Federal Energy Regulatory Commission
Office of Energy Projects

August 2014

Columbia Gas Transmission, LLC **Docket No. CP14-17-000**

East Side Expansion Project

Environmental Assessment

Cooperating Agency

US Army Corps of Engineers

Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 1
Columbia Gas Transmission, LLC
East Side Expansion Project
Docket No. CP14-17-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared an environmental assessment (EA) for the East Side Expansion Project, proposed by Columbia Gas Transmission, LLC (Columbia) in the above-referenced docket. Columbia requests authorization to install a total of about 19.1 miles of 20- and 26-inch-diameter pipeline loop[1], and to modify and upgrade several aboveground facilities in Pennsylvania, New Jersey, New York, and Maryland in order to provide 312,000 dekatherms per day of firm natural gas transportation service to growing mid-Atlantic markets.

The EA assesses the potential environmental effects of the construction and operation of the East Side Expansion 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 United States Army Corps of Engineers participated as a cooperating agency 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 proposed East Side Expansion Project includes the following:

- construction of about 9.6 miles of 20-inch-diameter pipeline loop in Gloucester County, New Jersey (Line 10345 Loop);
- construction of about 9.5 miles of 26-inch-diameter pipeline loop in Chester County, Pennsylvania (Line 1278 Loop);
- abandonment of existing compressors and installation of new compression at the Milford Compressor Station in Pike County, Pennsylvania, and at the Easton Compressor Station in Northampton County, Pennsylvania;

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

- modifications to the Eagle Compressor Station in Chester County, Pennsylvania, and the Rutledge Compressor Station in Hartford County, Maryland; and
- modification of the Pennsburg meter and regulation (M&R) Station and the Quakertown M&R Station in Bucks County, Pennsylvania, and the Wagoner M&R Station in Orange County, New York.

The FERC staff mailed copies of the EA to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; newspapers and libraries in the project area; and parties to this proceeding. In addition, the EA is available for public viewing on the FERC's website (www.ferc.gov) using the eLibrary link. A limited number of copies of the EA are available for distribution and public inspection at:

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

Any person wishing to comment on the EA may do so. Your comments should focus on the potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that 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 **September 29, 2014.**

For your convenience, there are three methods you can use to file your comments with the Commission. In all instances, please reference the project docket number (CP14-17-000) with your submission. The Commission encourages electronic filing of comments and has expert staff available to assist you at 202-502-8258 or efiling@ferc.gov.

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

(2) You can also file your comments electronically using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by

attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." You must select the type of filing you are making. If you are filing a comment on a particular project, please select "Comment on a Filing"; or

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

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

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18 CFR 385.214).[2] Only intervenors have the right to seek rehearing of the Commission's decision. The Commission grants affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Additional information about the project is available from the Commission's Office of External Affairs, at **(866) 208-FERC,** or on the FERC website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP14-17). 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. The eLibrary link also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

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

Kimberly D. Bose,
Secretary

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

EAST SIDE EXPANSION PROJECT
ENVIRONMENTAL ASSESSMENT

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TECHNICAL ABBREVIATIONS AND ACRONYMS

ACHP	Advisory Council on Historic Preservation
ACM	asbestos containing materials
APE	area of potential effects
AQCR	air quality control region
ATWS	additional temporary workspaces
BACT	Best Available Control Technology
CAA	Clean Air Act
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Columbia	Columbia Gas Transmission, LLC
Commission or FERC	Federal Energy Regulatory Commission
CWA	Clean Water Act
CWF	Cold Water Fishery
dB	decibel
dBA	A-weighted decibels
DOT	U.S. Department of Transportation
Dth/d	dekatherms per day
EA	Environmental Assessment
ECS	Environmental Construction Standards
EI	environmental inspector
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
ESCP	Erosion and Sediment Control Plan
Project	East Side Expansion Project
°F	degrees Fahrenheit
FW	freshwater
FWS	U.S. Fish and Wildlife Service
g/hp-hr	grams per horsepower-hour
GHG	greenhouse gases
GIS	Geographic Information System
GWP	global warming potential
GWPA	Groundwater Protection Area
HAP	hazardous air pollutant
HCA	high consequence area
HDD	horizontal directional drill
HDDCP	Horizontal Directional Drill Contingency Plan
hp	horsepower
HQ	high quality

IBA	Important Bird Areas
IPCC	Intergovernmental Panel on Climate Change
lb/MWh	pounds per megawatt-hour
lbs/MMBtu	pounds per million Btu
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
M&R	measurement and regulation
MAOP	maximum allowable operating pressure
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDth/d	thousand dekatherms per day
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MF	Migratory Fishery
mg/L	milligrams per liter
MLV	mainline valve
MMBtu/hr	million Btu per hour
MMI	Modified Mercalli Intensity
MP	milepost
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAI	Natural Area Inventory
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standard for Hazardous Air Pollutants
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
NJDEP	New Jersey Department of Environmental Protection
NJDEP HPO	NJDEP Historic Preservation Office (serves as SHPO in NJ)
NJDFW	NJDEP Division of Fish and Wildlife
NJNHP	New Jersey Natural Heritage Program
NNSR	Non-attainment New Source Review
NO_2	nitrogen dioxide
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOI	Notice of Intent
NO_x	nitrogen oxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive area
NSPS	New Source Performance Standard
NSR	New Source Review
NTU	nephlometric turbidity units
NWI	National Wetland Inventory
NYSDEC	New York State Department of Environmental Conservation
O_2	oxygen
O_3	ozone
OEP	Office of Energy Projects
PADCNR	Pennsylvania Department of Conservation and Natural Resources

PADEP	Pennsylvania Department of Environmental Protection
Pb	lead
pCi/L	picocuries per liter
PEM	palustrine emergent
PFBC	Pennsylvania Fish and Boat Commission
PFO	palustrine forested
PGC	Pennsylvania Game Commission
PHMC BHP	Pennsylvania Historical and Museum Commission is Bureau of Historic Preservation (serves as SHPO in PA)
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	Upland Erosion Control, Revegetation, and Maintenance Plan
PM_{10}	particulate matter with diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with diameter less than or equal to 2.5 microns
ppm	parts per million
ppmvd	parts per million by volume, dry basis
PRM	Potomac-Raritan-Magothy
Procedures	Wetland and Waterbody Construction and Mitigation Procedures
PSD	Prevention of Significant Deterioration
PSS	palustrine scrub-shrub
PTE	potential to emit
ROW	right-of-way
RTU	Remote Terminal Unit
SE	saline estuarine
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOP	State-Only Operating Permit
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SSA	sole source aquifer
SSURGO	Soil Survey Geographic
SWD	stormwater detention
TDR	Transfer of Development Rights
TDS	total dissolved solids
TMDL	total maximum daily load
tpy	tons per year
TSF	Trout Stocked Fishery
TSS	total suspended solids
UNT	unnamed tributary
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VFW	Veterans of Foreign Wars
VOC	volatile organic compounds
WHPA	wellhead protection area
WMA	Watershed Management Area
WWF	Warm Water Fishery

1.0 PROPOSED ACTION

1.1 Introduction

On November 1, 2013, Columbia Gas Transmission, LLC (Columbia) filed an application with the Federal Energy Regulatory Commission (Commission or FERC) in Docket No. CP14-17-000 for a Certificate of Public Convenience and Necessity (Certificate) and authorization under Sections 7(b) and 7(c) of the Natural Gas Act (NGA) to construct, modify, abandon, and operate certain natural gas transmission facilities in Pennsylvania, New Jersey, New York, and Maryland. Columbia's proposed system expansion, referred to as the East Side Expansion Project (Project) would include construction of two natural gas looping[1] pipeline segments, compression facilities, and other aboveground facility modifications. The Line 10345 Loop would consist of about 9.6 miles of 20-inch-diameter pipeline in Gloucester County, New Jersey and the Line 1278 Loop would consist of about 9.5 miles of 26-inch-diameter pipeline in Chester County, Pennsylvania. Additionally, Columbia proposes to abandon and replace compressor units at two existing compressor stations in Pike and Northampton Counties, Pennsylvania; modify two existing compressor stations in Chester County, Pennsylvania and Harford County, Maryland; and modify three meter and regulation (M&R) stations, two in Bucks County, Pennsylvania and one in Orange County, New York.

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 (CFR) parts 1500-1508], and the Commission's implementing regulations under 18 CFR 380. The U.S. Army Corps of Engineers (USACE) – Philadelphia District participated as a cooperating agency in the development of this EA. USACE intends to use our EA in its determination about whether to issue permits under the USACE jurisdiction.

The assessment of environmental impacts is an integral part of the FERC's decision on whether to authorize Columbia's proposed abandonment, and issue a Certificate to construct 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; and
- identify and recommend mitigation measures, as necessary, to minimize environmental impacts.

1.2 Purpose and Need

According to Columbia, the purpose of the Project is to expand its pipeline system capacity in order to provide 312,000 dekatherms per day (Dth/d) of firm transportation service to growing mid-Atlantic markets, including local distribution companies connected to Columbia's existing Hanover (Adams County, Pennsylvania) and West Deptford (Gloucester County, New

[1] A loop is a segment of pipe that is usually installed adjacent to an existing pipeline and connected to it at both ends. The loop allows more gas to be moved through the system.
[2] "We," "us," and "our" refer to environmental staff of the Commission's Office of Energy Projects.

Jersey) Laterals and power generation load growth on the West Deptford Lateral. Columbia has stated that the Project is supported by binding Precedent Agreements with contract terms ranging from 10 to 15 years from the Project in-service date.

Under section 7 (c) of the NGA, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission bases its decisions on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project.

Section 7(b) of the NGA specifies that no natural gas company shall abandon any portion of its facilities subject to the Commission's jurisdiction without the Commission first finding that the abandonment will not negatively affect the present or future public convenience and necessity.

1.3 Public Review and Comment

On March 8, 2013, the Commission granted Columbia's request to use the FERC's Pre-filing Process in Docket No. PF13-7-000. 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 conducted environmental site reviews, solicited comments from the public, met with concerned landowners and municipal officials, encouraged Columbia to communicate frequently with the public and resource agencies, and worked with Columbia to refine its proposal and develop its application.

Columbia hosted five Open Houses in the vicinities of its proposed facilities to share information about the Project with the public. Open Houses were held in Exton, Pennsylvania on April 8, 2013; Swedesboro, New Jersey on April 9, 2013 and September 11, 2013; Milford, Pennsylvania on June 17, 2013; and in Easton, Pennsylvania on August 1, 2013. Questions or comments from stakeholders at the meetings generally concerned the purpose of the Project, safety, traffic congestion, air quality, water quality, potential effects to agricultural lands, and potential conflicts with proposed future development.

On June 6, 2013, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned East Side Expansion 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 over 540 interested parties, including federal, state, and local officials; agency representatives; affected landowners; environmental and public interest groups; potentially interested Indian tribes; and local libraries and newspapers.

We conducted two public scoping meetings, one in Chester County, Pennsylvania on June 18, 2013, and one in Gloucester County, New Jersey on June 19, 2013. Based on stakeholder concerns raised at these meetings, letters submitted to the Commission, and staff's requests for additional environmental information, Columbia developed several route variations and alternatives. Because of the potential effects to previously unidentified landowners, the Commission issued a second NOI on October 1, 2013, requesting comments on Columbia's

proposed route variations and alternatives that it planned to incorporate into the Project design. We conducted additional public scoping meetings, one in Gloucester County, New Jersey on October 15, 2013 and one in Chester County, Pennsylvania on October 16, 2013, based on Columbia's route changes.

The Commission received 204 comment letters and various oral comments totaling 673 comments during the scoping period. Transcripts of the oral comments received at the scoping meetings are included in the public record for the Project[3]. A number of comments were non-environmental, including topics such as market analysis to determine Project need, the impact of the Project on gas prices, general comments in support or opposition of the Project, and previous experiences with Columbia. These issues are outside the scope of this EA.

We also received comments indicating that Columbia is segmenting its upgrade projects in order to avoid full environmental review under NEPA. We examined other Columbia projects that are planned, proposed, or publically announced to ensure that our NEPA analysis is inclusive of all direct, indirect, and cumulative impacts of the proposed action. We also considered Columbia's Modernization Program, which is a system wide plan to address Columbia's aging infrastructure and prioritize portions of Columbia's system needing upgrades for safety and reliability reasons.[4] Potential Modernization Program projects could span as many as six states, on a variety of different mainlines, and be implemented over a span of 10-15 years. Columbia states that the projects were identified through a risk-based prioritization process and are subject to change in time, scope and location. The East Side Expansion Project is not a part of the Modernization Program and it is independent of planned enhancements to other portions of Columbia's system. Direct and indirect environmental impacts from contemplated Modernization Program projects will be considered when, and if, they are proposed. Furthermore, the potential projects identified in Columbia's Modernization Program do not occur in the Project area; therefore, we did not consider any Modernization Program projects in our cumulative impacts analysis.

Additionally, several commenters contend that the Project would be a major federal action significantly affecting the quality of the human environment and thus requires a comprehensive environmental impact statement (EIS). Pursuant to 18 CFR 380.6(a)(3) of the Commission's regulations, an EIS would normally be prepared first for "[m]ajor pipeline construction projects under section 7 of the NGA using right-of-way in which there is no existing natural gas pipeline," except that the Commission would prepare an EA first if it believes that such "a proposed action . . . may not be a major federal action significantly affecting the quality of the human environment."[5] The regulations state that "[d]epending on the outcome of the environmental assessment, an environmental impact statement may or may not be prepared."[6] In short, the regulations make clear that an EIS is not absolutely required to be prepared first in any instance, and that only "major" greenfield pipelines normally lead directly to preparation of an EIS being prepared. The regulations do not define or explain what constitutes a "major"

[3] Under accession numbers 20130705-4006, 20130705-4005, 20131115-4004, and 20131016-4013.
[4] On January 24, 2014, the Commission approved a settlement in Docket No. RP12-1021-000, which established the basis for the modernization program, including a mechanism for the recovery of costs associated with the program. Columbia Gas Transmission, LLC, 142 FERC ¶ 61,062 (2013). This approval did not authorize any construction or abandonment of facilities.
[5] 18 CFR 380.6(b)(2006)
[6] Id

pipeline. However, we conclude that 19.1-miles of pipeline loop that is collocated with existing right-of-way for about 84 percent of its route does not fall within the category of a "major pipeline construction project" as contemplated by section 380.6(a)(3) of our regulations. Opposition to a proposal does not of itself render an action that warrants an EIS for NEPA purposes.

We also received comments regarding the potential effects associated with natural gas development activities, including production of natural gas from shale formations. Our authority under the NGA relates only to natural gas facilities that are involved in interstate commerce. The permitting of oil and gas production facilities is under the jurisdiction of various state and federal agencies where those facilities are located. Thus, the facilities associated with the production of natural gas from regional shale formations are not under FERC jurisdiction. We find no causal link between natural gas production and the proposed Project, which is designed to provide Columbia's customers with additional firm services under long-term contracts. Development of natural gas would occur with or without the Project and could find other avenues to market. However, as part of our analysis of cumulative impacts in section 2.10 of this EA, we have analyzed whether any such production is both reasonably foreseeable and proximal to the proposed Project such that incremental and additive impacts could result to environmental resources.

Table 1.3-1 summarizes the environmental comments received during the public scoping process and identifies the sections of this EA where these comments are addressed.

TABLE 1.3-1

Issues Identified During the Public Scoping Process

Issue	Comment Summary	EA Section Addressing Issue
General	Description of Project	1.1, 1.2, 1.4
	Future plans and upgrades/segmentation	1.0 and 1.3
	Need for an EIS	1.3
	Potential effect on natural gas extraction/fracking	1.2
	Communication with Columbia	1.0, 2.5
	Purpose of Project	1.0
Agriculture	Farmland preservation and traditional rural heritage	2.5.1
	Impact on Agricultural Development Area	2.5.3
	Impact on specialty crops	2.5.1
Air Quality and Noise	Compressor station emissions	2.8.1
	Construction vehicle emissions	2.8.1
	FERC should require air modeling	2.8.1
	Concerned about fugitive emission	2.8.1
	Technology used for compression	2.8.1
	Emissions from blowdowns	2.8.1
	Concerned about low frequency vibrations from horizontal directional drills	2.8.2
	Compressor station noise and vibration	2.8.2
	Restoration of noise buffers at compressor stations	2.8.2
Alternatives	No Action alternative	3.0
	Alternative energy: wind, solar, and energy efficiency	3.1
	Address system alternatives	3.2
	Additional compression instead of looping	3.2.1, 3.2.2
	Replacement instead of looping	3.2.1, 3.2.2
	Use of Mid-Atlantic Express route	3.3
	Comments on High Hill Road Alternative	3.3
	Comments on Oldmans Creek Road Alternative	3.3
	Comments on various route variations	3.4

TABLE 1.3-1

Issues Identified During the Public Scoping Process

Issue	Comment Summary	EA Section Addressing Issue
Construction Issues	Environmental Inspector program	1.7.1
	Spill prevention measures	1.7
	Hydrostatic test water discharge	1.7.1
	Safety concerns around work areas	1.7.1
	Workspaces too large	1.7.1
Cultural Resources	Milford is associated with American Conservation Movement	2.7
	Native American sites in area	2.7
	Historic house in vicinity may have artifact scatter, too	2.7
Cumulative impacts	Air impacts from multiple projects permitted in the near future	2.10.10
	Impacts to water resources, including others with state water crossing permits	2.10.2
	Impacts on gas extraction including shale development	1.3
Geology	Effect of increased runoff on sink holes	2.1.1
	Rocky/steep characterization of individual properties	2.1.1
Land Use, Recreation, and Visual Effects	Impact on Transfer of Development Rights	2.5.3
	General development plans	2.5.3
	New Jersey's Farmland Preservation Program	2.5.3
	Impact on NJ State lands and Green Acres program	2.5.3
	Central Chester County's Bicycle and Pedestrian Circulation Plan	2.5.2
	Impacts on day care and healthcare facilities and other places where people live and congregate	2.5
	Impacts on recreational facilities, including parks, fields, and hiking/biking trails	2.5.2, 2.5.4
	Residential impacts	2.5 and 1.7.1
	Visual effects of removal of trees	2.5.1 and 2.5.4
	Impact on waste water treatment plant, disposal fields	2.3.3
	New Jersey Department of Environmental Protection's Landscape Project	2.3.3
	Restrictions on land use	2.5.1, 2.1.2
	Increase of trespass/all-terrain vehicles	2.5.1
	Pipelines already on property	2.5
	Impacts to schools	2.5.1, 2.5.2
Safety	Potential for leaks and explosions	2.9
	Quality of pipe	2.9
	Concerned about gas pressure in pipeline	2.9
	Maximum safe operation limits for flow velocity in the system	2.9
	Gas velocities over 50 feet per second	2.9
	Impact on health from compressor station pollution	2.9
Socioeconomic	Impacts on property values	2.6
	Impact on future residential development	2.6
	Necessity for flood insurance	2.1.1
	Adequate compensation for easement and construction damage	2.6.2
	Traffic plans	2.6.3
	Impact on recreation tourism	2.6.1
	Will provide more jobs	2.6.2
	No benefit to residents	2.6.2
Soils	Erosion and sediment control	2.1.2, 2.2, 2.3.1
	Soil subsidence	2.1.2
	Soil compaction	2.1.2
	Topsoil segregation	1.7.1 and 2.1.2
Threatened and Endangered Species	Impact on federal and state threatened and endangered species	2.4
	Impact on sensitive species and species of concern:	2.4.1
	Bald eagle	2.4
	Bat habitat	2.4

TABLE 1.3-1

Issues Identified During the Public Scoping Process

Issue	Comment Summary	EA Section Addressing Issue
Vegetation	Replant/restore existing landscaping	2.3.1
	Tree clearing	2.3.1
	Habitat loss and fragmentation	2.3.1
	Noxious weeds	2.3.1
	Appropriate reseeding	2.3.1
Water Use and Impacts	Impacts on well water	2.2 and 2.1.1
	Impacts on wastewater and stormwater infrastructure	2.5.3
	Pollution control plan for equipment spills	1.7, 2.1.2, 2.2.2
	Impacts to municipal and groundwater supply sources	2.2.2
	Impact of horizontal directional drills on aquifer	2.2.2
	Effect of compressor station on water quality	2.2
	Impacts on hydrology, flood hazard areas and floodways	2.1.1, 2.2.1, 2.2.2
Wetland and Waterbodies	Concerned about impacts on tidelands, high quality waters	2.2
	Impacts on riparian zones	2.2.1
	Impacts on forested wetlands	2.2.3
	Monitoring water runoff, sediment, and effect on water temperature	2.2.1 and 2.2.3
	Effects from deforestation	2.3
	Brandywine tributaries: surface runoff, scour, channel and sediment disturbance	2.2.1
	Impacts on Delaware River Basin	2.2.1
	Impacts on vernal pools	2.2.3
Wildlife	Direct and indirect impacts on wildlife	2.3.2
	Habitat loss and fragmentation	2.3.2
	Baseline survey of benthic invertebrates	2.2.1

1.4 Proposed Facilities

The Project would consist of the following proposed facilities:

- about 9.6 miles of 20-inch-diameter pipeline loop in Gloucester County, New Jersey (Line 10345 Loop);
- about 9.5 miles of 26-inch-diameter pipeline loop in Chester County, Pennsylvania (Line 1278 Loop);
- pig[7] launcher/receivers in New Jersey and Pennsylvania at the beginning and end of each loop;
- one mainline valve (MLV) at milepost (MP) 4.2 on Line 10345 Loop;
- one MLV at MP 7.1 on Line 1278 Loop;
- modifications to four existing compressor stations, as follows:
    - Milford Compressor Station (Pike County, Pennsylvania): abandon and remove all facilities at the existing station and install two 4,700 horsepower (hp) Solar Centaur 40 gas turbine/compressor units and auxiliary equipment; replace 700 feet of 12-inch-diameter piping with 20-inch-diameter pipe between the compressor station and an adjacent interconnect with Tennessee Gas Pipe Line Company, LLC;
    - Easton Compressor Station (Northampton County, Pennsylvania): abandon and remove two existing Solar Saturn 2,240 hp compressor units and auxiliary

[7] A pig is an internal tool that can be used to clean and dry a pipeline and/or to inspect it for damage or corrosion.

equipment, install two new 10,802 hp Solar Taurus 70 turbine/compressor units and auxiliary equipment;

- Eagle Compressor Station (Chester County, Pennsylvania): install new actuators and over pressure protection regulation to allow bi-directional flow and operational flexibility;
- Rutledge Compressor Station (Harford County, Maryland): modify the MLV setting, and install new actuators, valves, and piping to enable remote operating capability and bi-directional flow; and

- minor modifications to three existing M&R stations, as follows:
  - Pennsburg M&R Station (Bucks County, Pennsylvania): install over pressure protection regulation, a new Remote Terminal Unit (RTU) panel and building, and new actuators to enable remote valve operation;
  - Quakertown M&R Station (Bucks County, Pennsylvania): install new back pressure regulators, over pressure protection regulation, a new RTU panel and building, and new actuators to enable remote valve operation; and
  - Wagoner M&R Station (Orange County, New York): install a new meter, station piping, flow control valve, and communication equipment.

Figure 1.4-1 depicts the general location of the proposed facilities. Project maps are included in appendix A. Table 1.4-1 provides a summary and location of all new and modified facilities.

