the Commission may issue to Columbia.

1. Columbia shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EA, unless modified by the Order. Columbia **must**:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;

    b. justify each modification relative to site-specific conditions;

    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

    d. receive approval in writing from the Director of OEP **before using that modification**.

2. The Director of OEP, or the Director's designee, has delegated authority to address any requests for approvals or authorizations necessary to carry out the conditions of the Order, and take whatever steps are necessary to ensure the protection of environmental resources during construction and operation of the Project and activities associated with abandonment. This authority shall allow:

    a. the modification of conditions of the Order;

    b. stop-work authority; and

    c. the imposition of any additional measures deemed necessary to ensure continued compliance with the intent of the conditions of the Order as well as the avoidance or mitigation of unforeseen adverse environmental impact resulting from Project construction, operation, and abandonment activities.

3. **Prior to any construction**, Columbia shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EA, as supplemented

by filed alignment sheets, and shall include the R-801 Line right-of-way modification identified in condition number 13 condition. **As soon as they are available, and before the start of construction**, Columbia 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's exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Columbia's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas pipeline/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 shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by the FERC Plan and/or minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

   Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;

   b. implementation of endangered, threatened, or special concern species mitigation measures;

   c. recommendations by state regulatory authorities; and

d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the Certificate and before construction or abandonment by removal begins**, Columbia shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. Columbia must file revisions to the plan **as schedules change**. The plan shall identify:

   a. how Columbia will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EA, and required by the Order;

   b. how Columbia 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 Columbia will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);

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

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

   h. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:

      i. the completion of all required surveys and reports;
      ii. the environmental compliance training of onsite personnel;
      iii. the start of construction; and
      iv. the start and completion of restoration.

7. Columbia shall employ at least one EI per construction spread. The EI(s) shall be:

a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;

b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;

c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;

d. a full-time position, separate from all other activity inspectors;

e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and

f. responsible for maintaining status reports.

8. Beginning with the filing of its Implementation Plan, Columbia shall file updated status reports with the Secretary on a **weekly** basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on Columbia's 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 EI(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);

d. a description of the corrective actions implemented in response to all instances of noncompliance;

e. the effectiveness of all corrective actions implemented;

f. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and

g. copies of any correspondence received by Columbia from other

federal, state, or local permitting agencies concerning instances of noncompliance, and Columbia's response.

9. Columbia must receive written authorization from the Director of OEP **before commencing construction of any Project facilities or abandonment by removal.** To obtain such authorization, Columbia must file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

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

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

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

    b. identifying which of the conditions in the Order Columbia 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 any abandonment by removal activities**, Columbia shall file the following information with the Secretary for review and written approval by the Director of OEP:

    a. identification of any equipment or facilities to be abandoned or disturbed that may be contaminated with polychlorinated biphenyls (PCBs) or asbestos-containing materials (ACMs);

    b. verification that the appropriate PCB/ACM testing will be conducted on this equipment/facility, and discussion of how any abandoned PCB/ACM-contaminated material will be properly disposed of; and

    c. worker safety protocols for handling PCB/ACM-contaminated materials.

13. Columbia shall restrict the new permanent pipeline right-of-way width for the R-801 Line to 25 feet for those portions of the new easement that will be immediately adjacent to its existing operational right-of-way (*section A*).

14. **Prior to construction**, Columbia shall file with the Secretary, for review and written approval by the Director of the OEP, an *Abandoned Mine Investigation and Mitigation Plan*. This plan shall include the final results of Columbia's geohazard investigations pertinent to mine hazards, the results of secondary investigations to further characterize potential mine-related features (addressing the recommendations of Columbia's geotechnical contractor), and site-specific mitigation and monitoring measures Columbia will implement when crossing abandoned mine lands, including measures to manage and dispose of contaminated groundwater. (*section B.1*)

15. **Prior to construction**, Columbia shall file with the Secretary, for review and written approval by the Director of the OEP, an *Acid Mine Drainage Mitigation Plan*. (*section B.1*)

16. **Prior to construction**, Columbia shall file with the Secretary, for review and written approval by the Director of the OEP, its final geohazard report. The geohazard report shall include the results of Columbia's site-specific identification of the slopes that will require blasting, quantification of the potential for blasting-induced slope instability or movement for each slope, developed measures to mitigate and monitor the sites post-construction, and include descriptions of and distances to nearby and downslope environmental and human receptors from potential blast-induced landslides or debris flows. (*section B.1*)