To the extent practicable, Columbia would collocate the pipelines parallel to existing natural gas transmission pipelines or other existing utility/road rights-of-way. The Line 10345 Loop would begin about 1.1 miles east of the Delaware River, and continue east to the Swedesboro M&R Station, where it would tie into the existing Line 10345 pipeline. Line 10345 Loop is offset from the existing Line 10345 to avoid residential development around several segments. Line 10345 Loop would follow the Center Square Road until its intersection with Pedricktown Road, where it would then continue southwest, adjacent to the north side of Pedricktown Road. At the intersection of Pedricktown Road and Oldmans Creek Road, the Line 10345 Loop would follow Oldmans Creek Road, continuing past the elementary school near the New Jersey Turnpike. The route then would turn northeast roughly adjacent to the New Jersey Turnpike until the end of the Line 10345 Loop at the Swedesboro M&R station.

Line 1278 Loop would be roughly adjacent to the existing Line 1278 pipeline between Eagle Compressor Station and Downingtown Compressor Station in Chester County, Pennsylvania. Between MP 6.3 to 6.7, Line 1278 Loop would be adjacent to Highway 30 on its south side on land owned by Caln Township.

The Pennsburg M&R Station serves as an interconnection with Texas Eastern Transmission, LP and has the ability to flow gas into Line 1278 or Columbia's Line 10110. The proposed modifications would allow Columbia to remotely control which line would receive natural gas. The Quakertown M&R Station currently regulates gas flowing from the Pennsburg M&R Station and the Easton Compressor Station. Columbia would install equipment that would allow the station to hold the gas pressure north of the station. Work proposed at the Wagoner M&R Station would enable incremental flow at the existing interconnect with the Millennium Pipeline Company, LLC.

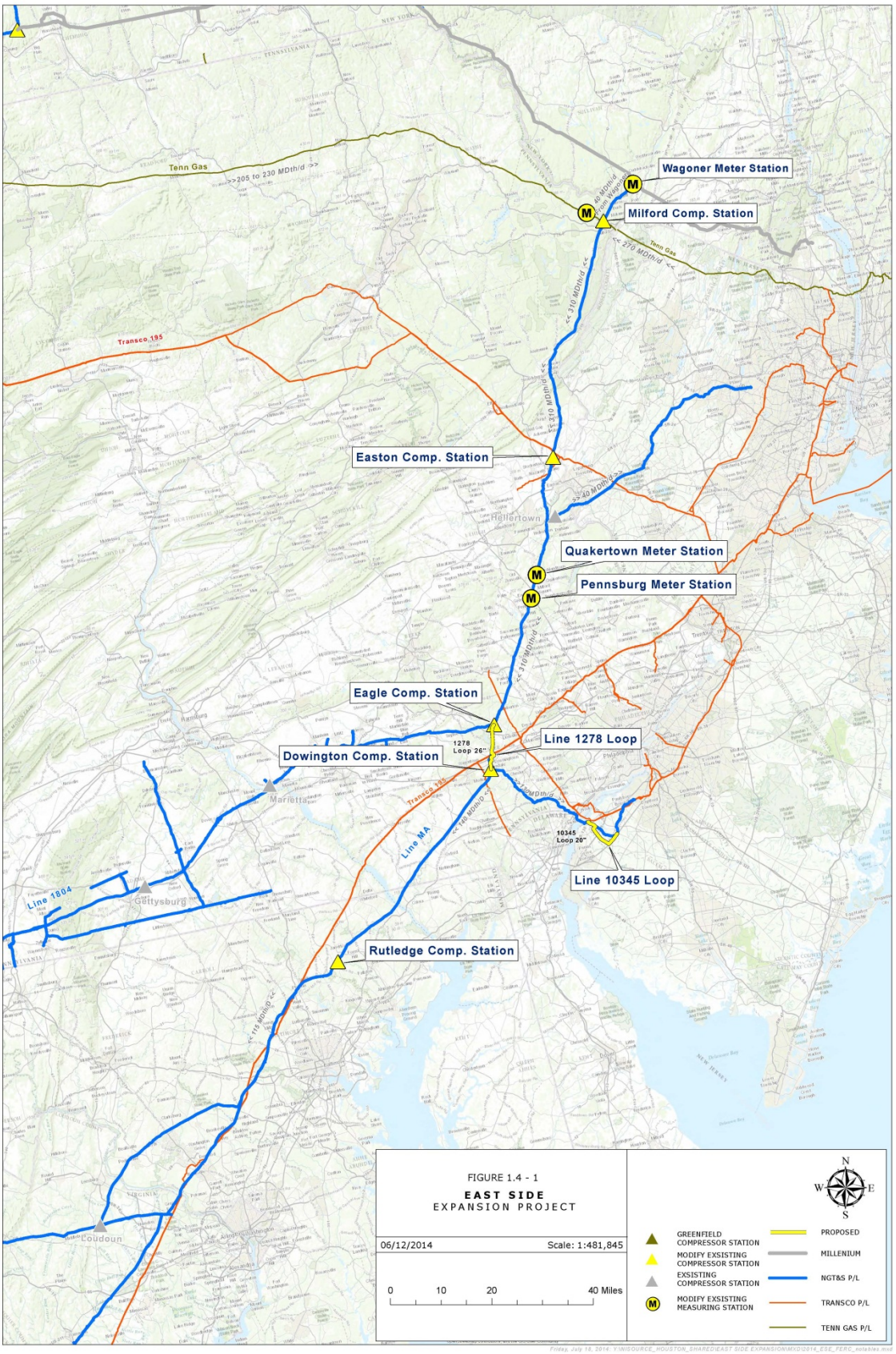

Figure 1.4-1 General Location of the Proposed Facilities

TABLE 1.4-1

Summary of the Proposed Pipeline and Aboveground Facilities

Facility	Length (miles)	Diameter (inches)	MP	Location	Description
Pipelines					
Line 10345 Loop	9.6	20	0.0-9.6	Gloucester Co., NJ	New pipeline would loop the existing 16-inch-diameter Line 10345 between RT-130 Gate Setting Site and Swedesboro M&R Station.
Line 1278 Loop	9.5	26	0.0-9.5	Chester Co., PA	New pipeline would loop the existing 14-inch-diameter Line 1278 between Eagle Compressor Station and Downingtown Compressor Station.
Total	**19.1**				
New Aboveground Facility					
Uni-Directional Pig Launcher / Receiver	N/A	24	0.0	Gloucester Co., NJ	At the start of Line 10345 Loop.
Mainline Valve	N/A	20	4.2	Gloucester Co., NJ	On Line 10345 Loop.
Uni-Directional Pig Launcher / Receiver	N/A	24	9.6	Gloucester Co., NJ	At Line 10345 Loop end.
Bi-Directional Pig Launcher / Receiver	N/A	30	0.0	Chester Co., PA	At the start of Line 1278 Loop.
Mainline Valve	N/A	26	7.1	Chester Co., PA	On Line 1278 Loop.
Bi-Directional Pig Launcher / Receiver	N/A	30	9.5	Chester Co., PA	At the Line 1278 Loop end at the Downingtown Compressor Station.
Modified Aboveground Facility					
Milford Compressor Station	N/A	N/A	N/A	Pike County, PA	Demolition of the existing facilities and installation of two new compressor units for a new station total of 9,400 hp. There would be no expansion of the existing facility fenceline.
Easton Compressor Station	N/A	N/A	N/A	Northampton Co., PA	Upgrades, including two new compressor units for a new station total of 22,254 hp. Work would require an expansion of the existing facility fenceline but would be contained within Columbia's existing site property.
Eagle Compressor Station	N/A	N/A	0.0	Chester Co., PA	Modifications; no expansion of the existing facility fenceline.
Pennsburg M&R Station	N/A	N/A	N/A	Bucks Co., PA	Modifications; no expansion of the existing facility fenceline. The proposed RTU building would be located outside the existing facility fenceline within Columbia's maintained right-of-way.
Quakertown M&R Station	N/A	N/A	N/A	Bucks Co., PA	Modifications; no expansion of the existing facility fenceline.
Wagoner M&R Station	N/A	N/A	N/A	Orange Co., NY	Modifications; no expansion of the existing facility fenceline.
Rutledge Compressor Station	N/A	N/A	N/A	Harford Co., MD	Modifications; a new fence would be installed around a new proposed valve setting outside the existing compressor station fenceline but within existing maintained portions of Columbia-owned property.

N/A = Not Applicable

1.5 Land Requirements

Construction of the Project would affect about 248.9 acres of land, and operation would permanently affect about 72.0 acres of land. The remaining 176.9 acres would be restored and allowed to revert to pre-construction conditions and use following construction. Table 1.5-1 identifies the acres of land required to construct and operate the Project.

TABLE 1.5-1

Summary of Land Requirements

Facilities	Land Affected During Construction [a/] (acres)	Land Affected During Operation [b/] (acres)
New Jersey		
Line 10345 Loop		
Pipeline Right of Way [c/]	79.06	39.58
Additional Temporary Work Spaces	6.38	0.00
Pipeline Facility Access Roads	1.98	0.20
Contractor Yards (Preferred)	21.45 (1 site)	0.00
New Jersey Subtotal	**108.87** (with preferred Yard)	**39.78**
Pennsylvania		
Line 1278 Loop		
Pipeline Right-of-Way [c/]	81.21	29.62
Additional Temporary Work Spaces	11.42	0.00
Milford Compressor Station	2.68	0.33
Easton Compressor Station	4.80	2.28
Eagle Compressor Station	0.96	0.00
Pennsburg M&R Station	0.29	0.03
Quakertown M&R Station	0.28	0.00
Compressor Station Access Roads	0.64	0.00
Pipeline Facility Access roads	7.30	0.00
Contractor Yards (Preferred)	25.25 (1 site)	0.00
Pennsylvania Subtotal	**134.83** (with preferred Yard)	**32.26**
New York		
Wagoner M&R Station	0.78	0.00
M&R Access Roads	2.42	0.00
New York Subtotal	**3.20**	**0.00**
Maryland		
Rutledge Compressor Station	1.99	0.00
Maryland Subtotal	**1.99**	**0.00**
Grand Total	**248.89**	**72.04**

[a/] Land Affected During Construction includes Land Affected During Operation.

[b/] Land Affected During Operation includes only the new permanent right-of-way that is in addition to the existing easement of Columbia's existing pipeline. Further, it does not include proposed right-of-way across agricultural and open lands, which would revert to pre-existing conditions after construction. In the absence of Columbia's existing pipeline easement, total permanent new right-of-way associated with the Project would be 44.2 acres for Line 10345 Loop and 46.4 acres for Line 1278 Loop, assuming a 50-foot-wide permanent right-of-way exclusive of horizontal directional drill (HDD) areas.

[c/] Includes proposed mainline valves and/or launcher/receiver sites.

Note: Totals may not equal sum of addends due to rounding.

Construction and operation of the pipelines would require the acquisition of temporary workspace and permanent easements. Land requirements for pipeline construction would differ according to the type of terrain, environmental features, and the presence of existing structures. Columbia would typically utilize a 100-foot-wide construction right-of-way in uplands. Site-specific conditions may require the use of less or greater workspace. Columbia would maintain a 50-foot-wide permanent easement for operation along segments that are not adjacent to the existing pipeline easement. Portions of the permanent easement would overlap with Columbia's existing easements. Additional temporary workspace (ATWS) would be required to cross roads, waterbodies, wetlands, steep slopes, at utility crossovers, and at the beginning and ends of the pipelines to allow for mobilization of construction equipment.

Workspaces, to the extent practical, would be located abutting, parallel or overlapping with Columbia's existing pipeline easement or other utility corridors. Typically, Columbia would overlap 25 to 35 feet of workspace with existing right-of-way. Where Columbia's existing and proposed pipelines would be collocated, an additional 15 to 25 feet of new permanent right-of-way would be acquired. The separation between pipelines in a shared right-of-way would be 15 feet from centerline to centerline; except in wetlands where a 25-foot offset is needed (due to saturated soil conditions) to prevent soils from migrating to the new trench. Drawings showing typical right-of-way cross sections and how the construction and operation rights-of-way would overlap or be adjacent to existing rights-of-way are included in appendix B of this EA (see Columbia's Environmental Construction Standards (ECS) Attachment B: Project Specific Construction Typicals).

Because of residential developments in the area of the Project, Columbia could not collocate new facilities with existing facilities in all locations. Along Line 10345 Loop in New Jersey, Columbia would overlap or collocate with various existing rights-of-way including Columbia existing pipelines and road rights-of-way for about 8.8 miles (about 91 percent). Along Line 1278 Loop in Pennsylvania, Columbia would overlap or collocate with existing rights-of-way for 7.3 miles (about 77 percent). Segments of the Line 1278 Loop deviate from the existing Line 1278 right-of-way in areas of dense residential development.

With one exception, the pig launchers/receivers would be located within existing facility fencelines or within proposed pipeline rights-of-way, and would not require the use of additional land. A minor modification to the fenceline at the start of the Line 10345 Loop would be needed to accommodate the new launcher/receiver.

Table 1.5-2 identifies the land required for pipe/contractor ware yard. Columbia would require the temporary use of at least two sites for pipe/contractor ware yards, one per pipeline loop. The proposed Line 10345 Loop Yard is a primarily agricultural field near MP 7.5. The proposed line 1278 Loop Yard is also a primarily agricultural field near MP 1.5. Following construction, all ware yards would be allowed to revert to previous use.

TABLE 1.5-2

East Side Expansion Project Pipe/Contractor Ware Yards

Yard Name	County, State	Existing Land Use	Acreage
Line 10345 Yard	Gloucester County, NJ	96.3% agriculture, 3.7% open land	21.5
Line 1278 Yard	Chester County, PA	99.8% agriculture, 0.3% industrial/commercial	25.3

Columbia would use existing public and private roads to access the Project. For smaller, residential roads that may be used, Columbia would coordinate with the subdivision or landowner to minimize traffic and inconvenience to residents. Columbia has identified 32 private roads needed to access construction workspace (table 1.5-3). One new and permanent access road (AR-NJ-GL-001A) would be needed for operation of the Line 10345 Loop while the remaining access roads would be used only during construction and restoration. Minor upgrades of these roads may be required and could include blading or grading, installation of gravel or rock, culvert replacement, and/or tree trimming.

TABLE 1.5-3

East Side Expansion Access Roads

Facility/Access Road ID	Location (Milepost)	Area Affected (acres)	
		Construction [a/]	Operation
Line 10345 Loop			
AR-NJ-GL-001A	0.0	0.61	0.19
AR-NJ-GL-001	0.5	1.05	0.00
AR-NJ-GL-001B	1.2	0.03	0.00
AR-NJ-GL-001C	1.4	0.02	0.00
AR-NJ-GL-001E	2.6	0.01	0.00
AR-NJ-GL-001D	3.2	0.01	0.00
AR-NJ-GL-004A	4.8	0.01	0.00
AR-NJ-GL-005	5.3	<0.01	0.00
AR-NJ-GL-006A	5.7	0.04	0.01
AR-NJ-GL-007	9.6	0.20	0.00
Line 10345 Loop Access Road Subtotal		**1.98**	**0.20**
Line 1278 Loop			
AR-PA-CH-001A	0.7	1.07	0.00
AR-PA-CH-001	0.8	0.19	0.00
AR-PA-CH-002	1.3	0.92	0.00
AR-PA-CH-002A	1.3	0.49	0.00
AR-PA-CH-003	1.5	0.25	0.00
AR-PA-CH-004	2.1	0.46	0.00
AR-PA-CH-005	2.3	0.73	0.00
AR-PA-CH-006	2.8	0.68	0.00
AR-PA-CH-007	4.9	0.18	0.00
AR-PA-CH-008	6.3	0.04	0.00
AR-PA-CH-008A	6.3	0.10	0.00
AR-PA-CH-008B	7.3	0.01	0.00
AR-PA-CH-008C	7.1	0.01	0.00

TABLE 1.5-3

East Side Expansion Access Roads

Facility/Access Road ID	Location (Milepost)	Area Affected (acres)	
		Construction [a/]	Operation
AR-PA-CH-011 [b/]	7.7	0.51	0.00
AR-PA-CH-012	8.2	0.31	0.00
AR-PA-CH-012A	8.2	0.03	0.00
AR-PA-CH-013	8.3	0.02	0.00
AR-PA-CH-014	8.5	0.73	0.00
AR-PA-CH-015	9.0	0.07	0.00
AR-PA-CH-016	9.5	0.50	0.00
Line 1278 Loop Access Road Subtotal		**7.30**	**0.00**
Aboveground Facilities			
AR-NY-OR-001	N/A	2.42	0.00
AR-PA-BU-001	N/A	0.64	0.00
Aboveground Facility Access Road Subtotal		**3.06**	**0.00**
PROJECT TOTAL		**12.34**	**0.20**

[a/] Construction impacts include temporary and permanent impacts.
[b/] Please note that there is no AR-PA-CH-090 or AR-PA-CH-010.
Access AR-PA-CH-008C & AR-NJ-GL-002A are completely within new permanent pipeline right-of-way and therefore the areas affected are included within the pipeline affected acreages (see Table 1.5-1).

Columbia would use and upgrade two existing facility driveways (Milford and Easton Compressor Stations) to complete the aboveground facility work.

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

1.6 Construction Schedule and Workforce

Columbia anticipates starting construction in the Fall of 2014, pending receipt of all the necessary permits and approvals. However, the majority of pipeline construction would not begin until Spring of 2015. Construction would typically occur for 10 hours per day during daylight hours, six days per week. Columbia anticipates an in-service date of September 2015.

Columbia would construct both loops concurrently. Construction of the Project would require a maximum workforce of about 390 people, which would include about 120 personnel per loop and 30 per compressor station and M&R station. Columbia would not require any additional operations staff.

1.7 Construction, Operation, and Maintenance Procedures

The Project would be designed, constructed, operated, and maintained in accordance with the U.S. Department of Transportation (DOT) regulations in 49 CFR 192 (Transportation and Other Gas by Pipeline: Minimum Federal Safety Standards) and other applicable federal and state safety regulations.

Construction and restoration of the Project would be conducted in accordance with Columbia's ECS, provided in appendix B, as well as its Project-specific Erosion and Sediment Control Plan (ESCP) that would be developed in consultation with applicable state and county agencies. Columbia's ECS incorporates the May 2013 version of our *Upland Erosion Control, Revegetation and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures).[1] The Plan and Procedures identify the Commission staff's baseline mitigation measures for minimizing erosion, enhancing revegetation, and minimizing the extent and duration of disturbance on wetlands and waterbodies during the construction of FERC jurisdictional natural gas projects. However, Columbia has proposed some alternative measures to those in our Plan and Procedures that are marked with struck out text in the ECS. We discuss these alternative measures in the appropriate environmental analysis sections of this EA, and have recommended certain changes to correct inconsistencies or deficiencies.

In addition to implementing its ECS and ESCP, Columbia would implement the following plans:

- Spill Prevention, Control, and Countermeasure Plan (SPCC Plan);
- Severe Weather Plan;
- Horizontal Directional Drill Contingency Plan (HDDCP);
- Blasting Plan;
- Karst Terrain Plan;
- Plans for the Unanticipated Discovery of Historic Properties and Human Remains during Construction; and
- Agricultural Impact Minimization Plan.

We have reviewed these plans, and except as noted in the environmental analysis section of this EA, find them to be acceptable.

1.7.1 Typical Construction Procedures

Columbia would employ conventional cross-country pipeline construction techniques in accordance with its ECS. Work would be conducted as shown in figure 1.7-1 as one continuous operation to minimize the amount of time a tract of land is disturbed. The stages of typical pipeline construction procedures are described below.

[1] The Plan and Procedures are available at http://www.ferc.gov/industries/gas/enviro/guidelines.asp.

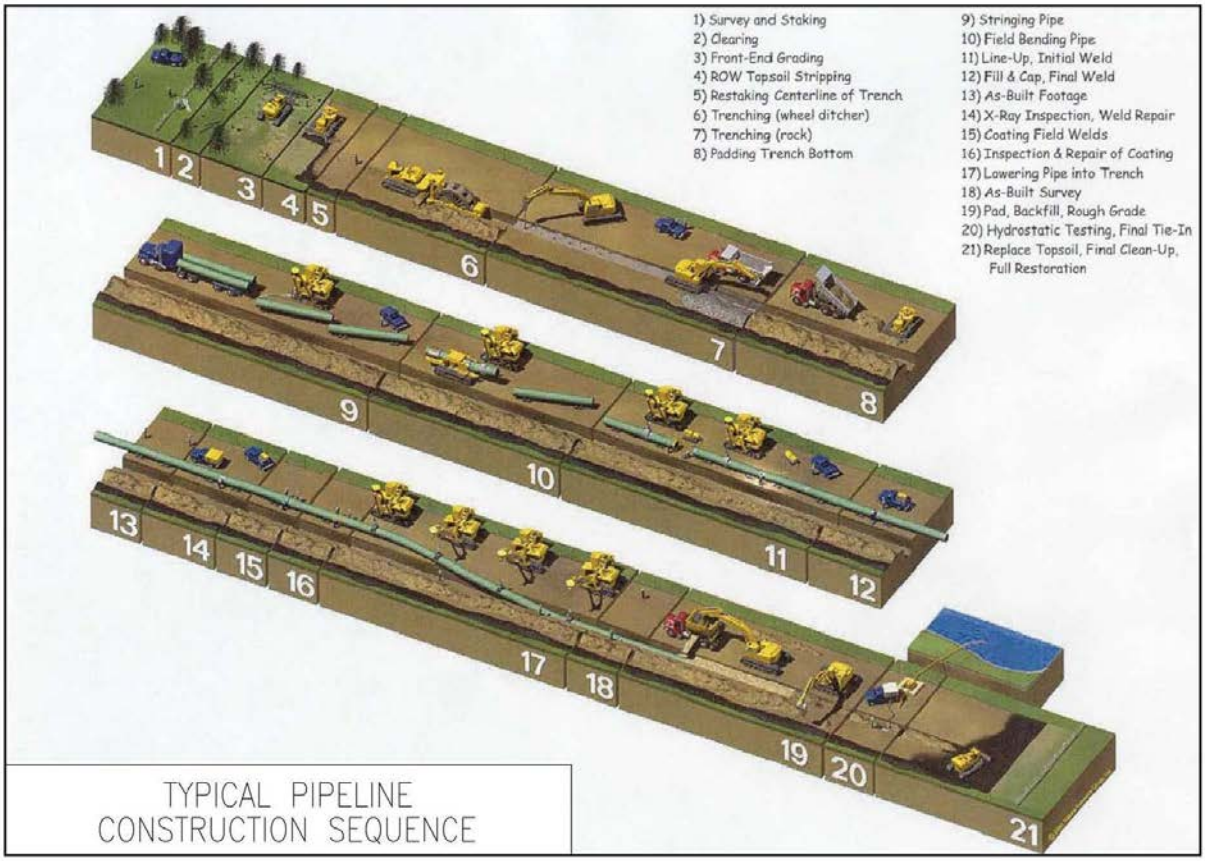

Figure 1.7-1 Typical Pipeline Construction Sequence

Survey and Staking

Columbia would contact the New Jersey and Pennsylvania One Call Systems to verify and mark all utilities where any ground disturbance would occur. Prior to construction, Columbia would survey and stake the route centerlines, foreign pipeline and utility crossings, and workspace limits, along with wetland boundaries and other environmentally sensitive areas. Typically, Columbia would stake the centerline in 200-foot intervals and at points of inflection (pipeline bends).

Clearing and Grading

Clearing and grading crews would remove vegetation and obstacles from the construction right-of-way and temporary workspaces required for construction. This would include trees (as necessary), stumps, logs, brush, and large rocks. Unless necessary for construction purposes, timber would be limbed, cut, and removed from the workspace. Unusable timber and brush would be chipped or hauled offsite to commercial facilities or an approved location in accordance with applicable regulations. Fences within the construction workspace would be cut and braced where necessary. Fences would be installed to control livestock, protect sensitive areas, and limit access by the public as necessary.

Prior to grading, Columbia would install erosion control devices. The upland portions of the construction right-of-way would be graded to create a safe and level work surface. Columbia would preserve the natural drainage to the extent practicable.

Trenching

Trenching would be conducted by a rotary wheel ditching machine, backhoe, or ripper. Typically, the trench would be excavated to a depth sufficient to provide 3 feet of soil cover over the top of the pipe after backfilling. In areas of bedrock, a minimum of 18 inches of cover would be provided in Class I Areas and 24 inches in Class II and III Areas, in accordance with DOT requirements (discussed in more detail in section 2.9). Columbia would provide a minimum 4 feet of cover in active agricultural areas. Additional cover would also be provided at road, railroad, and waterbody crossings. At least 12 inches of clearance would be maintained when crossing foreign utility lines.

Excavated soil would be stockpiled along the right-of-way away from construction traffic and the pipe assembly area (the "spoil side"). In areas of actively cultivated crops and pastures, residential areas, wetlands, and other areas at the landowner's request, Columbia would segregate and store separately the topsoil from subsoils. In these areas, Columbia would remove and segregate up to 12 inches of topsoil.

Pipe Stringing, Bending, Welding, and Coating

Pipe would be delivered to the cleared and graded right-of-way where it would be strung adjacent to the trench. Bends in the pipe may be needed for direction changes, as well as natural grade changes. Prior to welding, select joints would be bent in the field by track-mounted hydraulic bending machines. Following stringing and bending, the pipe would be placed on supports to weld segments of pipe together. The pipe arrives with a protective coating with the ends uncoated where they will be welded together. Once welded, these areas are coated by a coating crew. The pipe would then be inspected for defects in the coating and welds and repaired as needed before installation in the trench.

Lowering In and Backfilling

The trench would be dewatered, if needed, to perform an inspection of the trench and cleaned of debris. In rocky areas, sandbags or support pillows may be placed on the bottom of the trench to protect the pipe.

Columbia would lower the pipe into the trench, and install trench breakers as required before backfilling at specified intervals to prevent water movement along the pipeline. In areas of saturated soil, set-on concrete weights, pipe sacks, soil anchors, and/or concrete coating may be used to keep the pipe from rising. After the pipe is in position, the trench would be backfilled with the previously excavated material. Clean fill or protective coating would be placed around the pipe prior to backfilling if the excavated material contains large rocks or other material that could damage the pipe or its coating. Where topsoil is required to be stored separately from subsoil, the subsoil would be backfilled first, followed by replacement of the topsoil. Topsoil would not be used to pad the pipe. In upland areas, a soil mound would be left over the trench to allow for soil settlement, unless otherwise requested by the landowner.

Hydrostatic Testing

Prior to hydrostatic testing, the pipe would be cleaned using a cleaning pig. After backfilling, the pipeline would be hydrostatically tested in accordance with the requirements in 49 CFR 192, Columbia's ECS, and any requirements of individual state permits. Columbia would use water from municipal supplies for the hydrostatic testing. No chemicals would be added to the test water. The water in the pipe segments would be pressurized and held for a minimum of eight hours (or four hours for fabricated units and for short, visible sections). If leaks are found, the defect would be repaired and the pipe section would be re-tested until all required specifications are met. Upon completion of hydrostatic testing, the water would be discharged in accordance with all applicable federal and state water requirements. Refer to section 2.2.1 of this EA for additional information on hydrostatic testing, including proposed sources for hydrostatic test water withdrawal and discharge.

Cleanup and Restoration

All work areas would be graded to match pre-construction contours. Erosion control methods would be implemented and could include contouring, permanent slope breakers, mulch, and re-seeding or sodding with soil-holding grasses. Columbia would restore fences, gates, driveways, and roadways affected by construction to original or better condition. Upland locations, excluding actively cultivated cropland, would be revegetated with seed, fertilizer, and soil additive recommendations based on landowner and/or the local soil conservation authority requirements/recommendations.

Markers showing the location of the pipeline loops would be installed in accordance with 49 CFR 192. The markers would identify Columbia as the operator and list telephone numbers for emergencies and inquiries. Columbia would place markers at regular intervals along the rights-of-way and adjacent to road crossings.

Special Pipeline Construction Methods

Waterbody Crossings

Conventional open-cut methods, direct pipe, or horizontal directional drill (HDD) methods would all be used to cross waterbodies. An open-cut waterbody crossing would be conducted at ephemeral and intermittent waterbodies with no water flow at the time of construction using methods similar to conventional upland open-cut trenching. The pipeline trench would be excavated across the waterbody with a backhoe-type excavator. Spoil excavated from the trench would be placed above the stream banks for use as backfill. Once the pipe is installed and the trench would be backfilled, the banks and stream bottom would be restored to pre-construction contours and stabilized.

Dry crossing methods (flume or dam-and-pump) would be used at waterbodies with perceptible flow. A dry ditch crossing diverts water flow during pipe installation. A flume crossing directs the flow of water through one or more flume pipes placed over the area to be excavated. Trenching then occurs under the flume pipes without reducing downstream water flow. Concrete coating or set-on weights would be utilized, as necessary, to keep the pipeline from floating to the surface. After pipe installation, backfill of the trench, and restoration of the stream banks, the flume pipes would be removed.

The dam-and-pump method involves installing temporary dams upstream and downstream of the waterbody, typically with sandbags and plastic sheeting. Following dam installation, Columbia would use appropriately sized pumps with hoses to transport the stream flow around the construction work area and trench. The area between the dams would be dewatered prior to trenching. Intake screens at the pump inlets would limit entrainment of aquatic life, and energy dissipating devices installed at the pump discharge point would minimize erosion and streambed scour. Trench excavation and pipe installation would then commence through the dewatered portion of the waterbody. After pipe installation, backfill of the trench, and restoration of the stream banks, the temporary dams would be removed, and flow of the construction work area would be restored.

Columbia would also utilize two "trenchless" construction methods, the direct pipe method and HDD, to minimize impacts on streams and associated wetlands, as well as features like highways and residential areas. Direct pipe installation consists of creating a borehole with a microtunneling machine and installing a pre-fabricated pipe in one sequence. During excavation, the tunnel face can be controlled using slurry-supported tunneling technology even in heterogeneous, water permeable soils. HDD installation involves a pipe segment installed beneath the ground surface by pulling the pipe through a borehole. At an HDD crossing, a drill rig would be placed on the entry side of the HDD and a small pilot hole would be drilled along a pre-determined path beneath the crossing. The pilot hole would be progressively enlarged through a process called reaming. Several passes with progressively larger reaming tools would be needed to enlarge the hole to a sufficient diameter to accommodate the pipeline. During this process, bentonite drilling fluid would be circulated through the hole to remove drill cuttings and maintain the integrity of the hole. Once the reaming process is complete, a prefabricated segment of pipe would be attached to the drill string on the exit side of the crossing, and pulled back through the hole toward the drill rig. Columbia would utilize the HDD method and direct pipe method at 10 locations, identified in table 1.7-1.

TABLE 1.7-1

Proposed HDD and Direct Pipe Locations

Facility	MP	Length (feet)	Crossing
Line 10345 Loop	0.6	2,802	Tideland and railroads (HDD)
	2.9	1,907	Tideland and residence (HDD)
	3.5	6,440	I-295, Tideland and protected species (HDD)
	5.3	1,887	Tideland and residence (HDD)
	9.3	1,650	Wetland and State Lands (HDD)
Line 1278 Loop	1.4	3,884	Neighborhood, I-76 and protected species (HDD)
	2.3	2,373	Neighborhood (HDD)
	4.3	3,090	Brandywine Creek (HDD)
	7.8	3,168	Beaver Creek and associated forested wetlands (direct pipe)
	8.0	715	Beaver Creek and associated forested wetlands (direct pipe)

Although the HDD method would avoid direct effects by precluding surface disturbance, an inadvertent release of bentonite drilling fluid could occur if drilling fluids escape the drill hole and are forced to the surface. In order to minimize potential impacts of inadvertent releases of drilling fluids, Columbia would implement measures identified in its HDDCP. This method also

requires ATWS that are larger than would be necessary for other methods. These areas are needed to accommodate drilling equipment and to fabricate the long pipe segment.

Wetlands

Columbia would clearly mark wetland boundaries in the field with signs and/or highly visible flagging prior to the start of construction. The construction right-of-way would be limited to 75 feet in wetlands. Vegetation would be cut off at ground level. Tree stump removal and grading would be limited to the area directly over the trench unless safety-related construction constraints require otherwise. Trench plugs, such as sack breakers or foam breakers, would be installed at the entry and exit points, if necessary to maintain wetland hydrology and to minimize the flow of water to and from the trench. Topsoil would be segregated from the subsoil and stored in unsaturated areas. Specific wetland crossing procedures would depend on the level of soil stability and saturation encountered during construction. Original topographic conditions and contours would be restored as nearly as practicable following construction.

Road and Railroad Crossings

Columbia would cross roads and railroads using either open-cut or conventional bore methods, with the exception of Interstate 76, Ferro Corporation New Jersey Railroad, Conrail Railroad, SMS Line Railroad, and Interstate 295, which would be crossed using the HDD method.

The open-cut method would typically be used to cross driveways, local roads, and small state roads with low traffic densities. Columbia would detour traffic around the work area, and temporary bypass roadways may be constructed. Multi-lane roads would be crossed one lane at a time with traffic being diverted to other lanes. Traffic may also be rerouted around the work area with the use of adjacent roadways. Roadway surfaces would be restored to the specifications outlined in the permit conditions.

The conventional boring technique would consist of excavating a pit on each side of the crossing, placing boring equipment within the pits, boring a hole under the road bed or railroad, and pulling a section of pipe through the hole. Typically, there would be little or no disruption on traffic at road, highway, or railroad crossings during boring operations. All crossings would be conducted in accordance with applicable state and local roadway opening permits or with the landowner of private roadways. If a roadway crossing cannot be completed in a single workday, Columbia would cover the trench with steel plates and install fencing around any off-road portions of the trench near the roadway.

Agricultural Areas

Columbia has developed an Agriculture Impact Minimization Plan that outlines protective measures that Columbia would implement to minimize impacts in agricultural areas. Prior to construction, Columbia would consult with landowners to identify drain tiles or other irrigation systems within the construction rights-of-way. Any damage to these systems would be repaired by Columbia following construction. Columbia would segregate a minimum of 12 inches of topsoil in areas that are annually cultivated or have crops rotated. The pipe would be buried to allow a minimum of 4 feet of cover. The Agricultural Impact Minimization Plan is provided in appendix C.

Residential and Other Areas

Where residences are within 50 feet of construction, Columbia would reduce the construction right-of-way width to minimize impacts. Columbia would utilize special construction techniques such as stove pipe, drag section, or mini-crew construction methods, where appropriate. Columbia would not remove mature trees and landscaping from within the construction right-of-way unless necessary for the safe operation of construction equipment. Lawn and landscaping would be restored immediately following backfilling, weather conditions permitting. Fences, mailboxes, and other structures would be replaced. Sidewalks, driveways, and roads would be restored as soon as practical and in accordance with any agreements between landowners and Columbia. Additional information regarding construction in residential and other areas for the 37 residences and 26 other structures within 50 feet of the construction rights-of-way is provided in section 2.5.1 and site-specific construction plans for the 37 residences are provided in appendix D.

Stove Pipe Construction

In areas where right-of-way width would be reduced because of constraints adjacent to the right-of-way, Columbia would implement stove pipe construction. This requires the contractor to construct one length of pipe (usually 40 feet) at a time. A bell hole would be excavated at the end of the single joint to allow construction personnel to safely attach the newly installed pipe to the pipe already in the ditch. Standard upland construction methods would be followed at this point. The construction crew required for the stove pipe method would be about one-third to one-fourth the normal crew size and the amount of equipment on site would be limited to that equipment necessary at that time.

Mini-Crew Construction

The mini-crew construction technique uses a reduced size workforce, similar to that used for the stove pipe method. The mini-crew would follow the same installation procedures as standard upland construction, but would proceed over a shorter time period. This concentrated pipe installation process would be carried out over several weeks and would limit the effect to landowners and their property.

Drag Section Construction

Drag section construction is used in areas where there is insufficient space to assemble the pipe in-place. With this technique, the trench is excavated, the prefabricated section of pipe (drag section) is installed, and the trench is backfilled all in one day. The drag section is assembled in staging areas away from the congested area. This method reduces the amount of time work occurs in a given location by conducting much of the construction sequence (bending, welding, x-ray, and coating) at the nearby staging area.

Blasting and Rock Removal

In areas of shallow bedrock, Columbia may remove the rock through the use of mechanical rippers, track-mounted excavators (trackhoe) or trenchers, hammering with a trackhoe attached device, or blasting. The method would ultimately depend on the hardness of the bedrock encountered. Blasting would be conducted in accordance with all applicable regulations and Columbia's Blasting Plan. Blasting is discussed in more detail in section 2.1.1.

Steep Slopes

In areas with slopes greater than 30 percent, Columbia would install temporary slope breakers at least every 100 feet in accordance with its ECS and any state requirements. If necessary, trench breakers may be installed in conjunction with the slope breakers to channel water off the right-of-way. Permanent slope breakers would be constructed as described and shown in Columbia's ECS and Project-specific ESCP. In areas of steep slopes, seed would be applied at an increased application rate to promote establishment of vegetation and rapid stabilization.

Portions of the pipeline routes would cross areas of steep side-slope terrain and may require the use of cut-and-fill grading to provide for safe working conditions. The upslope side of the construction right-of-way would be cut during grading. Material from the cutting would be used to fill the downslope side to create a safe and level surface for travel lanes and equipment operation. Additional ATWS may be required downslope to accommodate the fill material. During grade restoration, the spoil would be placed back in the cut and compacted to restore original contours.

Karst Terrain

Karst terrain features such as sinkholes, caves, and caverns could occur along the Line 1278 Loop. To the extent practicable, Columbia would reroute the pipeline around any sinkhole or karst features encountered during construction. If a reroute is not feasible, Columbia would incorporate preventative measures into the pipeline design to mitigate potential safety concerns. If conditions that could lead to a sinkhole are discovered, Columbia would remediate the sinkhole by excavating the sinkhole to expose the throat and plugging the throat using graded rock fill. Columbia has developed a Karst Terrain Plan that would be implemented if karst features were encountered during construction. For further discussion of Karst terrain, see section 2.1.1.

Aboveground Facility Construction Procedures

Aboveground facility construction would begin with clearing and grading, as necessary, to create level surfaces for the movement of construction vehicles and to prepare areas for equipment removal and new equipment installations. Erosion and sediment controls would be installed. If needed, additional material would be imported from approved sources to achieve desired site grades. Final grading and landscaping would be completed in accordance Columbia's ECS.

Station piping would meet the requirements set forth in 49 CFR 192. Columbia would coat station piping and connect it to the existing cathodic protection system to protect against corrosion. Prior to placing station interconnects into service, Columbia would conduct pressure testing of the piping system. Pressure testing would be conducted in accordance with applicable state and local code or regulatory requirements.

Columbia would check and test controls and safety features, including the emergency shutdown system, over-pressure protection devices, gas and fire detection facilities, over-speed, vibration, and other on-and-off engine protection and safety devices, prior to placing new compressor units into service.

Environmental Compliance Inspection and Monitoring

Columbia would assign one environmental inspector (EI) per construction spread. Additional inspectors would be brought in as necessary. The EI would ensure compliance with all applicable permit conditions. The EI would also ensure compliance with Columbia's Severe Weather Plan, which establishes best management practices to prepare for severe weather, and address potential effects resulting from severe weather events. In addition to the EI, Columbia's contractor would provide an environmental foreman to oversee the correct installation and maintenance of erosion control devices. Environmental inspection staff would also be on site during construction at aboveground facilities to ensure environmental compliance.

To ensure environmental compliance, Columbia's contractor and the contractor's environmental foreman would receive training on Columbia's plans and construction methods/procedures. This training would include requirements for compliance with all applicable permits.

Following construction, Columbia would continue to inspect the construction work areas to ensure construction-related impacts are identified and addressed. The inspectors would continue to monitor the right-of-way until all permit requirements that are applicable to erosion and sediment control, stabilization, and restoration are satisfied. Weekly inspections of erosion control devices and post-rainfall inspections would be conducted by the inspectors. The inspectors would also generate reports and punch lists, manage contractor maintenance and repairs of erosions control devices and/or re-seeding efforts, and facilitate agency site visits. After the restoration criteria are met, Columbia's operations personnel would continue to monitor the right-of-way on a routine basis and repair permanent erosion controls as necessary.

FERC staff would also conduct regular inspections throughout construction and restoration of the Project. FERC inspections would continue generally for two growing seasons at a minimum, until restoration is deemed successful. State and county officials may conduct additional inspections.

1.7.2 Operation and Maintenance Procedures

Columbia would operate and maintain the newly constructed pipeline facilities in the same manner it currently operates and maintains its existing system. Routine patrols would be conducted by personnel who are trained to perform both emergency and routine maintenance on pipeline facilities.

Permanent erosion control devices would be installed during right-of-way restoration and inspected during periodic pipeline and right-of-way patrols to ensure proper functioning. Conditions that require attention would be corrected.

1.8 Non-Jurisdictional Facilities

Two of the proposed compressor station modifications (Milford and Easton) would require upgrades of existing electrical infrastructure. Impacts could include the installation of additional poles or traffic impacts during any required upgrades. These impacts would be short term and minor. Such upgrades would result in minimal environmental effect beyond the boundary of the existing facilities.

1.9 Permits, Approvals and Consultations

Table 1.9-1 provides a list of the federal and state permits, approvals, and consultations identified by Columbia.

TABLE 1.9-1

Environmental Permits, Approvals, and Consultations

Agency	Permit/Approval/Consultation	Filing Date and Consultation	Anticipated Approval/ Authorization
Federal			
Federal Energy Regulatory Commission	Certificate under Section 7 of the Natural Gas Act	November 2013	Pending
U.S. Corps of Engineers - Philadelphia District	Authorization to discharge dredged or fill materials into waters of the United States under Section 404 of the Clean Water Act (33 USC § 1344)	November 2013	November 2014
National Marine Fisheries Service – Northeast Regional Office	Consultation under Section 7 of the Endangered Species Act and the Marine Mammal Protection Act (16 USC §§ 1531 et seq.)	September 19, 2013	September 23, 2013
U.S. Fish and Wildlife Service (FWS) – Pennsylvania Field Office	Consultation under Section 7 of the Endangered Species Act; the Migratory Bird Treaty Act; and the Fish and Wildlife Coordination Act (16 USC §§ 1531 et seq.)	July 23, 2013	Ongoing
FWS – New Jersey Field Office	Consultation under Section 7 of the Endangered Species Act; the Migratory Bird Treaty Act; and the Fish and Wildlife Coordination Act (16 USC §§ 1531 et seq.)	July 26, 2013	Ongoing
FWS – New York Field Office	Consultation under Section 7 of the Endangered Species Act; the Migratory Bird Treaty Act; and the Fish and Wildlife Coordination Act (16 USC §§ 1531 et seq.)	April 18, 2013	November 2014
FWS – Chesapeake Bay Field Office	Consultation under Section 7 of the Endangered Species Act; the Migratory Bird Treaty Act; and the Fish and Wildlife Coordination Act (16 USC §§ 1531 et seq.)	April 18, 2013	November 2014
New Jersey			
New Jersey Department of Environmental Protection (NJDEP) – Division of Land Use Regulation	Upland Waterfront Development Individual Permit	November 2013	November 2014
	Flood Hazard Area Individual Permit	November 2013	November 2014
	Freshwater Wetlands General Permit	November 2013	November 2014
	Tidelands License (NJSA 12:3)	November 2013	November 2014
	NJ Pollution Discharge Elimination System (NJPDES) Hydrostatic Test Water Discharge General Permit	November 2013	November 2014
NJDEP – Division of Water Quality	NJPDES Discharge to Surface Water Construction Dewatering General Permit	November 2013	November 2014
NJDEP – Historic Preservation Office	National Historic Preservation Act Section 106 Consultation	Initiated May 2013	Ongoing
NJDEP – Division of Parks and Forestry Natural Heritage Program	Consultation for NJ state-listed species	July 26, 2013	November 2014

TABLE 1.9-1

Environmental Permits, Approvals, and Consultations

Agency	Permit/Approval/Consultation	Filing Date and Consultation	Anticipated Approval/ Authorization
Pennsylvania			
Pennsylvania Department of Environmental Protection (PADEP) – Southeast Regional Office	Chapter 105 Water Obstruction & Encroachment Joint Permit	November 2013	November 2014
	Erosion & Sedimentation Control General Permit for Oil & Gas Activities (ESCGP-2)	November 2013	November 2014
	Air Quality Permit (Title V) or Registration	June 2014	November 2014
	National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges Resulting from Hydrostatic Testing of Tanks and Pipelines (PAG-10)	November 2013	November 2014
PADEP – Northeast Regional Office	Chapter 105 Water Obstruction & Encroachment General Permit 11	November 2013	November 2014
	Air Quality Permit (Title V) or Registration	June 2014	November 2014
	NPDES General Permit for Discharges Resulting from Hydrostatic Testing of Tanks and Pipelines (PAG-10)	November 2013	November 2014
	Consultation for Pennsylvania state-listed birds and mammals (34 Pa. CSA §§ 101 et seq.)	July 12, 2013	July 12, 2013
PA Game Commission – Division of Environmental Planning and Habitat Protection	Consultation for Pennsylvania state-listed fish, reptiles, amphibians, and aquatic organisms (30 Pa. CSA §§ 101 et seq.)	July 12, 2013	July 12, 2013
PA Fish and Boat Commission – Natural Diversity Section	Consultation for Pennsylvania state-listed plants, natural communities, terrestrial invertebrates and geologic features (32 PS §§ 5301 et seq.)	July 23, 2013	November 2014
State Historic Preservation Office – PA Historical and Museum Commission	National Historic Preservation Act Section 106 Consultation	Initiated May 2013	Ongoing
County			
Chester County Conservation District	Erosion and Sedimentation Control Plan (ESCP) Review	November 2013	November 2014
Gloucester County Conservation District	ESCP Review	January 2014	November 2014
Pike County Conservation District	ESCP Review	January 2014	November 2014
Northampton County Soil Conservation District	ESCP Review	January 2014	November 2014
Montgomery County Conservation District	ESCP Review, if applicable	January 2014	November 2014
Bucks County Conservation District	ESCP Review, if applicable	January 2014	November 2014

2.0 ENVIRONMENTAL ANALYSIS

2.1 Geology and Soils

2.1.1 Geology

The predominant unconsolidated surficial geologic materials present in the entire Project area (Line 10345 Loop and Line 1278 Loop) consist of alluvium, residuum, saprolite and colluvium derived from schist, granite, gneiss and other felsic, mafic and ultramafic igneous and metamorphic rocks (National Atlas 2013).