17. **Prior to construction of the Highway 32 and Wetland 545B HDDs**, Columbia shall file with the Secretary for review and written approval by the Director of OEP, settlement monitoring, minimization, and mitigation plans developed in coordination with the owners of overlying infrastructure. (*section B.1*)

18. **Prior to construction of the Wetland 558B and Wetland 545B HDDs**, Columbia shall complete and file with the Secretary additional geotechnical and/or geophysical investigations along the proposed HDD alignment to better define the topography of the bedrock surface. If the results of these investigations lead to changes in the drill path or HDD entry/exit locations, Columbia shall file with the Secretary, for review and written approval by the Director of OEP, the modifications to the Wetland 558B and Wetland 545B HDDs. (*section B.1*)

19. **Prior to construction**, Columbia shall file with the Secretary, for review and written approval by the Director of OEP, a *Site Mitigation Plan* for the proposed use of the South Point Plant location as contractor yards. The Plan shall include measures designed to protect the ongoing groundwater contamination remediation efforts, and Columbia shall document that it has

developed the Plan in consultation with the EPA. (*section B.2*)

20. Columbia shall **not begin** construction of the Project **until**:

    a. the FERC staff completes any necessary ESA Section 7 consultation with the FWS; and

    b. Columbia has received written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin. (*section B.4*)

21. **Prior to construction,** Columbia shall file with the Secretary, for review and written approval by the Director of OEP, a plan developed in coordination with the USFS, designed to avoid, minimize, and/or mitigate impacts on occupied timber rattlesnake habitat within the WNF. (*section B.4*)

22. Columbia shall **not begin** construction of the proposed Project at designated Project-specific locations until:

    a. Columbia completes the Kirtland's snake (at CY-001-B, CY-004-B, MP 38.7, and MP 43.2) and eastern spadefoot (at CY-004-B) biological surveys and reports;

    b. Columbia has finalized its plan, developed in consultation with the ODNR, WNF, and USFS (where applicable), regarding its planned approach for protecting state-listed species; and

    c. Columbia has received written notification from the Director of OEP that construction and/or use of mitigation (including implementation of conservation measures) may begin. (*section B.4*)

23. **Prior to construction**, Columbia shall file with the Secretary evidence of landowner concurrence with the site-specific residential construction plans for parcels OH-JA-090.320 and OH-LA-131.000 where construction work areas will be within 10 feet of a residence. (*section B.5*)

24. **Prior to construction**, Columbia shall file the *Heavy Haul Route Study* with the Secretary for review and written approval by the Director of OEP. (*section B.6*)

25. **Prior to construction**, Columbia shall file with the Secretary, for review and written approval by the Director of OEP, an addendum to the *Cemeteries Avoidance Plan* indicating how the boundaries of small or family cemeteries with missing headstones will be defined. Additionally, the Plan shall address cemetery buffer sizes developed in coordination with the USFS regarding cemeteries within the WNF. Columbia shall also provide the Ohio SHPO and USFS comments on the addendum. (*section B.7*)

26. **As part of the Implementation Plan**, Columbia shall provide a revised UDP that includes notification of the proper WNF staff in the event of unanticipated finds on WNF lands. (*section B.7*)

27. Columbia shall **not begin construction** of facilities and/or use of staging, storage, or temporary work areas and new or to-be-improved access roads **until:**

    a. Columbia files with the Secretary:

        i. remaining cultural resources survey reports;
        ii. site evaluation reports, avoidance plans, or treatment plans, as required; and
        iii. comments on the reports and plans from the Ohio SHPO and USFS, as applicable.

    b. the Advisory Council on Historic Preservation has been given an opportunity to comment if historic properties would be adversely affected; and

    c. the FERC staff reviews and the Director of OEP approves all cultural resources reports and plans and notifies Columbia in writing that either treatment measures (including archaeological data recovery) may be implemented or construction may proceed.

    All materials filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "**CUI//PRIV – DO NOT RELEASE.**" (*section B.7*)

28. Columbia shall use mobile blowdown silencers at the McArthur RS, Symmes VS and the Neds Fork VS during the proposed abandonment activities to reduce noise levels to less than 70 dBA L_{dn}. (*section B.8*)

29. **Prior to construction within the WNF,** Columbia shall file a plan for review and approval by the Director of OEP, developed in coordination with and approved by the USFS, designed to avoid or minimize impacts on sensitive habitats in the Bluegrass Ridge Special Area to the extent feasible. (*section C*)

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