Physiography and Geologic Setting

Topography within the Project area ranges from nearly flat to very steep, with slopes ranging from 0 to 45 percent along the pipeline loops (USDA 2008). About 21 percent of the proposed pipeline routes would cross soils with an average slope of greater than 8 percent. Greater than 30 percent slopes along the pipeline loops are listed in table 2.1-1.

TABLE 2.1-1

Project Areas with Slopes Greater Than 30 Percent

	Beginning Milepost	Ending Milepost	Total Miles
Line 10345 Loop	4.70	4.74	0.04
	9.45	9.49	0.04
Line 1278 Loop	4.05	4.09	0.04
	4.36	4.41	0.05
	5.40	5.53	0.13

Source: USDA 2008

Mineral Resources

Review of the U.S. Geological Survey (USGS) Mineral Resources Data System, USGS topographic maps, and aerial photography indicates that no active mining or mineral resource areas are present within at least 2 miles of the Project facilities (USGS 2003; PADCNR 2013; NJDEP 2006). Oil or gas exploration and production in the vicinity of the Project has primarily been associated with resources in the Appalachian Basin located north and west of the Project area (Energy Information Services 2009). More recently, the Marcellus Shale has become a viable gas resource with the introduction of fracking technology (Maryland DNR 2014). However, the Marcellus Shale is not present in the Project area, except for Pike County, Pennsylvania (Delaware Riverkeeper Network 2014). Oil and gas production is not indicated to be historically economically viable in the Project area and wells are not expected to be present in the immediate area of the Project.

Geological Hazards

Geologic hazards are naturally occurring physical conditions that may result in damage to land and property or injury to people. In the Project area, these include seismic activity, flash flooding, soil liquefaction, landslides, and ground subsidence.

Seismic Hazards

Earthquake intensity is a measure of the extent to which man-made structures are damaged by a seismic event and generally depends on distance from the epicenter of that event. The Modified Mercalli Intensity (MMI) Scale ranges from an earthquake intensity value of I, in which the earthquake is not felt, to an intensity value of XII, in which damage is nearly total, large rock masses are displaced, and objects are thrown into the air (Cargo and Mallory 1977). An intensity value of V is "felt by nearly everyone; and dishes, windows, etc. may be broken."

There have been over one dozen earthquakes of intensity V or greater recorded in New Jersey in the past 150 years, including two more significant seismic events (intensity VI or greater) recorded in southwestern New Jersey (USGS 2008). An earthquake of intensity VII, was recorded in Salem County on October 9, 1871. On February 28, 1973, again in Salem County, there was an intensity VI earthquake with a magnitude of 3.8. These earthquakes occurred in the same local vicinity and are both more than 10 miles southwest of any portion of the Project in New Jersey, and are at least 20 miles southeast of any segment of the Project that lies in Pennsylvania (National Atlas 2013).

Several intensity V or greater earthquakes have also been recorded in Pennsylvania. The largest magnitude earthquake to originate near the Project area was recorded in Berks County on January 16, 1994 which is about 25 miles northwest of the Project area, with an intensity of V on the MMI scale and a magnitude of 4.6 (National Atlas 2013). Six earthquakes with lesser magnitudes and greater intensity levels were recorded in counties within 45 miles of the Project. Each of these six earthquakes had intensities of VI and occurred between 1889 and 1984. Based on the Seismic Source Zones Map provided in Algermissen et al. (1982), the Project area would likely experience about 33 intensity V (maximum magnitude of 7.3) earthquakes every 100 years.

The USGS-National Earthquake Hazard Reduction Program has developed a series of maps that depict the estimated probability that certain levels of ground shaking from an earthquake will occur within a given area over a period of time. Shaking or ground motion during an earthquake can be expressed in terms of acceleration due to gravity. According to the USGS National Seismic Hazards maps, the Project area is within an area where a 500-year earthquake (an earthquake with a 10 percent probability of occurring within any 50-year interval) would result in peak ground accelerations of 3 percent of gravity (USGS 2008), indicating a reasonably low-risk area for seismic activity.

Another indication of low seismic risk is the lack of any identified recent active faults in the Project area. The USGS Quaternary Faults and Fold Database describes faults and associated folds in the United States that are believed to be sources of earthquakes greater than magnitude 6 in the past 1,600,000 years. The database is intended to be an archive of historical (less than 150 years) and ancient earthquake sources that can be used in seismic-hazard analyses, such as those conducted when siting nuclear reactors; developing seismic design provisions for buildings, bridges, and utilities; and providing earthquake-preparedness education. The closest seismic feature identified was the Central Virginia seismic zone, about 190 miles southwest of the Project area (USGS 2006).

Soil Liquefaction

Soil liquefaction is a phenomenon often associated with seismic activity in which saturated, non-cohesive soils temporarily lose their strength and liquefy (i.e., behave like viscous liquid) when subjected to forces such as intense and prolonged ground shaking. Areas with the potential for soil liquefaction are:[11]

- underlain by Holocene deposits which are likely to be non-cohesive such as alluvial, lacustrine, and shoreline deposits;
- where the water table occurs at 10 feet or less below the surface; and
- where the USGS Open File Report 82-1033 (Algermissen et al. 1982) indicates a 10 percent probability that horizontal ground accelerations of 10 percent of gravity or greater would be exceeded in 50 years (referred to as "seismic threshold").

The water table in the Project area varies, and groundwater depths less than 10 feet below the surface occur in some locations, particularly along the Line 10345 Loop in New Jersey. However, the seismic threshold is not met anywhere in the Project area. Therefore, soil liquefaction is not a significant hazard in the vicinity of the Project.

Ground Subsidence

Common causes of ground subsidence include the presence of karst terrain, underground mining, and significant fluid withdrawal such as in oil-producing regions. Karst features such as sinkholes, caves, and caverns can form as a result of the long-term action of groundwater on soluble carbonate rocks (e.g., limestone and dolomite). Karst does not occur within the Project area in New Jersey; however, parts of the proposed Project facilities in Pennsylvania are considered to have the potential for karst features (National Atlas 2013). Mapping performed by the Pennsylvania Department of Conservation and Natural Resources indicated karst features and surface depression areas between MP 6.1 and MP 8.6.

The fact that pipelines are structurally strong and narrow in width greatly reduces the probability that a critical size sinkhole would develop in close enough proximity and affect the integrity of the pipeline. Steel pipe has considerable strength as a structural member. Allowable span lengths that would prevent over-stressing the steel depend upon pipe diameter, wall thickness, and soil conditions. If necessary, Columbia would make minor route adjustments to avoid sinkholes and/or develop specific design and monitoring criteria, which may include sinkhole stabilization and/or use of heavier wall pipe. If a karst feature is identified during construction or operation of the proposed facilities, Columbia would consult with the appropriate agencies in each state to identify suitable mitigation measures and obtain all necessary permits. A typical mitigation method would be to excavate the sinkhole to expose the throat, and then plug the throat using a graded rock fill. During hydrostatic testing of the pipeline, special care would be taken to avoid releasing large volumes of water onto land that is prone to sinkhole development. Columbia does not anticipate blasting in shallow bedrock areas to affect karst caves. Columbia has developed a Karst Terrain Plan that would be implemented if karst terrain is encountered.

[11] We define areas with potential for seismic soil liquefaction in the "Order Establishing Guidelines for the Submission of Required Data for Pipeline Projects" issued July 27, 1988.

Columbia has performed geotechnical borings along the Line 1278 Loop route, with the boring depths ranging from 14 to 200 feet. The Columbia geotechnical borings between MP 7.8 and MP 8.1 encountered voids ranging from a few inches to up to 3 feet. Based on review of the data and the boring logs, Columbia believes there is a low risk of karst-related collapse and a moderate risk of karst-related surface subsidence in this area. Columbia is currently reviewing the information provided by its consultant and would develop a plan to account for potential additional stresses to the pipeline from surface subsidence from MP 7.8 to MP 8.1. Because Columbia has not filed the geotechnical report and resulting plan, **we recommend that:**

- **Prior to construction of Line 1278 Loop, Columbia should file with the Secretary of the Commission (Secretary) for review and written approval by the Director of Office of Energy Projects (OEP), the geotechnical report for MPs 7.8 to 8.1 and any resulting plan to account for potential ground subsidence at this location.**

Underground mining poses risks to engineered structures due to the potential of the overlying strata to collapse into the void formed by the extraction of minerals. Review of available mining data indicates no underground mining activities are present in the Project area (National Atlas 2013). Therefore, the Project would not be susceptible to potential effects related to underground mining.

The Project would be located in a part of the country where regional subsidence due to past and/or present oil and gas production is not likely. Based on a review of available data, no indication of economically viable oil or gas production wells were identified in the vicinity of the proposed Project facilities.

Landslides

Landslides involve the downslope movement of earth materials under a force of gravity due to natural or man-made causes. Small, localized debris flows or slides may also occur in the vicinity of river and stream banks with steep slopes, particularly after intense precipitation events. Landslides in the immediate vicinity of the Project could result in an increase or decrease in the amount of overburden directly above pipeline facilities. Based on an analysis of the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (digital soil survey data), about 20 percent of the soils crossed by the Project pipeline loops have average slopes greater than 8 percent and would, therefore, be more susceptible to landslides. About 2 percent of the pipeline loops would cross soils with average slopes of greater than 30 percent (USDA 2008). These areas are shown by milepost in table 2.1-1. Areas of the Project identified on the National Atlas online database in 2013 identified the bank areas on the eastern side of the Delaware River as having moderate susceptibility to landslides. This area is in the vicinity of Line 10345 Loop's origin. However, the area of the proposed Line 10345 Loop is characterized by low slopes and occurrence of a landslide is therefore unlikely. The Line 1278 Loop crossing of the East Branch Brandywine Creek and its associated steep gully, located at approximate MP 4.5, is proposed using the HDD method, which would eliminate any ground disturbance in this area that could result in a landslide.

Columbia would monitor steep slopes and areas susceptible to slippage for any evidence of a potential problem. Columbia would evaluate the success of vegetation establishment and would reseed areas requiring additional seeding as soon as seasonal constraints allow.

Additionally, Columbia operations staff would conduct routine aerial inspections of the pipeline rights-of-way to identify any potential areas of concern. Any areas exhibiting excessive erosion or lack of vegetation would be repaired as soon as practicable.

Columbia has been operating existing pipeline facilities in this area (including 8 percent and 30 percent slope areas) since the 1940s and is not aware of any substantial slope failures that have occurred in the vicinity of the Project area. If a significant landslide hazard is identified during construction, Columbia would implement mitigation measures to stabilize these areas. A standard best management practice to mitigate increased erosion on steeper slopes is to install additional trench breakers. We conclude this best management practice would limit significant transportation of sediments in heavy precipitation events, and hence, would also limit the potential of landslides to occur.

Flash Flooding

Flooding associated with heavy rainfall can occur throughout the majority of New Jersey and Pennsylvania in the Project area with the greatest potential for flash flooding along waterbodies during or after a large storm event with significant precipitation over a short period of time. Flash flooding could potentially cause erosion of soils along waterbodies and exposure of the proposed pipeline facilities.

Flash flooding has not resulted in any significant damage to Columbia's existing facilities in the Project area or resulted in any service interruptions since its installation in the 1940s. Therefore, it is not anticipated that flash flooding is of significant concern to the Project.

About 14.6 percent of the Line 10345 Loop crosses the 100-year floodplain associated with Oldmans Creek and its tributaries or Lake Narraticon. About 9.6 percent of the Line 1278 Loop crosses the 100-year floodplain associated with East Branch Brandywine Creek and its tributaries or Beaver Creek.

We received several comments about flooding and the need for flood insurance. The Project pipeline facilities would be designed and installed in accordance with 49 CFR 192, which presents standards to provide adequate protection from washouts, floods, unstable soils, landslides, and other hazards that may cause the pipeline to move or to sustain abnormal loads. Columbia would monitor local weather conditions and forecasts during construction activities.

The pipeline would be buried and any surficial flooding would not affect the Project facilities. In particularly wet soils, the pipeline would be either concrete-coated or weighted to provide negative buoyancy. In most areas where such wet soils exist, the proposed construction method would be HDD. In instances where the HDD technique is utilized, the pipe would be at such depths that buoyancy from saturated soils would not be a concern. With implementation of these measures, we conclude that flooding would not affect the pipeline. Further, Columbia would obtain all necessary permits for floodplain crossings, as well as associated and required documentation to ensure that potential scouring during flood events would not expose the pipeline.

Blasting

An estimated 10 percent (1.89 miles) of the proposed Project pipeline loops cross areas with bedrock at depths of less than 60 inches (USDA 2008). This area of shallow bedrock is entirely along the Line 1278 Loop (MP 5.92 to MP 6.18). In addition to soils data available from

the USDA, core samples taken by Columbia near this area of the Project indicate that bedrock occurs between 11 and 18.5 feet below ground level. Rock samples collected to the north of the Line 1278 Loop consist of very dense gneiss, while samples collected to the south consist of highly fractured limestone. Although identified as being a potential blasting area, based on Columbia's engineering investigations and construction experience in this area, it is highly likely that the rock can be removed by mechanical means. However, the potential for blasting cannot be completely ruled out at this time. Blasting is not anticipated on the Line 10345 Loop or at any of the aboveground facility modifications.

Columbia would implement measures contained in its Blasting Plan for any areas requiring blasting. Columbia would comply with applicable federal, state, and local regulations governing the storage, handling, firing, and disposal of explosive materials. Columbia's contractors would use the minimum explosive charge necessary to fracture bedrock and keep shot rock from leaving the construction right-of-way. Blasting mats, consisting of cable-weaved used tires or other materials, would be used, as necessary, to prevent the scattering of rock and debris. Control of blasting would limit stresses on existing pipelines, nearby domestic structures, water supply wells, or electrical transmission tower footings located near the Project area.

Blasting would be conducted during daylight hours and would not begin until occupants of nearby buildings, stores, residences, places of business, and farms have been notified. Special care would be taken to monitor and assess blasting within 150 feet of buildings or other structures and water supply wells. If blasting is required within 150 feet of residential or commercial buildings, an independent contractor would be hired to perform pre- and post-blast structural inspections and, if necessary, seismographic monitoring. Where blasting has the potential to affect water quantity/quality from domestic or agricultural wells or springs in the proximity of the construction work area, Columbia would conduct pre- and post-blasting (within two months of construction work restoration) testing of water wells within an appropriate distance (typically 150 feet) of the construction site with landowner permission. These tests may include a pump inspection, peak particle velocity, flowrate, and bacteriological cultures. If a water well is damaged due to construction activities, Columbia would provide a temporary source of water and would compensate the owner for damages and/or repair the water supply.

Large rock not suitable for use as backfill material would not be permanently windrowed along the rights-of-way unless permission is secured from the landowner or land managing agency. Disposal of rock debris would be in areas approved by the individual landowners or land management agency in accordance with Columbia's ECS and regulatory requirements. Should Columbia have to dispose of excess rock outside of the rights-of-way, an approved landfill, gravel operation, or recycling facility would be utilized. If necessary, permits and clearances would be obtained for off-right-of-way disposal areas.

2.1.2 Soils

Soil types that occur within the Project area were identified using the USDA SSURGO database. Potential impacts on these soils from the Project are presented in this section.

Construction activities that would have the potential to impact soils and revegetation include clearing and grading, trenching, backfilling, and restoration. Potential short-term soil impacts include reduction of soil quality by mixing topsoil with subsoil or by bringing excess rocks to the surface, loss of soil due to water or wind erosion, and soil compaction due to heavy

equipment traffic. In addition, the presence of certain soil and topographic conditions (e.g., droughty soils and steep slopes) within the Project area could result in poor revegetation of the rights-of-way and temporary workspaces and pose certain hazards during construction and operation of the Project.

To minimize or avoid impacts on soils during construction, Columbia would implement its ECS that incorporates the soil mitigation measures in our Plan and Procedures and various erosion and sediment control measures in accordance with state and local regulations. Columbia would also develop Project-specific ESCPs, which would be submitted to the counties for review and approval. Erosion and sediment controls would be installed and maintained throughout construction and during post-construction monitoring until restoration efforts are considered stable. In addition, topsoil would be stored separately from subsoil to prevent mixing in agricultural and residential lands and where requested by the landowner.

Standard Soil Limitations

Construction and operation of the Project has the potential to affect several general soil characteristics. These include prime farmland soils, hydric soils, compaction-prone soils, highly water erodible and highly wind erodible soils, stony/rocky soils, shallow bedrock, and droughty soils with poor revegetation potential. Table 2.1-2 summarizes soil characteristics by pipeline loop. Aboveground facilities were not considered in this analysis because only a small portion of facility construction would occur outside the existing facilities' fencelines. The soils in aboveground facility areas have been previously disturbed and construction of this Project would not represent new impacts on soil resources.

TABLE 2.1-2

Summary of Soil Limitations Crossed by the Proposed Pipeline Loops [a/]

Facility	Total Length (miles)	Prime Farmland [b/]	Hydric [b/]	Compact. Prone [c/]	Highly Erodible		Droughty [f/]	Stony – Rocky [g/]	Shallow - to - Bedrock [h/]
					Water [d/]	Wind [e/]			
Line 10345 Loop	9.61	3.74	5.08	0.13	0	4.60	2.71	0	0
Line 1278 Loop	9.49	3.61	1.22	0	0.08	0	4.46	0.84	1.89
Total	**19.10**	**7.35**	**6.30**	**0.13**	**0.08**	**4.60**	**7.17**	**0.84**	**1.89**

[a/] Crossing lengths are presented in miles and include soils directly crossed by the proposed pipeline loops. It does not include aboveground facilities, access roads, or additional temporary workspaces. Values within a row do not add up to the total listed in the total column because soils may occur in more than one characteristic class or may not occur in any class listed in the table.

[b/] As designated by the NRCS.

[c/] Includes soils that have clay loam or finer textures in somewhat poor, poor, and very poor drainage classes.

[d/] Includes soils that have high soil erodibility due to the particular soil characteristics [(K) values >0.17].

[e/] Includes soils in wind erodibility groups 1 and 2 which are typically soils that are most susceptible to wind erosion that consist mostly of sand.

[f/] Includes coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained.

[g/] Includes soils that have either: 1) a very gravelly, extremely gravelly, cobbley, stony, bouldery, flaggy, or channery modifier to the textural class, or 2) >5 percent (weight basis) of rock fragments larger than 3 inches in the surface layer.

[h/] Includes soils that have bedrock within 60 inches of the soil surface.

Note: The numbers in this table have been rounded and as a result, totals shown may be slightly different from the actual total.

Prime Farmland

The USDA defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses" (USDA NRCS 2012). Prime farmland has an acceptable and reliable water supply from precipitation or irrigation, a favorable temperature and growing season, an

acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks (USDA NRCS 2012). The soil series that are categorized as prime farmland generally have good drainage characteristics and are on slopes not exceeding 8 percent. About 38 percent of land potentially affected by the pipeline loops is classified as prime farmland.

Columbia would segregate topsoil either from the full work area or from over the trench and trench spoil storage area in accordance with its ECS. About 93 percent of the soils that would be crossed by the pipeline loops have 12 inches or less of topsoil. About 23 percent of soils have less than 6 inches of topsoil. During backfilling, the subsoil and topsoil would be replaced in the proper order to help ensure post-construction revegetation success. Because topsoil would be returned and agricultural practices would not be prohibited, we conclude that Project effects on Prime Farmland would not be significant.

In fields with drain tiles and irrigation systems, pipeline construction would be conducted in accordance with Columbia's ECS. Should construction damage drainage tiles or irrigation piping, Columbia would repair or restore their function to original or better condition. Therefore, we conclude effects on drain tiles would not be significant during operation of the Project.

Hydric Soils

Hydric soils are, by definition, soils that are formed under conditions of saturation, flooding, or ponding long enough during the growing seasons to develop anaerobic conditions in the upper part of the soil column (USDA NRCS 2005). There are also soil series that based on their associations with other soils in the topographic landscape can have hydric inclusions. About 33 percent of the soils crossed by the proposed pipeline loops are considered hydric.

Due to extended periods of saturation, hydric soils can be prone to compaction and rutting as discussed below. Columbia would minimize rutting of hydric soils by implementing the measures outlined in its ECS. In addition, high groundwater levels associated with hydric soils could create a buoyancy hazard for the pipeline loops. Special construction methods and the use of concrete-coated pipe or other weighting methods would be used to prevent buoyancy hazards during installation and operation of the pipeline loops. Hydric soils associated with wetlands are discussed in section 2.2.1.

Compaction Prone Soils

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting. About 0.7 percent of the soils crossed by the proposed pipeline loops are compaction prone soils, of which all occur along the Line 10345 Loop.

Columbia would minimize compaction and rutting impacts by implementing mitigation measures in its ECS during construction in soft or saturated soils. Compaction impacts would be mitigated through the use of deep tillage operations during restoration, such as use of a paraplow or similar implement. In areas where topsoil segregation would occur, plowing with a paraplow or similar implement would be conducted before replacement of the topsoil to alleviate subsoil compaction.

The Line 1278 Loop would cross two parcels used by the Upper Uwchlan Township for spray and drip disposal of wastewater. Compaction would be detrimental to the operation of these fields. Currently, these fields are actively managed to prevent compaction from occurring. A wastewater reclamation area at approximate MP 1.05 is not currently active and would not be affected by the Line 1278 Loop. However, the pipeline loop would cross the wastewater reclamation area at MP 2.79. Columbia would reduce its workspace to the smallest possible footprint, per an agreement with township officials, to minimize effects through this disposal area. Columbia would test and mitigate, as necessary, for compaction according to its ECS during restoration.

Highly Erodible Soils (Wind and Water)

Soil erosion potential is affected by inherent soil characteristics such as texture, grain size and organic content, slope of the land, and the type and density of vegetative cover. Soil erosion increases in inverse proportion to the effectiveness of vegetation cover (i.e., soils with denser vegetation cover are less susceptible to erosion). Wind erosion processes are less affected by slope angles.

About 24 percent of the soils crossed by the proposed pipeline loops are susceptible to wind erosion, and a small percentage, 0.4 percent, of the soils are considered highly water erodible. About 20 percent of the rights-of-way are characterized by slopes greater than 8 percent. Columbia would minimize erosion impacts by using erosion control and soil conservation techniques during construction in accordance its ECS. Temporary erosion controls, including interceptor diversions and sediment filter devices (e.g., hay bales and silt fences) would be installed following initial ground disturbance. Where necessary, slope breakers and temporary sediment barriers would be constructed as detailed in Columbia's ECS and ESCPs to be developed in consultation with county conservation districts to direct water off the rights-of-way and to control the movement of sediment on the rights-of-way during construction. The effectiveness of temporary erosion controls would be monitored by the EIs and inspections would be conducted on a routine basis in accordance with Columbia's ECS. Except in active agricultural areas, temporary erosion control devices would be maintained until the rights-of-way are revegetated successfully. Once revegetated, temporary erosion control devices would be removed.

Stony/Rocky and Shallow Bedrock Soils

Construction through soils with shallow bedrock could result in the incorporation of bedrock fragments into surface soils. Introducing stone or rock fragments to the surface may reduce soil moisture-holding capacity and reduce soil productivity. In addition, stone or rock fragments in the surface layer have the potential to damage agricultural equipment.

About 10 percent of the soils within the Project area contain bedrock within 60 inches of the surface. In addition, approximately 4 percent of soils that would be crossed by the pipeline loops are considered stony/rocky soils. Columbia would minimize the mixing of excavated bedrock with backfill, and would remove excess rock from surficial soils in cultivated and rotated croplands, hayfields, pastures, residential areas, and per landowner request. Removal of excess rock would be conducted to ensure rock distribution is similar throughout the right-of-way with adjacent undisturbed areas. If bedrock is too hard or thick to use typical equipment to remove the rock, blasting may be required as discussed above in section 2.1.1.

Droughty Soils with Poor Revegetation Potential

Droughty soils having poor revegetation potential have coarse-textured surface layers, are moderately well to excessively drained, and can be difficult to revegetate. The drier soils have less water to aid in the germination and eventual establishment of new vegetation. The coarser textured soils have a lower water holding capacity following precipitation, which could result in moisture deficiencies in the root zone, creating unfavorable conditions for many plants. Successful restoration and revegetation is important for maintaining agricultural productivity and to protect the underlying soil from potential damage, such as erosion.

About 38 percent of the soils crossed by the proposed pipeline loops are considered droughty soils and could be difficult to revegetate. As mentioned above, about 20 percent of the proposed pipeline loops would be constructed on slopes greater than 8 percent, thereby making it more difficult to revegetate. Columbia would implement general and site-specific measures to create a favorable environment for the re-establishment of vegetation in accordance with its ECS.

Following final grading and cleanup, Columbia would condition the right-of-way for planting including preparation of a seedbed and the application of soil amendments at rates agreed to by the landowner, land management agency, or county conservation districts. Seed mixes, rates and dates would be as permitted by the appropriate agencies or as approved by the county conservation districts. Seeding would not be conducted in actively cultivated croplands unless specified by the landowner. In areas where erosion potential is greater due to steep slopes or other reasons, Columbia would uniformly spread mulch over the ground surface to minimize the effects of water and wind erosion and preserve moisture in the soil.

Revegetation efforts would be considered successful when the density and cover of non-nuisance vegetation is similar to adjacent undisturbed areas. Revegetation efforts would be confirmed through post-construction monitoring as outlined in Columbia's ECS.

Inadvertent Spills or Discovery of Contaminants

Other potential impacts during construction would include the accidental release of petroleum hydrocarbons or other hazardous materials, as well as discovery of contaminated soils during trench excavation and grading activities.

Soil contamination during construction could result from spills or leaks of fuels, lubricants, and coolant from construction equipment. This could adversely affect soils in the immediate vicinity. 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 SPCC Plan that specifies cleanup procedures in the event that leaks or spills associated with construction occur. Columbia and its contractor would use the SPCC Plan to contain and dispose, if necessary, of any material that may contaminate soils.

Columbia conducted federal and state environmental database reviews to identify known areas of contamination and/or potentially contaminated soils along the proposed pipeline loops. The results of the database search identified 16 known hazardous waste sites within 0.5 mile of the Project. However, no Project facilities would cross any known hazardous waste sites. If contaminated or suspect soils (e.g., oil-stained soils) were identified during trenching operations, Columbia would halt work in the area of the suspected contamination until the type and extent of the contamination was determined. Columbia would notify the applicable state agency and the

FERC, and the response action would be identified based on the type and extent of contamination; the responsible party; and local, state, and federal regulations.

Right-of-Way Restoration

Columbia's ECS includes several alternative measures to our Plan and Procedures that it would implement during right-of-way restoration. These alternative measures are identified by struck out text in the ECS (see appendix B). We have identified several deficiencies or inconsistencies with regards to the alternative measures, as described below. To date, Columbia has not provided sufficient justification for these alternative measures, as described below.

Columbia proposes to bury stumps and large rocks within the construction work area with landowner approval except in agricultural, residential, or wetland areas. This method of disposal of construction debris is an unacceptable restoration practice.

Columbia's ECS strikes out the right-of-way restoration timing requirement that is included in our Plan. It is necessary to include a timing requirement to ensure that right-of-way restoration is completed in as timely a manner as feasible, and to apply a consistent performance metric for compliance purposes.

Columbia's ECS uses various definitions to determine success of revegetation efforts in agricultural areas. A single definition is required to ensure monitoring and signoff of successful right-of-way revegetation is adequate.

Columbia's ECS states that mowing and clearing of riparian areas is *restricted to* April 15–August 1 of any year. For consistency with our Procedures, mowing and clearing of riparian areas is *prohibited* between April 15-August 1 of any year.

To ensure Columbia's ECS is consistent with our Plan and Procedures, and provides equal or better protection to resources, **we recommend that**:

- **Prior to construction, Columbia should file with the Secretary a revised ECS for review and written approval by the Director of OEP that includes the following:**

  a. a statement that burial of construction debris, including large rocks and stumps, within the construction work area is an unacceptable method of disposal;

  b. a statement that final grading will be completed within 20 calendar days of backfilling (10 days in residential areas), weather and soil conditions permitting;

  c. a definition of vegetation success in agricultural areas that is consistent with the 2013 Plan (revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise); and

  d. a statement that mowing and clearing of riparian areas is prohibited between April 15-August 1 of any year.

We have determined that no significant effects on soils would result due to the construction of the Project because Columbia would:

- return the right-of-way and extra workspaces as closely to preconstruction contours as feasibly possible;
- stabilize soils and control erosion by the use of our Plan and Procedures, implementing Columbia's ECS, our recommended additional measures, and the county conservation district approved ESCP;
- segregate and replace topsoil in agricultural land, residential areas, and at the request of landowners;
- de-compact soils in agricultural and residential areas, if compaction occurs; and
- repair drainage systems if damage is incurred during construction.

2.2 Water Resources and Wetlands

2.2.1 Surface Water Resources

As identified in tables 2.2-1 and 2.2-2, the pipeline would cross 40 perennial, intermittent, and ephemeral waterbodies. All waterbodies crossed would be within the Delaware River Basin. No waterbodies would be crossed by the Project in Maryland and New York though minor impacts to the buffer area at some streams may be affected. The following discussion focuses on waterbodies directly crossed by the proposed pipelines.

New Jersey Surface Water Resources

The Project would include 13 waterbody crossings along the New Jersey portion of the Line 10345 Loop. Standards or regulations for turbidity, total suspended solids (TSS), and total dissolved solids (TDS) have been established on a statewide basis for New Jersey waters. Waterbodies classified as Freshwater 2 (FW2) are subject to the following restrictions: maximum 30-day average of 15 nephelometric turbidity units (NTU) or a maximum of 50 NTU at any time. For saline estuarine waters, levels shall not exceed a maximum of 30 NTU at any time. For TSS, FW2 waters are not exceed 40 milligrams per liter (mg/L). TDS concentrations for FW2 waters should not interfere with compliance with the designated uses for the waterbody or should not exceed 500 mg/L, whichever is more stringent. For waterbodies classified as saline estuarine (SE) waters in New Jersey, TSS and TDS concentrations should not exceed levels that would render the water unsuitable for the waterbodies designated uses.

TABLE 2.2-1

Surface Water Crossings in New Jersey

Waterbody Name	MP	Waterbody ID	Flow Regime	State Designation [a/]	Crossing Width (feet)	Crossing Method [b/]
UNT to Oldmans Creek	2.2	S300NJ	Perennial	FW2-NT/ SE1	15	Open-cut
UNT to Oldmans Creek	3.0	S302NJ/ W303NJ PEM Complex	Perennial	FW2-NT/ SE1	383	HDD
Ebenezer Branch	3.6	S303NJ	Perennial	FW2-NT/ SE1	104	HDD
UNT to Oldmans Creek	4.4	S305NJ	Perennial	FW2-NT/ SE1	77	HDD
UNT to Oldmans Creek	4.3	S304NJ	Perennial	FW2-NT/ SE1	4	HDD
Indian Branch	4.7	S306NJ/ W313NJ PEM Complex	Perennial	FW2-NT/ SE1	77	HDD
UNT to Oldmans Creek	5.1	S904NJ	Perennial	FW2-NT/ SE1	3	Open-cut
UNT to Oldmans Creek	5.6	S905NJ	Perennial	FW2-NT/ SE1	4	HDD

TABLE 2.2-1

Surface Water Crossings in New Jersey

Waterbody Name	MP	Waterbody ID	Flow Regime	State Designation [a/]	Crossing Width (feet)	Crossing Method [b/]
UNT to Oldmans Creek	6.6	S901ANJ	Ephemeral	FW2-NT/ SE1	5	Open-cut
UNT to Oldmans Creek	6.6	S901NJ	Intermittent	FW2-NT/ SE1	1	Open-cut
UNT to Church Run	8.3	S309NJ	Perennial	FW2-NT	1	Open-cut
Church Run	8.5	S310NJ	Perennial	FW2-NT	4	Open-cut
UNT to Lake Narriticon	9.5	S115ANJ	Perennial	FW2-NT	12	HDD

[a/] FW2-NT = Freshwater-2 Non-Trout Waters, SE=Saline Estuarine waters, PEM=palustrine emergent.
[b/] In some locations more than one waterbody would be crossed by a single HDD.
UNT=unnamed tributary.

Pennsylvania Surface Water Resources

The Project would cross 27 waterbodies in Pennsylvania along the Line 1278 Loop. Beaver Creek would be crossed three times. The waterbody classification system in Pennsylvania is based on fishery type and includes classifications based on warm water, cold water, and migratory fish assemblages (see also section 2.3 of this EA). All waterbodies crossed by the Project in Pennsylvania are classified as freshwaters. Pennsylvania has a freshwater TDS standard of average of 500 mg/L and a maximum of 750 mg/L (PA Code 93.7a-93.7c). Currently, no statewide turbidity or TSS standard has been established; however, a water quality narrative statement (PA Code 93.7c) is provided as the general criterion. It establishes that non-listed substances may not be harmful or injurious to the existing or designated water uses.

TABLE 2.2-2

Surface Water Crossings in Pennsylvania

Waterbody Name [a/]	MP	Waterbody ID [a/]	Flow Regime [f/]	State Designation [b/]	Crossing Width (feet) [c/]	Crossing Method [d/]
UNT to Pickering Creek	0.3	S200PA	Intermittent	HQ-TSF, MF	3	Open-cut
UNT to Marsh Creek	1.4	S203PA	Intermittent	HQ-TSF, MF	1	Open-cut
UNT to Marsh Creek	2.1	S205PA	Perennial	HQ-TSF, MF	5	HDD
UNT to Marsh Creek	2.7	S201PA	Perennial	HQ-TSF, MF	4	HDD
UNT to E Branch Brandywine Creek	3.6	S202PA	Intermittent	HQ-TSF, MF	1	Open-cut
Shamona Creek	4.5	S206PA	Perennial	HQ-TSF, MF	43	HDD
E Branch Brandywine Creek	4.6	S207PA	Perennial	WWF, MF	324	HDD
UNT to E Branch Brandywine Creek	4.8	S208B [d/]	Ephemeral	HQ-TSF, MF	TBD	HDD
UNT to E Branch Brandywine Creek	4.8	S208PA	Perennial	HQ-TSF, MF	9	HDD
UNT to E Branch Brandywine Creek	5.1	S226PA	Ephemeral	HQ-TSF, MF	1	Open-cut
UNT to E Branch Brandywine Creek	5.2	S211PA	Intermittent	HQ-TSF, MF	2	Open-cut
UNT to E Branch Brandywine Creek	5.4	S3ALT	Intermittent	HQ-TSF, MF	2	Open-cut

TABLE 2.2-2

Surface Water Crossings in Pennsylvania

Waterbody Name [a/]	MP	Waterbody ID [a/]	Flow Regime [f/]	State Designation [b/]	Crossing Width (feet) [c/]	Crossing Method [d/]
UNT to E Branch Brandywine Creek	5.5	S2ALT	Perennial	HQ-TSF, MF	27	Open-cut
UNT to E Branch Brandywine Creek	5.6	S401PA	Ephemeral	HQ-TSF	3	Open-cut
UNT to E Branch Brandywine Creek	6.0	SWA400PA	Swale	HQ-TSF	TBD	Open-cut
UNT to E Branch Brandywine Creek	6.1	S400PA	Ephemeral	WWF-TSF	4.3	Open-cut
UNT to E Branch Brandywine Creek	7.1	S300PA	Intermittent	CWF, MF	2	Open-cut
UNT to E Branch Brandywine Creek	7.2	S300CPA	Ephemeral	WWF-TSF	1	Open-cut
Beaver Creek	7.8	S216PA	Perennial	CWF, MF	97	Direct Pipe
Beaver Creek	8.1	S216PA	Perennial	CWF, MF	29	Direct Pipe
Beaver Creek	8.1	S216PA	Perennial	CWF, MF	41	Direct Pipe
UNT to Beaver Creek	8.2	SWA300 [e/]	Swale	CWF, MF	TBD	Open-cut
UNT to Beaver Creek	9.1	S220PA	Swale	CWF, MF	TBD	Open-cut
UNT to Beaver Creek	9.4	S219PA	Intermittent	CWF, MF	1	Open-cut
UNT to Marsh Creek	2.3	S1ALTPA	Perennial	HQ-TSF	5	Culvert
UNT to Vantine Brook	NA	S1PA	Perennial	HQ-CWF	2	Open-cut
Hazelbach Creek	NA	S600PA	Perennial	HQ-TSF	15	Existing culverted crossing

[a/] Not all waterbodies in this table would meet the criteria for a waterbody as defined by the FERC Procedures, at the time of construction. UNT=unnamed tributary

[b/] HQ= High Quality, TSF= Trout Stocked Fishery, WWF- Warm Water Fishery, CWF= Cold Water Fishery, MF= Migratory Fishery

[c/] Waterbodies on denied survey access properties have been digitized based on USGS topographic mapping and crossing widths are listed as TBD.

[d/] In some locations more than one waterbody would be crossed by a single HDD.

[e/] Waterbody within the construction right-or-way.

[f/] Swales are not well defined channeled features, and crossing length could not be defined as these feature may not have met the definition of a waterbody at the time of survey

One perennial waterbody, an unnamed tributary to Vantine Brook (S1PA), is located within the work area for the Milford Compressor Station and would be temporarily affected as a result of the interconnect piping construction.

Sensitive Waters or Special Status Waters

In New Jersey, the Line 10345 Loop would be within the New Jersey Department of Environmental Protection (NJDEP) Watershed Management Area (WMA) #18, the Lower Delaware. Included in this WMA are Oldmans Creek and Raccoon Creek. Oldmans Creek drains an area of 44 square miles and flows on the Coastal Plain to the Delaware River. The Raccoon Creek Watershed is about 40 square miles and drains central Gloucester County, flowing to the Delaware River.

In Pennsylvania, the Line 1278 Loop would cross the headwaters of Pickering Creek and the main channels of East Branch Brandywine Creek and Beaver Creek. All three of these waters and their tributaries are Approved Trout Waters (Trout Stocked Fishery [TSF]). Waters between Dorlan Mill Road and Highway 30 flow into East Branch Brandywine Creek, which is designated as High Quality Trout Stocked Fishery (HQ-TSF) in the northern section and WWF (Warm Water Fishery)-TSF in the southern section. Waters south of Highway 30 flow into Beaver Creek are designated as CWF (Cold Water Fishery)-TSF (PA Bulletin 2010). Columbia has completed its final design of the trenchless construction method proposed for the multiple crossings of Beaver Creek but has not filed this with the Commission for our review. Therefore, **we recommend that:**

- **Prior to construction of Line 1278 Loop, Columbia should file with the Secretary for review and written approval by the Director of OEP a site-specific plan for crossings of Beaver Creek that identifies the proposed trenchless construction technique.**

Numerous commenters have expressed concerns over potential effects of the Project on the East Branch of Brandywine Creek. The FERC recognizes these concerns and the proposed crossing of the East Branch of Brandywine Creek would be through the use of HDD methods thereby minimizing construction related effects to this waterbody. The East Branch Brandywine Creek is listed as a Pennsylvania Scenic River in its Lower Brandywine section; however, the Line 1278 Loop would not cross the Lower Brandywine section of the creek and would not have any effect on the designated scenic reach of the East Branch of Brandywine Creek.

Blasting in Waterbodies

Two waterbodies (identified as SWA400 and S400PA) along the Line 1278 Loop would be crossed in areas with shallow bedrock (approximate MP 6.0 and MP 6.1 on the Line 1278 Loop). These two waterbodies are both unnamed tributaries to the East Branch of Brandywine Creek. This area of shallow bedrock may be excavated by mechanical means. However, in the event that the bedrock cannot be excavated mechanically, blasting may be required through these waterbodies. Columbia would implement measures contained in its Blasting Plan in any areas where blasting may be required.

Crossing Methods for Waterbodies

Waterbodies would be crossed using the open-cut method, conventional bore, HDD and the direct pipe method. Crossing methods at individual waterbodies are detailed in tables 2.2-1 and 2.2-2. A detailed summary and description of the construction techniques is provided in section 1.0 of this EA and summarized below. All streams that have perceptible flow at the time of crossing and proposed for open-cut would be crossed using a dry-ditch method, which includes the dam-and-pump or flume method. Where this method is employed, ATWS would be required for assembly of the pipe strings and for temporary storage areas for stockpiled spoil. HDD and direct pipe methods would involve the installation of the pipeline beneath waterbodies, thereby avoiding direct disturbance of aquatic resources or resuspension of sediments containing potential contaminants. The Project would not cross any impaired streams in New Jersey and seven of the stream crossing would be constructed using the HDD method. In Pennsylvania, a total of six stream crossings would be constructed by HDD and three by trenchless methods. Three of these streams or creeks are listed as impaired waters with associated total maximum

daily loads (TMDLs) for the identified impairments. These streams include Shamona Creek (S206PA), East Branch Brandywine Creek (S207PA) and Beaver Creek (S216PA). These TMDLs applied to the main segments or discrete segments of these waterbodies based on Section 305(b) and 303(d) reports for Pennsylvania waters and not to unnamed tributaries. Those segments with TMDLs have been identified for crossing by HDD or trenchless methods to eliminate potential resuspension of sediments in the impaired segments.

Waterbody Construction Effects and Mitigation

Constructing the pipelines using the dry-ditch method would temporarily affect waterbody flow and quality. Operating the pipelines would not affect waterbodies. Construction activities (including blasting, trenching, and the general use of construction equipment) would disturb river/creek beds and banks, and increase erosion and sedimentation potentials. Increased sedimentation and the disruption of water flow could increase turbidity levels and adversely affect water quality (temperature and dissolved oxygen concentrations). Water quality could also be affected by the inadvertent release of equipment-related fluids.

Although the HDD method generally avoids impacts on water quality by precluding disturbance of the waterbody bed and banks, an inadvertent release of drilling fluid could occur if drilling fluids escape the drill hole and are forced to the surface. In the event of an inadvertent discharge/fill in wetlands or waterbodies as a result of HDD activities, Columbia would contact the following agencies, as appropriate based on the location of the discharge, by phone immediately but no later than 24 hours: USACE, Pennsylvania Department of Environmental Protection (PADEP), Pennsylvania Fish and Boat Commission (PFBC), NJDEP, NJDEP Division of Fish and Wildlife (NJDFW), and the FERC. The U.S. Fish and Wildlife Service (FWS) would also be contacted in the event of a release within known habitat of a federally listed species. The release could result in a plume of elevated TSS and turbidity to extend from the release point downstream during the inadvertent release. In order to minimize potential impacts of inadvertent releases of drilling fluids, Columbia would implement measures identified in its HDDCP. If an inadvertent release is detected, drilling would stop or pressure would be reduced such that the leak would stop. Drilling mud would be contained and cleaned up, followed by restoration. Once drilling has stopped and the drilling mud release ended or contained, TSS and turbidity levels would be expected to return to pre-release levels.

Sediment Impacts

Using methods of construction as described above would decrease the amount of sediment that would otherwise get suspended in the water column from a wet open-cut crossing. These methods would not only decrease turbidity in the stream that could affect aquatic life, but would also decrease the chances for disturbing any contaminants that are already present in the sediments of the streambed. The Project does not cross any impaired streams in New Jersey. In Pennsylvania, Columbia proposes to cross seven of the eight impaired or TMDL listed streams by HDD or direct pipe method.

Construction-Related Disturbance Impacts

Alteration of the waterbody banks and removal of riparian vegetation would affect bank stability. If not stabilized and revegetated properly, soil erosion associated with surface runoff and waterbody bank sloughing could result in deposition of riparian soils and rocks along the shoreline and deposition of eroded soils downstream of the crossings. The accumulated

soils/sediments and debris could act to smother or alter benthic macroinvertebrate communities outside the crossing disturbance footprint where these deposits accumulate. A Project-specific ESCP would be prepared for review and approval by the counties. The ESCP would incorporate various erosion and sediment control measures as required by state regulations and requested by the counties. Measures, such as minimization of clearing of streamside vegetation, installation and maintenance of temporary and permanent erosion controls, and minimization of the duration of in-stream construction would be included in the ESCP. Disruption of the waterbody would be limited to only that which is necessary to construct the crossing, reducing the suspension and deposition of sediments downstream of the crossing location. Columbia would maintain adequate flow rates in streams to limit the potential effects to aquatic life and downstream users.

To avoid and minimize effects on waterbodies, Columbia would construct the pipeline facilities in accordance with its ECS, which incorporates our Procedures and appropriate federal and state requirements, and the measures described in its ESCP, SPCC Plan and other Project-specific plans. These measures include:

- requiring temporary erosion and sediment control measures installed and maintained across the construction right-of-way;
- maintaining adequate waterbody flow rates throughout construction;
- requiring completion of construction within specific time frames based on specific crossing lengths;
- confining/minimizing potential blasting activities to only two waterbody segments;
- implementing best drilling (HDD and direct pipe) practices, monitoring, and responding to inadvertent drilling mud returns;
- routinely inspecting equipment fluid tanks and storage areas for leaks, and storing fuel, lubricants, and hazardous materials in upland areas at least 100 feet from waterbodies and wetlands; and
- responding quickly to leaks and spills by implementing the containment, countermeasure, and cleanup measures outlined in the SPCC Plan.

Columbia has requested an alternative measure from section V.B.2.a of our Procedures for the ATWS within 50 feet of wetlands and waterbodies for 2 locations along the Line 10345 Loop for a HDD pullback (MP 4.9) and a school parking lot crossing (MP 6.8). An alternative measure was also requested at 5 locations along the Line 1278 Loop. These areas are required for a HDD pullback (MP 0.8), road crossing (MP 1.0), stream crossing (MP 5.6), Highway 30 bore (MP 6.3), and the direct pipe at Beaver Creek (MP 7.7). We have reviewed these ATWS locations and conclude the reduced setbacks are justified. Implementation of the Project ECS and ESCP would mitigate potential effects to resources in these areas.

Use of multiple construction techniques in crossing the affected waterbodies would allow for the most efficient crossing while also minimizing the environmental effects to the water bodies crossed by the pipeline. The use of HDD and trenchless construction techniques would avoid effects to the most sensitive waterbodies crossed including the East Branch of Brandywine Creek and avoid the disturbance of contaminants in TMDL listed waterbodies. Implementation of the Project ESCP and ECS as proposed by Columbia would also minimize the potential effects of erosion and scouring during and after installation at each of the crossings.

Following construction, waterbody crossings would be inspected on a regular basis to verify that temporary erosion controls are functioning properly and revegetation is progressing. At a minimum, the EI would conduct post-construction inspections at waterbodies on a weekly basis until the Project restoration criteria have been satisfied. Based upon these measures and construction protocols, we have determined that Project impacts on waterbodies would not be significant.

2.2.2 Groundwater

Aquifers

The Project area would be above carbonate and crystalline aquifers. Carbonate aquifers are made up of limestone and dolomite. Water in carbonate aquifers is very hard with more than 250 mg/L dissolved solids. Crystalline aquifers are composed of schists or other metamorphic or igneous rocks, with the water containing less than 200 mg/L dissolved solids. Some water of the crystalline aquifers can be moderately hard water with high iron concentrations. Depths of these aquifers range from 75 feet to 250 feet; and well yields can range from 5 to 500 gallons per minute (Penn State 2007).

One of the five major aquifers in the New Jersey Coastal Plain Aquifer System is the Potomac-Raritan-Magothy (PRM) aquifer located in the area of the Line 10345 Loop. The PRM aquifer system is the most widely used aquifer in the Coastal Plain, but it is not the primary source of drinking water for every county in the entire Coastal Plain area. In the Delaware Valley, three aquifers have been distinguished within the PRM system, designated as lower, middle, and upper, and there are two confining units or layers between the three water-bearing strata. The aquifers themselves are made up largely of sands and gravels, locally interbedded with silt and clay. Depths to groundwater in the PRM aquifer extend to more than 100 feet below ground surface (Navoy and Carleton 1995). The upper aquifer is about 0 to 90 feet thick and the middle aquifer outcrop is about 0 to 200 feet thick and both are used for drinking water. The lower aquifer sits on the bedrock surface; it is saline and not used for human consumption.

Line 1278 Loop in Chester County, Pennsylvania is located in an area of pre-Cambrian bedrock consisting of metamorphic and igneous rock (Lohman 1941). These rocks yield small quantities of water that are generally only sufficient for domestic use.

Springs

No springs or seeps have been identified within 150 feet of the proposed Project facilities. The PADEP Northeast Region (2013) identified two public water supply springs (#1 and #2) greater than 150 feet from, but within 3 miles of the Milford Compressor Station Project area. The compressor station is already present and the Project would include upgrades to the facility that would not require an expansion of the facility fence line. The existing facility has not affected area springs or groundwater. We conclude that the proposed upgrades, with the implementation of proposed erosion control measures, would not affect these water supply springs.

Sole Source Aquifers and Wellhead Protection Areas

The U.S. Environmental Protection Agency (EPA) defines a sole or principal source aquifer as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas can have no alternative drinking water source(s) that could

physically, legally, and economically supply all those who depend upon the aquifer for drinking water. All designated sole or principal source aquifers are referred to as "sole source aquifers" (SSA). Risks to an SSA from pipeline construction include spills of fuel and other hazardous materials.

According to the EPA Sole Source Aquifer Program (EPA 2014), there is only one SSA located near the Project area, the New Jersey Coastal Plain Aquifer System. Although the Line 10345 Loop would be constructed over the New Jersey Coastal Plain SSA, the pipeline trench depth is not expected to exceed 10 feet and would be well above the aquifer. Furthermore, Columbia would not store any fuel or other hazardous materials within 200 feet of any private well or 400 feet of any public well and would follow its Project-specific SPCC Plan for refueling of equipment.

Columbia has consulted with the NJDEP and searched publicly available data within the New Jersey Division of Water Supply and Geoscience and determined that the proposed Project is within two overlapping wellhead protection areas near MP 1.0 (NJDEP 2013a). The Environmental Resource Inventory for Logan Township also has a record of the wellhead protection areas for these two community water supply wells (Well Nos. 3009444 and 3014797) located near the intersection of Center Square Road and Birch Creek Road (east of approximate MP 1.25). The two wells are not within the Project construction limits and would not be affected by Project construction or operation.

The Delaware River Basin Commission has designated a portion of the Delaware River Basin as the Southeastern Pennsylvania Groundwater Protected Area (GWPA) (PADEP 2012). The southernmost portion (MPs 8.25 to 8.9) of the Line 1278 Loop would be located in the GWPA. The proposed Line 1278 Loop falls within the 0.5-mile Zone II wellhead protection area (WHPA) of three wells, and crosses the 400-foot Zone I WHPA of one of these wells (PADEP 2014). Columbia would follow its SPCC Plan that includes best management practices to prevent the release of contaminants and avoid effects to subsurface flows.

Hydrostatic Testing

After cleaning, the pipelines would be tested to verify integrity and to ensure its ability to withstand the designed maximum operating pressure. The source for hydrostatic test water would be municipal sources. Test water would be withdrawn from municipal supplies and pumped into the test section behind a fill pig. Test water would contact only new pipe. After testing is completed, the line would be depressurized and the water discharged by means of displacement pigs. Test water discharge would be in accordance with applicable state water regulations and federal and state discharge permitting requirements. The hydrostatic test water would typically be discharged into a well-vegetated upland area adjacent to the right-of-way. Discharge waters would be dispersed by an energy dissipating device to minimize erosion and sedimentation, and provide additional filtering. All required permits for a surface water discharge would be acquired prior to discharge. Test water would not be discharged directly into streams/rivers unless permitted to do so. If the water is discharged into a dry waterway (e.g., intermittent stream), the discharge rate would not exceed the flow of the stream during normal flow periods.

Groundwater Hazards

According to the NJDEP Geo-Web mapping tool database (NJDEP 2013b), there are no areas of contaminated groundwater or Classification Exception Areas within the vicinity of the Line 10345 Loop. Currently Known Extent areas are geographically defined areas where the local groundwater resources are known to be compromised, because the water quality exceeds drinking water and groundwater quality standards for specific contaminants. There are no Currently Known Extent areas along the Line 10345 Loop (NJDEP 2014). Based on information received from PADEP (2014), several areas of potential affected groundwater or soils in the vicinity of the Line 1278 Loop were identified. The majority of the mapped locations identified by the PADEP were previously identified by Environmental Data Resources, Inc. (EDR 2013). The only exception is one EPA Toxic Release Inventory Site located about 150 to 350 feet north of MP 6.5 along U.S. Highway 30. The site might only be indicative of an inventoried regulated site, and there is no further information available at this time to indicate the site poses a contamination concern.

Columbia does not anticipate any potential issues relative to contaminated groundwater during construction and operation of the Project facilities due to the shallow nature of this type of construction. However, if during construction, Columbia encounters any groundwater with a distinct odor or unusual visual appearance, Columbia would stop work, notify the appropriate state and federal agencies, and proceed in accordance with local, state, and federal regulations.

Public and Private Water Supply Wells

In the area of the Line 10345 Loop, all public and private wells in Woolwich Township and Swedesboro in Gloucester County, New Jersey draw water from the PRM aquifer (NJDEP 2013b). Older undocumented private wells near the Line 10345 Loop may tap a shallow aquifer above the PRM. In more developed portions of Logan Township, public drinking water is supplied by the New Jersey-American Water Company-Logan System and draws water from the Middle PRM aquifer. Less developed areas of Logan Township use private groundwater wells. Consultation with the NJDEP indicates that no public water supply wells occur within 150 feet of the Project. However, in Logan Township, two New Jersey Public Community Water wells (Well No. 30-09444 and 30-14797) are located about 900 feet northeast of the Line 10345 Loop at approximate MP 1.3. These wells would not be affected by construction.

In New Jersey, private well registration is considered sensitive and therefore is not publicly available. Columbia would conduct pre-construction surveys to ensure that water wells are not located in close proximity to pipeline construction areas.

Columbia is consulting with the PADEP regarding wells in the vicinity of the Easton and Eagle Compressor Stations in Pennsylvania. Based on a PADEP eMapPA query (2013), there are no groundwater wells within 3 miles of the Pennsburg or Quakertown M&R Stations in Pennsylvania. Table 2.2-3 identifies groundwater wells within 150 feet of the construction right-of-way for Loop Line 1278, based on information obtained from the Pennsylvania Department of Conservation and Natural Resources (PADCNR 2014) and field surveys. None of these wells are located within Project workspaces.

TABLE 2.2-3

Groundwater Wells within 150 feet of the Line 1278 Loop – Chester County, Pennsylvania

Well ID	MP	Well Depth (ft)	Depth to Bedrock (ft)	Well Yield (gpm)	Static Water Level (ft)	Water Level (ft)	Water Use	Location Relative to Workspace
479134	0.4	200	41	30.0	0.0	0	Domestic	25’ east
12885	0.6	0	0	0.0	0.0	0	N/A	140’ west
494983	0.0	200	100	10.0	40.0	126	Domestic	49’ west
12490	1.7	123	0	6.0	40.0	122	Domestic	75’ west
477254	4.4	260	23	10.0	0.0	0	Domestic	90’ west
104609	8.2	30	0	0.0	0.0	0	Industrial	10’ west
104611	8.3	20	0	0.0	0.0	0	Industrial	125’ west
251651	8.3	180	0	0.0	0.0	0	Commercial	135’ west
12791	9.4	315	0	21.0	12.0	180	Public Supply	90’ west
10544	9.4	126	0	18.0	10.0	80	Public Supply	90’ west
10543	9.4	105	0	22.5	6.0	81	Public Supply	90’ west
12792	9.4	166	0	6.0	5.0	40	Public Supply	90’ west
112563	9.4	166	6	0.0	5.0	0	Domestic	10’ east
112560	9.4	105	8	0.0	5.0	0	Domestic	10’ east
112561	9.4	126	9	18.0	9.0	0	N/A	10’ east
112562	9.4	315	9	21.0	12.0	0	Public Supply	10’ east
10536	9.4	125	0	7.0	25.0	125	Domestic	105’ east

Construction Effects and Mitigation

Although proposed pipeline construction activities could temporarily affect groundwater resources, Columbia would avoid or minimize most potential effects by the use of both standard and specialized construction techniques. Shallow aquifers could sustain minor effects from changes in overland water flow and recharge caused by clearing and grading of the Project right-of-way. In vegetated areas, water infiltration, which is normally enhanced by vegetation, would be reduced until vegetation is re-established. In addition, near-surface soil compaction caused by heavy construction vehicles could reduce the soil’s ability to absorb water. These minor effects would be temporary and would not significantly affect groundwater resources. Columbia would conduct construction activities in accordance with its ECS to minimize potential effects to groundwater in the vicinity of the Project.

If Columbia were to encounter groundwater during trenching associated with the proposed pipeline loops, Columbia would conduct trench dewatering in accordance with its ECS and all applicable local, state, and federal permits.

Erosion and sediment control measures described in Columbia’s ECS would be implemented during construction to prevent or limit potential effects from trenching and dewatering activities. Potential effects would include discharge of water (from dewatering activities) with sediment to surface water or localized erosion resulting from such discharge. Potential effects to groundwater could also result from accidental spills of oil or fuel during construction activities that might infiltrate soils and reach the groundwater table. Columbia has committed to our standard setbacks for wells, 200-foot radius of all private wells and at least 400-foot radius of all municipal or community water supply wells. We have reviewed Columbia’s SPCC Plan for the prevention of spills and their mitigation measures in cases of accidental releases and find the SPCC Plan acceptable.

Columbia proposes to discharge water from dewatering activities into well-vegetated upland areas, or into energy dissipating structures if vegetation is insufficient to minimize erosion. Implementation of these procedures and use of dewatering structures at stream crossings would minimize groundwater effects during dewatering operations.

Columbia does not anticipate blasting on the Line 10345 Loop or at any of the aboveground facility modifications. As described in section 2.1.1, areas that might require blasting are located from MP 5.9 to MP 6.2 on Line 1278 Loop; however, Columbia anticipates use of mechanical means to cross these areas and would therefore not use blasting. If Columbia uses blasting during construction, Columbia would conduct blasting in accordance with its ECS and the Project-specific blasting plan.

Columbia's ECS contains provisions to prevent and minimize potential effects on groundwater resources to the extent practical. In those instances where blasting has the potential to affect water quantity/quality from domestic or agricultural wells or springs in the proximity of the construction work area, Columbia would conduct, with landowner permission, pre- and post-blast (within two months of construction work restoration) testing of water wells within an appropriate distance (typically 150 feet) of the pipeline loop. These tests may include a pump inspection, flow rate, peak particle velocity measurement, and bacteriological cultures. If a water well is damaged as a result of Columbia's activities, Columbia would provide a temporary source of water to those affected and would compensate for damages or repair the water supply. In addition, Columbia would adhere to federal and state water quality standards (e.g., the Safe Drinking Water Act) to ensure that there would be no significant adverse effects to the quality of groundwater resources. Columbia's ECS only includes provision for pre- and post-testing for wells where blasting may occur; we conclude that tests should be offered to all well owners within 150 feet of construction activities, regardless of blasting, to determine whether any construction related impacts have occurred and to provide a quantitative basis for any necessary remedies. Columbia is still conducting agency consultations to verify the location of wells, and pre-construction well surveys are planned. Therefore, **we recommend that:**

- **Prior to construction of Line 10345 Loop and Line 1278 Loop, Columbia should file with the Secretary a revised table identifying the location by milepost of all private wells within 150 feet of pipeline construction or blasting activities. Columbia should conduct, with the well owner's permission, pre- and post-construction monitoring of well yield and water quality for these wells. Within 30 days of placing the facilities in service, Columbia should file a report with the Secretary discussing whether any complaints were received concerning well yield or water quality and how each was resolved.**

Construction of the proposed pipeline in areas of shallow groundwater might result in the localized alteration of groundwater flow. At this time, no areas of shallow groundwater have been identified along the pipeline route. However, if such areas are encountered during construction, Columbia would employ appropriate impact minimization measures including trench breakers and specialized construction techniques to ensure existing groundwater flow conditions are maintained. Based on the implementation of these measures and our recommendation to implement testing, we have determined that constructing and operating the Project would not result in a significant impact on groundwater resources.

2.2.3 Wetlands

Wetlands were delineated according to the routine methods set forth in the USACE *Wetland Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region: Version 2* (USACE 2012) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coast Plain Region: Version 2* (USACE 2010). Wetlands were also classified based upon the FWS National Wetland Inventory (NWI) classification system and Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979).

Wetlands in the Project area are regulated at the federal and state levels. On the federal level, the USACE has authority under Section 404 of the Clean Water Act (CWA) to review and issue permits for activities that would result in the discharge of dredged or fill material into waters of the United States, including wetlands. The USACE is responsible for issuing Section 404 permits in Pennsylvania, but in New Jersey has delegated Section 404 permitting authority for non-tidal wetlands and wetlands generally greater than 1,000 feet from the Delaware River to the NJDEP. Section 401 of the CWA requires that proposed dredge and fill activities under Section 404 be reviewed and certified by the designated state agency so that the Project would meet state water quality standards. The designated state agencies in Pennsylvania and New Jersey are the PADEP and NJDEP, respectively.

Wetlands that would be affected by the Project are summarized based on location, classification, and affected area. Wetland communities identified for the Project include palustrine and estuarine systems. Palustrine (freshwater) wetland systems include forested, scrub-shrub, emergent, or a combination of cover types. Two wetlands located in New Jersey are characterized as estuarine (tidal) wetland systems and consist of emergent and forested cover types and one wetland characterized as stormwater detention (SWD). Of the two cover types, the emergent portion is tidally influenced and is combined into the palustrine emergent (PEM) classification. Wetlands affected by the Line 10345 Loop and associated access roads are presented in table 2.2-4 and wetlands affected by the Line 1278 Loop and Milford Compressor Station are presented in table 2.2-5.

New Jersey

In New Jersey, the NJDEP - N.J.A.C. 7:7A-5.2 General Permit 2 for Underground Utility Lines states permanent aboveground disturbance of wetlands, transition area, and/or State open waters shall be no greater than 0.5 acre. Mitigation shall be performed for all permanent loss and/or disturbance of less than 0.1 acre of freshwater wetlands or State open waters unless the applicant demonstrates to the NJDEP that all activities have been designed to avoid and minimize effects to wetlands.

The Project would affect a total of 1.74 acres of wetland in New Jersey: 0.86 acre palustrine forested (PFO), 0.26 acre palustrine scrub-shrub (PSS), 0.09 acre SWD, and 0.53 acre PEM. Of the 1.74 acres of wetland, about 0.01 acre of wetland W118NJ (a PFO community) would be crossed by access road AR-NJ-GL-001. As identified in table 2.2-4, Columbia would avoid direct impacts to several wetland communities by using an HDD. Columbia would also avoid impacts to an open-water/emergent wetland complex (W126NJ) located in the northwest portion of the proposed contractor yard by fencing off the wetland from construction activities.

Based on consultation with the New Jersey Division of Fish and Wildlife, three NJDEP-regulated Potential Vernal Pool Buffer Areas are mapped within the Project area at MP 1.9, MP 6.4, and MP 8.4. Field inspections revealed no observable characteristics or evidence of vernal pools at MP 1.9 or MP 8.4. The Oldmans Creek Road re-route avoids the third Potential Vernal Pool Buffer Area mapped at MP 6.4. No additional vernal pools were identified along the Oldmans Creek Road route.

TABLE 2.2-4

Wetlands Crossed in New Jersey

Wetland ID	Classification [a/]	Milepost	Crossing Distance (feet)	Temporary Impacts (acres)	Permanent Operation Impact (acres) [b/]	Total Construction Impact (acres)
Line 10345 Loop						
W118NJ	PFO	0.4	175	0.18	0.12	0.30
W117NJ	PFO	0.8	475	HDD	HDD	HDD
W116NJ	PFO	0.9	953	HDD	HDD	HDD
W112NJ [c/]	PFO	1.8	0	0.01	<0.01	0.01
W303NJ	PFO/PEM	3.0	97	HDD	HDD	HDD
NJ State Wetland [d/]	PEM1B	4.0	0	0.07	0.00	0.07
W310NJ	PFO	4.0	115	HDD	HDD	HDD
W310NJ	PEM	4.1	366	HDD	HDD	HDD
W313NJ	PFO	4.6	277	HDD	HDD	HDD
W314NJ	PFO	5.5	582	HDD	HDD	HDD
W902NJ	SWD	6.8	0	0.09	0.00	0.09
W901NJ	PFO	6.9	261	0.09	0.16	0.25
W900NJ	PSS	7.1	199	0.22	0.04	0.26
W900NJ	PFO	7.1	162	0.15	0.14	0.29
W315NJ	PEM	8.2	280	0.46	0.00	0.46
W107NJ	PFO	9.5	223	HDD	HDD	HDD
		Subtotal	**4,165**	**1.27**	**0.46**	**1.73**
Access Roads						
W118NJ	PFO	0.3	8	0.01	0.00	0.01
		Subtotal	**8**	**0.01**	**0.00**	**0.01**
		Project Total	**4,173**	**1.28**	**0.46**	**1.74**

[a/] Some wetlands are listed more than once to break them into different classifications, as appropriate; PEM=palustrine emergent; PSS=palustrine scrub-shrub; PFO=palustrine forested; SWD=stormwater detention

[b/] Permanent PFO impacts calculated based on a 30-foot maintained ROW in a scrub-shrub or emergent state. Permanent PSS impacts calculated based on a 10-foot maintained right-of-way in an emergent state. There would be no permanent effects to PEM.

[c/] Wetland not crossed by the centerline of the Project.

[d/] Wetland is located on a no-survey access parcel; location and impacts have been estimated using the New Jersey State Wetlands data layer (NJDEP 1986).

Pennsylvania

Line 1278 Loop construction corridor would affect a total of 3.98 acres of wetland in Pennsylvania, including 2.20 acres of PFO and 1.78 acres of PEM wetlands. Trenchless crossings would be employed at two wetland communities and six wetlands would be crossed by HDD and would not be affected by the Project.

Wetland W1PA, a PEM community comprising less than 0.01 acre, was identified at the Milford Compressor Station. We have determined that construction of a fence as part of the Project at the Milford Compressor Station would result in minimal effect to wetlands.

TABLE 2.2-5

Wetlands Crossed in Pennsylvania

Wetland ID	Classification [a/]	Milepost	Crossing Distance (feet)	Temporary Impacts (acres)	Permanent Operation Impact (acres) [b/]	Total Construction Impact (acres)
Line 1278 Loop						
W200PA	PEM	0.3	147	0.20	0.00	0.20
W201PA	PEM	0.4	56	0.06	0.00	0.06
W202PA	PEM	0.5	114	0.20	0.00	0.20
W204PA [c/]	PEM	1.2	0	0.16	0.00	0.16
W205PA	PEM	1.3	307	0.40	0.00	0.40
W206PA	PEM	2.1	15	HDD	HDD	HDD
W206PA	PFO	2.1	95	HDD	HDD	HDD
W207PA	PFO	2.1	20	HDD	HDD	HDD
W203PA	PEM/PSS	2.7	14	HDD	HDD	HDD
W208PA	PEM	4.5	127	HDD	HDD	HDD
W211PA	PEM	4.8	22	HDD	HDD	HDD
W231PA	PEM	5.0	63	0.07	0.00	0.07
W230PA	PEM	5.1	32	0.03	0.00	0.03
W400PA	PFO	6.4	1,316	1.30	0.90	2.20
W401PA	PEM	7.1	143	0.19	0.00	0.19
W300PA	PEM	7.7	113	0.41	0.00	0.41
W214PA	PFO	8.0	462	Trenchless	Trenchless	Trenchless
W214PA	PEM	8.1	63	Trenchless	Trenchless	Trenchless
W215PA	PEM	9.3	50	0.05	0.00	0.05
		Subtotal	**3,159**	**3.07**	**0.90**	**3.97**
Milford Compressor Station						
W1	PEM	NA	20	0.01	<0.01	0.01
		Subtotal	**20**	**0.01**	**<0.01**	**0.01**
		Project Total	**3,179**	**3.08**	**0.90**	**3.98**

[a/] Some wetlands are listed more than once to break them into different classifications, as appropriate; PEM=palustrine emergent; PSS=palustrine scrub-shrub; PFO=palustrine forested

[b/] Permanent PFO impacts calculated based on a 30-foot maintained ROW in a scrub shrub or emergent state. Permanent PSS impacts calculated based on a 10-foot maintained right-of-way in an emergent state. There would be no permanent effects to PEM.

[c/] Wetland not crossed by the centerline of the Project.

Overall, constructing the Project would temporarily affect a total of about 5.72 acres of wetlands. About 1.32 acres of PFO wetlands would be permanently converted to PEM wetlands, and about 1.74 acres of PFO wetlands would experience long-term effects resulting from the loss of trees. The impact of construction on vegetation in emergent wetlands would be relatively short-term because herbaceous vegetation would regenerate quickly. Wetland soils would also be disturbed and could be adversely affected which in-turn could affect wetland revegetation. In addition, constructing the facilities would increase erosion and sedimentation potentials and could affect the hydrological characteristics of the wetlands crossed.

Permanently converting these wetlands would result in the loss of forested vegetation, associated habitat and function. However, some wildlife habitat and wetland function would be retained as the wetlands would not be totally lost, but converted to a different wetland type.

We expect that PEM wetlands would return to pre-construction conditions within one year following construction. We also expect that PSS wetlands would return to pre-construction conditions with three to five years following construction. Lastly, we expect PFO wetlands not permanently affected to return to pre-construction conditions between 10-30 years following construction. Mitigation for unavoidable effects to wetlands would be determined by the USACE during its permitting process for the Project.

The effects to wetlands would be greatest during construction. Columbia would implement the procedures specified in its ECS to minimize impacts on wetlands crossed by the Project. In addition, Columbia would develop wetland mitigation measures in coordination with the USACE and the state agencies during the permitting phase of the Project, and file these mitigation plans with the Commission prior to construction.

Avoidance and Mitigation Strategies

A commenter suggested that Columbia's plan to address effects to wetland resources would not be adequate. We have reviewed Columbia's application and find Columbia's proposed avoidance and mitigation to be adequate. Columbia has developed avoidance and minimization strategies to address effects on wetland resources during construction. Rerouting and implementation of HDD construction would eliminate impacts on eight wetlands on the Line 10345 Loop and six wetlands on the Line 1278 Loop, and implementation of trenchless construction methods eliminated effects on three wetlands on the Line 1278 Loop. In addition, Columbia would avoid placement of ATWS within wetlands and waterbodies to the extent practicable.

In addition to collocating the Project with existing natural gas pipeline easements, siting workspace outside of wetlands, reducing construction workspace requirements in wetlands, and use of HDD construction methods, Columbia would implement measures described in its ECS and other plans to avoid and minimize effects on wetlands. These measures include:

- minimizing the amount of vegetation cleared;
- segregating up to 12 inches of topsoil from the trench line in unsaturated wetlands;
- limiting the pulling of stumps to that necessary to excavate the trench and safely operate equipment;
- using low ground weight equipment or operating equipment on mats or timber riprap;

- installing erosion and sediment control devices;
- reseeding wetlands with seed mixes prepared in consultation with federal, state, and local agencies; limiting vegetation maintenance to a 10-foot-wide herbaceous strip and removal of select trees within 15 feet of the pipeline; and
- following our Procedures Post-Construction Maintenance and Reporting requirements (section VI.D.4-6).

Furthermore, the USACE may require the implementation of additional impact minimization measures and would require unavoidable impacts be mitigated. As requested by the USACE, we also evaluated the use of the conventional boring method to install the pipeline across all wetlands and waterbodies, and determined that the use of these methods would not be practicable for the level of Project effects.

Columbia would implement mitigation to address both short-term and temporary effects during construction and long-term and permanent effects on wetlands. Mitigation would be developed for permanent effects to wetlands in consultation with the USACE Philadelphia District, the PADEP and the NJDEP and would be included in the federal and state wetlands permits required to construct the Project. Columbia is undergoing negotiations concerning an identified wetlands mitigation site in the Brandywine-Christina watershed.

Columbia would implement a SPCC Plan during construction that is designed to prevent spills and to address spill incidents if they occur. Columbia's ESCP and ECS incorporate various erosion and sediment control measures requested by the counties, and required by our Plan and Procedures and state and local regulations. All post-construction monitoring would be in accordance with Columbia's ECS and our Procedures.

By implementing avoidance and minimization measures, restoring PEM and PSS wetlands to pre-construction conditions, implementing best management practices, and mitigation to compensate for the 1.32 acres of permanent conversion of forested to non-forested wetlands, we conclude that the Project would not have significant adverse effects to wetlands.

2.3 Vegetation, Wildlife, and Fisheries

2.3.1 Vegetation

Existing Environment

The Project would cross three vegetation community types: upland forest, open, and agricultural. Forest vegetation includes wooded areas and forested wetlands. Open vegetation includes non-forested lands, scrub-shrub and emergent wetlands, pastures, and other disturbed and non-managed vegetation. Agricultural vegetation includes active cropland and hayfields.

New Jersey

In New Jersey, the pipeline crosses forest, open, and agricultural vegetation including corn, soybeans, and specialty crops (squash, peppers, tomatoes, and asparagus). According to the New Jersey Natural Heritage Program (NJNHP) no unique, sensitive, or protected vegetation areas were identified within 0.5 mile of the Line 10345 Loop. No New Jersey-regulated noxious weeds were observed during Columbia's surveys of potentially affected lands.

Pennsylvania

In Pennsylvania, the pipeline and aboveground facilities would cross forest, open, and agricultural vegetation. The Natural Area Inventory (NAI) of Chester County describes the forest areas of Chester County as mixed oak forest, dominated by white, red, and black oaks, often mixed with tulip poplar, red maple, and/or beech (TNC 1994). Active agricultural land along the Line 1278 Loop primarily includes corn, soybeans, and other common crops. The Pennsylvania Natural Heritage Program identified six plant species along the Line 1278 Loop. A detailed discussion of threatened, endangered, and sensitive resources are provided in section 2.4.

According to the USDA, there are 13 noxious weed species that are regulated under the Noxious Weed Control Law in Pennsylvania. Of these species, only multiflora rose was observed during Columbia's field survey.

Vegetation Impacts and Mitigation

New Jersey

Construction of the Line 10345 Loop would affect 92.18 acres of forest, open land, and agricultural vegetation. Temporary disturbances would occur from pipeline construction, installation of access roads, placement of additional temporary workspaces, and use of established contractor yards. Operation of the Line 10345 Loop would convert about 5.59 acres of forested cover to permanent easement. In addition, about 0.07 acre of agricultural land would be in permanent easement but would be allowed to revert to pre-existing agricultural use. Table 2.3-1 summarizes vegetation impacts in New Jersey.

TABLE 2.3-1

Construction and Permanent Vegetation Impacts in New Jersey by Cover Type (acres) [a/]

Facility	Forested Land Cover [b/]		Open Land Cover [c/]		Agricultural Land Cover [c/]	
	Construction	Permanent	Construction	Permanent	Construction	Permanent
Line 10345 Loop						
Pipeline Facilities [d/]	10.30	5.59	6.59	0.00	46.93	0.00
Additional Temporary Workspaces	0.22	0.00	0.81	0.00	4.71	0.00
Access Roads	0.54	0.00	0.12	0.00	0.49	0.07
Contractor Yard (preferred)	0.00	0.00	0.49	0.00	20.96	0.00
Total	**11.08**	**5.59**	**8.01**	**0.00**	**73.09**	**0.07**

[a/] Residential and developed lands are less likely to provide vegetation cover suitable to support wildlife habitat and plant communities and, therefore, are excluded from this table.

[b/] Construction impacts for forest vegetation are based on a nominal 100-foot-wide construction area and ATWS; permanent impacts are a subset of construction impacts based on a 50-foot-wide permanent easement.

[c/] Construction impacts are based on a nominal 100-foot-wide construction area and ATWS. Except for the access road, there would be no permanent impacts on this cover type for its current use because this vegetation would be allowed to revert to pre-construction conditions.

[d/] Although permanent pipeline easement is proposed within agricultural and open lands, no change in vegetation cover type would result from the maintenance of the pipeline easement. Agricultural and open lands would be allowed to revert to pre-construction conditions, and the permanent pipeline easement would not restrict current land use in these areas. Therefore, no permanent impacts would result. On the Line 10345 Loop, permanent easement in agricultural and open lands would total 20.98 and 5.15 acres, respectively.

Note: Totals may not equal sum of addends due to rounding.

Pennsylvania

Construction of the Line 1278 Loop would affect 83.02 acres of forested, open land, and agricultural vegetation. Temporary disturbances would occur from pipeline construction, installation of access roads, placement of additional temporary workspaces, and established contractor yards. Operation of the Line 1278 Loop would convert about 8.22 acres of forested cover to emergent or scrub shrub cover. Table 2.3-2 presents the temporary and permanent impacts on forest, open, and agricultural land in Pennsylvania.

TABLE 2.3-2

Construction and Permanent Vegetation Impacts in Pennsylvania by Cover Type (acres) [a/]

Facility	Forested Land Cover [b/]		Open Land Cover [c/]		Agricultural Land Cover [c/]	
	Construction	Permanent	Construction	Permanent	Construction	Permanent
Line 1278 Loop						
Pipeline Facilities [d/]	21.42	8.22	18.27	0.00	11.18	0.00
Additional Temporary Workspaces	1.64	0.00	2.45	0.00	1.44	0.00
Access Roads	0.37	0.00	0.91	0.00	0.15	0.00
Contractor Yard (preferred)	0.00	0.00	0.00	0.00	25.19	0.00
Total	**23.43**	**8.22**	**21.63**	**0.00**	**37.96**	**0.00**

[a/] Residential and developed lands are less likely to provide vegetation cover suitable to support wildlife habitat and plant communities and, therefore, are excluded from this table.

[b/] Construction impacts for forest vegetation are based on a nominal 100-foot-wide construction area and ATWS; permanent impacts are a subset of construction impacts based on a 50-foot-wide permanent easement.

[c/] Construction impacts are based on a nominal 100-foot-wide construction area and ATWS. There would be no permanent impacts on this cover type for its current use because this vegetation would be allowed to revert to pre-construction conditions.

[d/] Although permanent pipeline easement is proposed within agricultural and open lands, no change in vegetation cover type would result from the maintenance of the pipeline easement. Agricultural and open lands would be allowed to revert to pre-construction conditions, and the permanent pipeline easement would not restrict current land use in these areas. Therefore, no permanent impacts would result. On the Line 1278 Loop, permanent easement in agricultural and open lands would total 2.67 and 6.48 acres, respectively.

Notes:
Totals may not equal sum of addends due to rounding.
All aboveground facilities are within previously developed and landscaped properties.

Pipeline Facilities

Constructing the pipeline facilities would result in the temporary, long-term, and permanent loss of vegetation. The loss of vegetation would reduce the quantity and quality of available wildlife habitat; could alter water flow and infiltration; and would increase the potential for soil erosion and the introduction of nuisance, exotic, and invasive plant species. Agricultural and grassland vegetation would be temporarily affected by construction-related activities. We expect these vegetation types to return to pre-construction conditions within one to five years following construction.

As stated previously, operating the facilities would require the permanent conversion of forested vegetation to grassland, which would undergo periodic vegetation maintenance.

Numerous commenters expressed concerns about erosion as a result of previous pipeline-related construction. To avoid and minimize effects on vegetation, Columbia would implement numerous measures as identified in its ECS, including:

- installing erosion control measures following initial disturbance of the soil;
- clearing by mechanical methods or hand cutting, not burning;
- limiting clearing activities to the surveyed, certificated construction right-of-way;
- maintaining a 50-foot-wide permanent right-of-way for the pipeline routes;
- maintaining a riparian strip within 25 feet of streams as measured from the mean high water mark, which would be allowed to permanently revegetate;
- segregating topsoil in agricultural, residential, and other areas at the landowner's request;
- seeding workspace areas used during construction, except in agricultural lands;
- reseeding shrub/shrub cover areas with herbaceous species and shrub species that would re-colonize the right-of-way;
- routine maintenance of the permanent right-of-way in uplands including mowing or clearing not more frequently than every three years in uplands;
- maintaining a corrosion/leak survey corridor not exceeding 10 feet in width centered on the pipeline;
- monitoring the disturbed areas to determine the post-construction re-vegetative success; and
- not clearing between HDD and direct pipe entry and exits.

In addition, about 73 percent of the Line 10345 Loop and Line 1278 Loop would be collocated with existing facilities. Lastly, in accordance with its ECS, Columbia would monitor the disturbed areas to determine the post-construction re-vegetation success. The re-vegetation monitoring would also assess the establishment of noxious weeds and determine control measures if densities are greater than off right-of-way. Exotic and invasive species are discussed below. Consequently, we conclude construction and operation of Project pipeline facilities would not have any significant adverse effects on vegetation.

Aboveground Facilities

All proposed expansions, including necessary additional temporary work areas required during construction at aboveground facilities, would be within Columbia's property or existing rights-of-way with the exception of one additional parcel that would be temporarily affected during work on the interconnect piping at the Milford Compressor Station, and the proposed modifications at the Pennsburg and Wagoner M&R Stations, which are sited on property owned by others. Following construction, aboveground facilities would be maintained as commercial/industrial land, resulting in no significant effects to vegetation resources, which are currently maintained as mowed grass. Consequently, construction and operation of aboveground facilities would not have any significant adverse effects on vegetation.

Exotic and Invasive Species Control and Mitigation Measures

Columbia would implement several management strategies to minimize the introduction of exotic and invasive plant species (e.g., noxious weeds) along the construction right-of-way or other temporary work areas where soil disturbance and/or removal of native vegetation may occur. Management and control measures that would be used to control invasive plants and noxious weeds, particularly in wetlands, include the following:

- follow Columbia's ECS to minimize sediment movement and the associated movement of noxious weed seeds;
- use construction techniques that minimize the time that bare soil is exposed and, therefore, minimize the opportunity for invasive species to become established;
- in wetland construction areas where conditions allow (i.e., non-saturated, no standing water), remove topsoil from the excavation areas and store it to the side for replacement once construction is complete. This would help minimize the introduction of noxious weeds and maintain the existing plant community seed stock;
- unless otherwise required by a permit condition, seed with annual rye (or winter rye if annual rye cannot be planted prior to freezing temperatures) to establish a quick cover crop for stability and allow native species in the soil to quickly establish to assure that a suitable growing substrate for noxious weeds is not available for long periods of time. If mulch is used, it would consist of clean, weed-free straw; and
- monitor the pipeline right-of-way and disturbed sites following construction to verify that re-vegetation of the areas has been successful and that invasive species have not become widely established.

Based on the characteristics of the types of vegetation affected; the collocation of the pipeline facilities; Columbia's construction, operation, and maintenance procedures; and Columbia's implementation of impact minimization measures, we have determined that the potential spread of nuisance, exotic, and invasive plant species would be minimized, and construction and operation of the facilities would not significantly affect vegetation.

2.3.2 Wildlife

The vegetation types described above serve as habitat for local wildlife. Forested cover types provide foraging, breeding, and general habitat for a variety of wildlife species. Nuts from trees such as oaks and hickories provide food for deer, mice, and squirrels. Berries from understory shrubs and woody vines may also provide important wildlife foods. Secondary canopy shrubs and saplings, brush piles, and fallen logs provide cover for various small- to medium-sized mammals. Large standing dead trees (particularly with cavities and/or exfoliating bark) provide nesting or roosting sites for a variety of birds, bats (and other mammal species), as well as foraging opportunities for birds such as woodpeckers. Forested areas, particularly large unfragmented tracts, provide important habitat for warblers and other migrating and nesting songbirds. Some game species may spend all or most of their time in these forested habitats. Several avian (e.g., waterfowl) and mammalian (e.g., white-tailed deer, eastern cottontail, gray squirrel, etc.) species are recreationally hunted within the Project area.

Cover types in the Project area include land in early successional stages that provide valuable nesting and foraging habitats for grassland bird species and edge habitats for species that utilize forest/open land interfaces. Mammals also use grasslands as foraging and denning habitat. Shrub lands provide sources of food and nesting sites for various birds, as well as cover for invertebrates, reptiles, amphibians, and small mammal species. Typical species that are dependent on this type of land cover are white-tailed deer, red fox, and red-tailed hawk. Agricultural lands provide foraging habitat for many of the common reptiles, amphibians, birds, and mammals found in the Project area.

Several species are typically found only in wetland habitats. These include species such as wood duck, wood thrush, and eastern box turtle. Emergent and scrub-shrub wetlands also support diverse vegetation and open water communities that provide habitat for species such as the common muskrat and many of the reptiles and amphibians.

Important Bird Areas

No Important Bird Area (IBA) sites were identified within 1 mile of the Project interconnects, compressor stations, and meter stations. IBAs were identified in proximity to the pipeline facilities as described below.

2.3.3 Migratory Birds

Migratory birds are protected under the Migratory Bird Treaty Act (16 U.S. Code 703-711). Additionally, Executive Order 13186 (66 FR 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the FWS. Executive Order 13186 also 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.

As described previously, constructing and operating the pipeline facilities would affect numerous habitats. These habitats support a variety of bird species including songbirds, raptors, and waterfowl. The Project area is within the FWS North American Bird Conservation Regions 28 – Appalachian Mountains, 29 – Piedmont, and 30 – New England/Mid-Atlantic Coast. Several birds identified as being of conservation concern in this region (FWS 2008) are likely to occur in the Project area (table 2.3-3).

TABLE 2.3-3

Birds of Conservation Concern

Common Name	Region 28 Appalachian Mountains	Region 29 Piedmont	Region 30 New England/Mid-Atlantic Coast
Red-throated Loon			X
Pied-billed Grebe			X
Horned Grebe			X
Greater Shearwater			X
Audubon's Shearwater			X
American Bittern			X
Least Bittern			X
Snowy Egret			X
Bald Eagle	X	X	X
Peregrine Falcon	X	X	X
Black Rail		X	X
Wilson’s Plover	X		X
American Oystercatcher			X
Solitary Sandpiper			X
Lesser Yellowlegs			X
Upland Sandpiper			X
Whimbrel			X

TABLE 2.3-3 Birds of Conservation Concern			
Common Name	**Region 28 Appalachian Mountains**	**Region 29 Piedmont**	**Region 30 New England/Mid-Atlantic Coast**
Hudsonian Godwit			X
Marbled Godwit			X
Red Knot (rufa ssp.)			X
Semipalmated Sandpiper (Eastern)			X
Purple Sandpiper			X
Buff-breasted Sandpiper			X
Short-billed Dowitcher			X
Least Tern			X
Gull-billed Tern			X
Black Skimmer			X
Short-eared Owl		X	X
Northern Saw-whet Owl	X		
Whip-poor-will	X	X	X
Red-headed Woodpecker	X		X
Yellow-bellied Sapsucker	X		
Olive-sided Flycatcher	X		
Loggerhead Shrike	X	X	X
Black-capped Chickadee	X		
Brown-headed Nuthatch		X	X
Bewick's Wren (bewickii ssp.)	X	X	
Sedge Wren	X	X	X
Wood Thrush	X	X	X
Blue-winged Warbler	X	X	X
Golden-winged Warbler	X		X
Prairie Warbler	X	X	X
Cerulean Warbler	X	X	X
Worm-eating Warbler	X		X
Swainson's Warbler	X	X	
Louisiana Waterthrush	X		
Kentucky Warbler	X	X	X
Canada Warbler	X		
Bachman's Sparrow		X	
Henslow's Sparrow	X	X	X
Nelson's Sharp-tailed Sparrow			X
Saltmarsh Sharp-tailed Sparrow			X
Seaside Sparrow			X
Rusty Blackbird	X	X	X
Red Crossbill	X		
Source: FWS 2008			

Displacement, avoidance, and potential changes to migration, foraging, and mating behaviors resulting from construction of the pipeline facilities and the loss and/or conversion of habitats could increase the amount of stress, injury, and mortality experienced by migratory birds, birds of conservation concern, and other birds.

About 16.03 miles (84 percent) of 19.1 miles of proposed pipeline would be collocated (i.e., abutting or within 200 feet) with existing pipelines. Additionally, pipeline facilities in New Jersey and Pennsylvania are proposed in areas with limited forested area; and no extensive deforestation is anticipated.

Columbia has proposed or would implement several mitigation measures during Project construction and operation to limit migratory bird impacts. These measures include:

- routing Project facilities to avoid sensitive resources where possible;
- maximizing the use of existing pipeline rights-of-way and other utility corridors;
- limiting the construction and operation right-of-way widths to the minimum necessary;
- providing mitigation for impacts on sensitive resources (e.g., wetlands) through agency permit conditions;
- adhering to the measures outlined in the ECS during construction of the Project facilities;
- adhering to NJDEP and FWS seasonal restrictions on tree cutting and herbaceous shrub removal associated with construction activities to allow for nesting of migratory birds; in New Jersey, this seasonal restriction will extend from March 15 to July 31; and
- restricting routine vegetation mowing or clearing during the migratory bird-nesting season between April 15 and August 1 of any year unless specifically approved in writing by the FWS.

Because Columbia would implement impact avoidance and minimization measures, and similar habitat exists adjacent to and near the proposed construction work areas, we have determined that constructing and operating the Project would not result in population-level impacts or significant measureable negative impacts on migratory birds.

New Jersey

The Line 10345 Loop is within the area of the Oldmans, Raccoon, Birch Creeks, and Pedricktown Region IBA. This IBA is a regional site that includes the open waters of Oldmans, Raccoon, and Birch Creeks; associated wetlands; deciduous woods and scrub-shrub habitat; and the Pedricktown Marsh. This IBA provides nesting habitat for the state-endangered northern harrier, least bittern, peregrine falcon, and bald eagle. The tidal wetlands host significant numbers of breeding American black ducks, northern pintails, marsh wrens, Virginia rails, and mallards. Northern pintails, green-winged teal, and American black ducks utilize designated areas throughout the winter and into the spring as they prepare for their northward migration. The area is also important for other migratory birds, including raptors (National Audubon Society 2013).

Pennsylvania

The Great Marsh IBA is about 1.8 miles to the west of the northern portion of the Line 1278 Loop (National Audubon Society 2013). Given the distance to the IBA, we have determined that the project would not affect this IBA.

New Jersey Landscape Project Priority Habitats

Land areas surrounding Church Run and Narraticon Run within the Project area are primarily designated critical forest and suitable forested wetland. Columbia would avoid effects to forested wetlands adjacent to these streams, and forested uplands/wetlands adjacent to an unnamed tributary to Lake Narraticon, through use of HDD. Columbia would use open trench construction to cross forested uplands adjacent to Church Run that would affect 4.75 acres during construction, of which 2.0 acres would remain as permanent right-of-way.

Construction and Operation Impacts and Mitigation

The cutting, clearing, and/or removal of existing vegetation during construction would affect wildlife by altering and in some cases permanently reducing the amount of available habitat. The degree of impact would depend on the type of vegetation affected and the rate at which it regenerates after construction, with clearing of forested areas having the potential for the greatest impact. The Project locations in Gloucester County, New Jersey and Chester County, Pennsylvania cross limited forested area as these regions are already developed.

Wildlife species may be stressed, injured, or temporarily disturbed or displaced from portions of their habitats, and mortality of individuals of less mobile species, such as some small mammals, reptiles, or amphibians may occur during construction. Larger, more mobile species would be expected to avoid the Project area during construction. Therefore, impacts on wildlife along the pipeline corridors and associated workspaces would generally be temporary and limited to the period of construction activities.

Effects to non-forested upland and wetland habitats disturbed by construction would be temporary, and these areas would be expected to recover quickly once construction is completed. Forested habitats, both upland and wetland, would be affected to a greater extent because of the long-term conversion of these wooded habitats to earlier successional stages in the temporary right-of-way, and due to the permanent conversion to scrub-shrub and/or non-woody herbaceous species in the permanent, maintained right-of-way.

In accordance with Columbia's ECS, temporary workspaces outside the permanent right-of-way would be allowed to return to pre-construction conditions. In upland portions of the permanent right-of-way, vegetation maintenance would be limited to once every three years. However, a 10-foot-wide swath centered over the pipeline may maintained in an herbaceous state for pipeline maintenance and inspection purposes.

The permanent, maintained right-of-way may function as a travel corridor for some wildlife species and may provide food, cover, and breeding habitat for those species that use open and emergent habitats. In addition, maintained utility rights-of-way can provide important early successional habitats for several important game species and migratory birds.

Land to be disturbed for construction and operation of the aboveground facilities is primarily existing industrial land, thereby minimizing effects to wildlife habitat. Columbia's use of existing access roads during construction would further minimize impacts on wildlife.

Construction and operation of the Project would result in short- and long-term effects on wildlife. Although some wildlife species would be affected, the Project would not likely have a significant effect on local populations or habitats of any species. The extent and duration of effects would vary depending on the species present in each affected habitat type and their individual life stage. Project-related effects are anticipated to be temporary or minor because the Project would not permanently alter most affected habitats.

2.3.4 Fisheries

In New Jersey, FW2 non-trout waters are typically classified as being warmwater environments, though the stream and creeks may contain coldwater fish species (i.e., trout) during part of the year as part of a stocked fishery.

In Pennsylvania, freshwater fisheries are characterized as WWF, CWF and Migratory Fisheries (MF). These classifications are based upon temperature regimes and fish assemblages. These waters may be further classified as TSF where the PFBC stocks trout to support a coldwater recreational fishery. MF refer to fish species that are anadromous or catadromous.

No marine waterbodies are present in the Project area. According to correspondence received from the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries), The Project area does not support Essential Fish Habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265 as amended through January 12, 2007). Tables 2.2-1 and 2.2-2 list the streams and fishery classification for the Project crossings for each respective loop.

As described previously, the pipeline loops would affect 40 waterbodies. According to the NJDEP, all waterbodies crossed by the Line 10345 Loop are suitable for non-trout species (i.e., warmwater species). For the Line 1278 Loop, the PADEP lists the main stem of the East Branch of Brandywine Creek below Shamona Creek as WWF; waterbodies upstream and tributary to the East Branch are HQ-TSF. Beaver Creek and its unnamed tributaries are classified as CWF. Crossing of Beaver Creek would be completed using the direct pipe crossing method, thereby avoiding direct impacts on the channel from open-cut methods. All of the waterbodies crossed by the Line 1278 Loop are also listed as suitable for migratory fish. The perennial stream identified at the Milford Compressor Station, an unnamed tributary to Vandine Brook, is classified as HQ-CWF. Hazelbach Creek, a perennial stream about 500 feet southwest of the Pennsburg Meter Station, is classified as HQ-TSF.

The quality and sustainability of the fishery present at each crossing are the products of hydrological regime and water quality. Intermittent streams typically lack the hydrological regime capable of supporting a permanent fishery, but may have water quality characteristics of supporting aquatic life. These streams may provide important nursery habitat for adjoining perennial fisheries, but cannot support a year-round fishery by themselves. Larger perennial streams have the hydrological regimes capable of supporting permanent fish populations.

Fisheries of Special Concern

The NJDFW reported that streams crossed by the Line 10345 Loop would be considered a migration and spawning area for anadromous species (e.g., American shad, *Alosa sapidissima*), with the exception of streams above Lake Narraticon (i.e., Church Run and tributaries). No fisheries of special concern were identified in Pennsylvania.

Waterbodies tributary to Pickering, Marsh, East Branch of Brandywine, and Shamona Creeks in Chester County, Pennsylvania, are listed as HQ-TSF. A TSF designation by the PFBC indicates that the stream is eligible for stocking with trout. Access to these fisheries by fishermen during construction may be affected by the crossing preparation and installation phases at each crossing.

The NJDFW recommends a timing restriction of March 1 through June 30 for the Line 10345 Loop for any streams crossed that are considered anadromous species (e.g., American shad*)* migration and spawning area, with the exception of streams above Lake Narraticon in the Church Run area. This would be verified by NJDFW's permit conditions. In Pennsylvania, the PFBC has an in-stream restriction for trout-stocked fisheries of March 1 through June 15. Therefore, in-water installation and construction activities would be subject to permit conditions and would decrease the conflict with recreational fisheries and the migratory patterns of anadromous fish.

Construction and Operation Impacts and Mitigation

Short-term impacts on fisheries may be caused by increased sedimentation and turbidity, temperature changes due to removal of vegetation cover over streams, introduction of water pollutants, or entrainment of fish. Local avoidance and/or displacement of fish and crayfish from the vicinity of the crossings during construction would occur in response to increases in noise, vibration, and physical disturbance of the stream bottom. This displacement may cause temporary stress on localized populations of fish and invertebrates through the overlap of home ranges in individuals and populations with non-affected populations outside of the crossing footprint. Additionally in-channel construction activities may result in limited inadvertent injury or mortality of fish or invertebrates as a result of excavation activities. This effect would be minor given the avoidance behavior of fish and crayfish within the stream channel crossing footprint during construction.

To minimize impacts on aquatic resources, Columbia would implement measures described in its ECS and SPCC Plan. Constructing the pipeline facilities would temporarily affect fisheries. The open-cut method would have greater effects on fisheries than HDD or direct pipe crossings, which would have no or minimal effects on these resources. The disruption of normal water flow and fish movement (including migration), and the loss and/or alteration of fisheries habitat including in-stream structure/cover and water quality effects resulting from construction-related activities would increase the rates of stress, injury and/or mortality experienced by fish (during all life stages) and other aquatic species.

Following construction, waterbodies that are properly restored would recover quickly, and effects on fisheries would cease to occur. Operating the pipeline facilities would not affect fisheries.

If blasting is required, effects on aquatic resources could result. The potential adverse effects of blasting for the pipeline ditch line could include direct mortality of organisms in the immediate vicinity of the blast as a result of shock wave effect. Temporary disruption of routine behavior of fish may occur as a result of shock wave effects and the contact of blast charge material with environmental media. Vibration from any blasting may result in mortality, injury and stress for some fish. Vibration could cause temporary disruption in normal fish behavior up and downstream from the blast point. Such effects are seen as being temporary, and normal behavior in local populations would be expected to recover following the blasting event and completion of construction activities.

In-stream restrictions for construction activities (including blasting) in TSF for March 1 through June 30 for New Jersey waters and March 1 through June 15 for Pennsylvania waters would reduce or eliminate exposure of stocked or migratory fish species to potential blast pressure waves and turbidity. In-water installation and construction activities would be subject to permit conditions and would decrease the conflict with recreational fisheries and migratory patterns of anadromous fish. Columbia would coordinate with resource trust agencies to determine risks from blasting to endangered or threatened species, if present.

To avoid and minimize effects on fisheries, Columbia would implement measures described in its ECS and other plans. These measures include:

- implementing HDD, direct pipe, and dry-waterbody crossings;
- allowing only the equipment necessary for excavation and backfilling in the stream channel;
- adhering to construction restrictions;
- implementing timing requirements for construction through CWF and WWF;
- installing erosion and sediment controls;
- adhering to its SPCC Plan and Blasting Procedures; and
- restoring streambeds and banks to pre-construction conditions to the fullest extent possible.

Based on the characteristics of the identified fisheries, the proposed waterbody crossing methods, hydrostatic test water withdrawal, discharge methods, and Columbia's implementation of impact minimization measures, we have determined that construction and operation of the pipeline facilities would not significantly affect fisheries, migratory fish, or fisheries of special concern.

2.4 Threatened, Endangered, and Other Special Status Species

Federal agencies are required under Section 7 of the Endangered Species Act (ESA), as amended, to ensure that any actions authorized, funded, or carried out by the agency do not jeopardize the continued existence of a federally listed endangered or threatened species or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. As the lead federal agency authorizing the Project, the Commission is required to consult with the FWS and/or NOAA Fisheries to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of the Project, and to determine the proposed action's potential effects on those species or critical habitats.

For actions with the potential to affect listed species or designated critical habitat, the lead federal agency must report its findings to the FWS and/or NOAA Fisheries in a Biological Assessment. If it is determined that the action may adversely affect a listed species, the federal agency must submit a request for formal consultation to comply with Section 7 of the ESA. In response, the FWS and/or NOAA Fisheries would issue a Biological Opinion as to whether the federal action would jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat. As described in the following sections, we have determined that the Project would not adversely affect federally listed endangered or threatened species or designated critical habitats.

Columbia, acting as the Commission's non-federal representative, initiated consultations with the FWS and NOAA Fisheries to identify the potential for the Project to affect federally listed endangered or threatened species. NOAA Fisheries reviewed the Project area and determined that no listed species under its jurisdiction are known to occur in the Project area; therefore, no listed species under NOAA jurisdiction would be affected by the Project (Vaccaro, C. 2013). Columbia also consulted with the NJDFW, NJNHP, PADCNR, PFBC, Pennsylvania Game Commission (PGC), New York Natural Heritage Program, and Maryland Department of Natural Resources (MDNR) to identify potentially affected species protected by these respective states.

Table 2.4-1 identifies the federally and state-listed species potentially occurring in the Project area. Based on site habitat assessments and agency consultations, 3 federally listed species, 1 federally proposed species, 2 species reviewed for federal listing, 12 state-listed or proposed species, and 5 state species of concern (including two habitats) were identified as occurring or having suitable habitat within the Project area (table 2.4-1). Based on our review of the Project, we have determined that constructing and operating the Project would result in *no effect* on threatened or endangered species at the Wagoner M&R Station in New York and the Rutledge Compressor Station in Maryland.

TABLE 2.4-1

Federal and State Protected Species Potentially Occurring within the Project Area

Common Name (Scientific Name)	Status within Project Area Known to Occur	Counties within Project Area Known to Occur	Habitat Information
Federally Listed			
Reptiles			
Bog Turtle (*Glyptemys (=Clemmys) muhlenbergii*)	T	Gloucester County, New Jersey Chester County, Pennsylvania	Occurs in slow, shallow, muck-bottomed rivulets of sphagnum bogs, calcareous fens, marshy/sedge-tussock meadows, spring seeps, wet cow pastures, and shrub swamps; the habitat usually contains an abundance of sedges or mossy cover (NatureServe 2013).
Mammals			
Northern Long-eared Bat (*Myotis septentrionalis*)	Proposed Endangered	Gloucester County, New Jersey	Dense forest stands and maternity roosts beneath exfoliating bark and in tree cavities. Caves and underground mines are used as hibernacula sites (BCI 2013).

TABLE 2.4-1

Federal and State Protected Species Potentially Occurring within the Project Area

Common Name (Scientific Name)	Status within Project Area Known to Occur	Counties within Project Area Known to Occur	Habitat Information
Eastern Small-footed Bat (*Myotis leibii*)	Listing Not Warranted	Gloucester County, New Jersey	Heavily forested, mountain regions, frequently but not exclusively in caves, in hemlock forests of eastern North America, although they generally roost on the ground under rocks, in crevices, occasionally in buildings and under tree bark (BCI 2013).
Little Brown Bat (*Myotis lucifugus*)	FWS proactively collecting information	Gloucester County, New Jersey	Mainly mountainous and riparian areas in a wide variety of forest habitats throughout the United States. This species is especially associated with humans and utilizes man-made structures (BCI 2013).
Plants			
Sensitive Joint-Vetch (*Aeschynomene virginica*)	T	Gloucester County, New Jersey	Fresh to slightly brackish tidal river systems within the intertidal zone where populations are flooded twice daily. It typically occurs at the outer fringe of marshes or shores (NatureServe 2013).
Swamp Pink (*Helonias bullata*)	T	Gloucester County, New Jersey	Restricted to forested wetlands that are groundwater influenced and are perennially water-saturated with a low frequency of inundation (NatureServe 2013). Occurs in Atlantic white-cedar swamps; swampy forested wetlands that border small streams; meadows; and spring seepage areas. Requires habitat that is saturated, but not flooded. Appears to be somewhat shade tolerant, needing enough canopy to minimize competition with other more aggressive species (CPC 2013).
State Listed			
Reptiles			
Bog Turtle (*Glyptemys (=Clemmys) muhlenbergii*)	NJ-E PA-E	Gloucester County, New Jersey Chester County, Pennsylvania	Occurs in slow, shallow, muck-bottomed rivulets of sphagnum bogs, calcareous fens, marshy/sedge-tussock meadows, spring seeps, wet cow pastures, and shrub swamps; the habitat usually contains an abundance of sedges or mossy cover (NatureServe 2013).
Red-bellied Turtle (*Pseudemys rubriventris*)	T	Chester County, Pennsylvania	Relatively large deep portions of creeks, rivers, marshes, ponds, lakes. Sometimes in brackish water. Massachusetts population in ponds only. Soft bottom and abundant aquatic vegetation preferred (NatureServe 2013).
Timber Rattlesnake (*Crotalus horridus*)	T	Orange County, New York	Generally found in deciduous forests in rugged terrain. In the summer, gravid (pregnant) females seem to prefer open, rocky ledges where temperatures are higher, while the males and non-gravid females seem to prefer cooler, thicker woods where the forest canopy is more closed (NYSDEC 2013).
Birds			
Bald Eagle (*Haliaeetus leucocephalus*)	E	Gloucester County, New Jersey	Nests in forested areas near large bodies of water. Winters in coastal areas, along large rivers, and large unfrozen lakes (Cornell 2013).
Great Blue Heron (*Ardea herodias*)	SOC	Gloucester County, New Jersey	Inhabit saltwater and freshwater habitats, from open coasts, marshes, sloughs, riverbanks, and lakes to backyard goldfish ponds. Forage in grasslands and agricultural fields (Cornell 2013).

TABLE 2.4-1

Federal and State Protected Species Potentially Occurring within the Project Area

Common Name (Scientific Name)	Status within Project Area Known to Occur	Counties within Project Area Known to Occur	Habitat Information
Butterfly Habitat			
Black Dash (*Euphyes conspicuus*)	SOC/ Habitat	Chester County, Pennsylvania	Inhabits bogs/fens, forested and scrub-shrub wetlands, and riparian zones. Includes almost any open kind of shrubby or partially wooded (red maple) wetland or part thereof at least co-dominated by *Carex stricta*. Does not occur in deep shade (NatureServe 2013).
Mulberry Wing (*Poanes massasoit*)	SOC/ Habitat	Chester County, Pennsylvania	Almost any kind of wetland or part thereof dominated by *Carex stricta* from quite open to partially wooded. Not in deep shade but often under trees. Probably most commonly in seepage areas, fens, and sedge meadows (NatureServe 2013).
Plants			
American Lotus (*Nelumbo lutea*)	E	Gloucester County, New Jersey	Quiet water river backwaters, lakes. Also grown as an ornamental (eNature 2013).
Bouquet Mud-plantain (*Heteranthera multiflora*)	SOC	Gloucester County, New Jersey	Roadside ditches, pond edges (eFloras 2013).
Carolina Elephant-foot (*Elephantopus carolinianus*)	E	Gloucester County, New Jersey	Open or shaded, damp to wet places in pine forests and mixed forests, often on sandy soils (eFloras 2013).
Elliot's Beardgrass (*Andropogon gyrans*)	R (proposed)	Chester County, Pennsylvania	Old pasture land; prefers dry or moist fields or open woods (PADCNR consultation).
Netted Chainfern (*Woodwardia areolata*)	T (proposed)	Chester County, Pennsylvania	Moist or wet woods and acidic bogs (PADCNR consultation).
Nuttall's Tick-trefoil (*Desmodium nuttallii*)	T (proposed)	Chester County, Pennsylvania	Open woods and edges (PADCNR consultation).
St. Andrew's Cross (*Hypericum stragulum*)	T (proposed)	Chester County, Pennsylvania	Dry oak woods, lawn, and non-native dominated hedge rows; prefers open woods, thickets, dry sandy soil, and serpentine barrens (PADCNR consultation). Open places with dry, sandy soils in the Piedmont and Coastal Plain (NatureServe 2013 and MDFW 2013).
Tawny Ironweed (*Vernonia glauca*)	E	Chester County, Pennsylvania	Woods (NatureServe 2013).
Twisted Yellow-eyed Grass (*Xyris torta*)	T (proposed)	Chester County, Pennsylvania	Sphagnum bogs and swampy meadows (PADCNR consultation).
Virginia Pennywort (*Obolaria virginica*)	SOC	Gloucester County, New Jersey	Moist hardwoods and thickets, frequently partially covered by leaf letter (eNature 2013).

E=Endangered; SOC=Species of Concern; T=Threatened; R=Rare

2.4.1 Federally Listed Species

Bog Turtle

The bog turtle is a small, semi-aquatic turtle. Bog turtles inhabit early successional, groundwater-driven, emergent wetlands. Primary bog turtle habitat typically consists of wetlands with wet, mucky soils, and open, sunny, emergent vegetation (PFBC 2011). The habitat may appear as shallow, muck-bottomed rivulets of sphagnum bogs, calcareous fens, marshy/sedge-tussock meadows, spring seeps, wet cow pastures, and shrub swamps because the

turtles depend on a mosaic of microhabitats for foraging, nesting, basking, hibernation, and shelter (FWS 2001). Bog turtles commonly bask on tussocks in the morning in spring and early summer. They burrow into soft substrate of waterways, crawl under sedge tussocks, or enter muskrat burrows during periods of inactivity in summer (NatureServe 2013). Habitat loss, degradation, and fragmentation from urban/suburban development; habitat loss from natural forest succession; invasive plant species invasion; illegal collection; and predation are the primary threats to bog turtles (PFBC 2011).

Wetlands along the Line 10345 Loop and Line 1278 Loop were identified as suitable bog turtle habitat by the FWS. Columbia conducted Phase II surveys of wetlands along the Line 10345 Loop and the Line 1278 Loop in Spring 2014 and did not observe any bog turtles. On August 1, 2014, the FWS concurred with the findings in the Phase II report; therefore, we have determined that constructing and operating the Project is *not likely to adversely affect* this species.

Bat Species

On October 2, 2013, the FWS (2013b) announced a 12-month finding on a petition to list the eastern small-footed bat and to list the northern long-eared bat as endangered or threatened under the ESA and to designate critical habitat (78 FR 61045). In addition, the FWS announced a 6-month extension on June 30, 2014 for the northern long-eared bat (79 FR 36698). The Project is within the range of both species. After review of available scientific and commercial information, the FWS found that listing the eastern small-footed bat was not warranted but listing the northern long-eared bat was warranted. The FWS proposed listing the northern long-eared bat as an endangered species throughout its range. In addition, the FWS is proactively collecting information on several other bat species believed to be susceptible to white-nose syndrome to determine if, in addition to existing threats, the disease may be increasing the extinction risk of these species. The little brown bat, which was identified as potentially occurring in the Project area, is one of these species.

Northern long-eared bats hibernate during winter in caves and mines, referred to as hibernacula. They typically use caves or mines with large passages and entrances, constant temperatures, and high humidity with no air currents. During summer, northern long-eared bats roost singly or in colonies beneath tree bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, such as caves and mines. This species appears to opportunistically select roosts, using tree species that retain bark or provide cavities or crevices. It also rarely roosts in structures such as barns, sheds, buildings, and under eaves of windows.

Threats to the northern long-eared bat include human disturbance of hibernacula, loss or degradation of summer habitat as a result of highway and commercial development, surface mining, wind facility construction and operation, and timber harvest and forest management. Although significant population declines have not been observed due to these actions, they may now also affect this bat's ability to persist while experiencing dramatic declines caused by white-nose syndrome.

The FWS has indicated that the Project would be within the potential summer habitat range of the northern long-eared bat. Summer time tree removal could impact northern long-eared bats by killing, injuring, or disturbing breeding or roosting bats. Therefore, the FWS

recommended that any tree removal be prohibited between April 1 and September 30 (Schrading, E. 2013). Because Columbia would limit tree removal to October 1 through March 31, we have concluded that constructing and operating the Project is *not likely to adversely affect* the northern long-eared bat.

Based on publicly available information regarding the aforementioned bat species, the FWS' finding that the listing of the eastern small-footed bat was not warranted, our review of the potential threats on bats, Columbia's intent to begin tree clearing in November, and its commitment to adhere to migratory bird vegetation clearing restrictions between March and July, we have concluded that construction and operation of the Project *is not likely to adversely affect* the eastern small-footed bat and the little brown bat.

Sensitive Joint-Vetch

Sensitive joint-vetch is in the pea family and inhabits the intertidal zone of fresh to slightly salty (brackish) tidal river segments, typically in areas where sediments accumulate and extensive marshes are formed. Bare or sparsely vegetated substrate appears to be a habitat requirement for this species, which usually grows on riverbanks within 6 feet of the low-water mark. The plant can also occur on accreting point bars and in sparsely vegetated microhabitats of tidal marsh interiors, such as low swales and areas of muskrat eat-out. This species is typically found in areas where plant diversity is high and annual species are prevalent (FWS 2013).

Threats to sensitive joint-vetch include dredging and filling of marshes, dam construction, shoreline stabilization, commercial and residential development, sedimentation, impoundments, water withdrawal projects, invasive plants, introduced insect pests, pollution, recreational activities, agricultural activities, mining, timber harvest, and salt water intrusion due to sea level rise (FWS 2013).

To avoid impacts on this species, Columbia would use HDD to cross all wetlands where the FWS has recommended surveys for sensitive joint-vetch; however, the FWS still recommends surveys for the species to address concerns in the event of a release of drilling mud/fluid in the wetland. Columbia would implement the procedures outlined in its HDD Contingency Plan if a release occurred. Columbia proposes to develop a specific impact avoidance plan in combination with the HDD Contingency Plan. To ensure the impact avoidance plan will address the FWS concerns and provide appropriate protection to the joint-vetch, **we recommend that:**

- **Prior to construction of Line 10345 Loop, Columbia should file with the Secretary for review and written approval by the Director of OEP the sensitive-joint vetch impact avoidance plan along with any proposed mitigation. Columbia should also provide FWS comments on the plan.**

Based on the characteristics of this species, Columbia's use of HDD to construct the pipeline across wetlands, and Columbia's implementation of our recommendation, we have determined that constructing and operating the Project is *not likely to adversely affect* this species.

Swamp Pink

Swamp pink is a perennial herb in the lily family. It is known from the Coastal Plain of New Jersey, Delaware, Maryland, and Virginia, but restricted to forested wetlands that are perennially water-saturated with a low frequency of inundation (NatureServe 2013). Degradation of this species' sensitive habitat via changes to the hydrologic regime is the primary threat. Such changes can be direct (ditching, damming, draining) or indirect (from development in the watershed). Other threats include poor water quality, invasive species, trash, all-terrain vehicles, deer herbivory, trampling, and collection (NatureServe 2013).

Swamp pink surveys were conducted by Columbia in Spring of 2014. No suitable habitat or swamp pink were identified in the survey areas. Therefore, we have determined that constructing and operating the Project would result in *no effect* on this species.

Bald Eagle

The bald eagle was removed from the federal list of threatened and endangered species by the FWS on July 9, 2007; however, it continues to be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, and is listed in New Jersey as endangered for foresting and nesting habitat, and as threatened for wintering habitat. These laws prohibit killing, selling, or harming eagles or their nests and also protect eagles from disturbances that may result in injury, decreased productivity, or cause nest abandonment. Bald eagles typically nest in forested areas adjacent to large bodies of water, staying away from heavily developed areas when possible (Cornell 2013). Bald eagles are tolerant of human activity when feeding, and may congregate around fish processing plants, dumps, and below dams where fish concentrate (Cornell 2013). For perching, bald eagles prefer tall, mature trees that afford a wide view of the surroundings. In winter, bald eagles can also be seen in dry, open uplands if there is access to open water for fishing (Cornell 2013).

Bald eagles have been reported in Gloucester County, New Jersey. One bald eagle nest was identified in the vicinity of the Line 10345 Loop. As currently proposed, construction activities would occur within 400 to 500 feet of the nest. Transient eagles would likely avoid areas of active construction during installation of the pipeline because bald eagles tend to be sensitive to disturbance.

In a letter dated September 25, 2013, the NJDEP expressed concerns with Line 10345 Loop activities in the vicinity of an existing bald eagle nest and provided additional restrictions that would be required by the NJDFW Bureau of Endangered and Non-game Species. The restrictions include a seasonal timing restriction from December 15 through July 31 for any Project-related activities within 1,000 feet from the nest, or relocation of HDD entry and exit locations to at least 1,000 feet away from the nest. A buffer wider than 1,000 feet may be required due to existing site conditions.

The FWS indicated in a letter dated November 18, 2013 that because the eagle nest is located within 400 feet of the Project, cutting of trees within the bald eagle nest buffer (600 feet) would likely result in the “taking” of bald eagles. The FWS therefore recommended an HDD alternative to avoid tree clearing activities within 600 feet of the eagle nest. Columbia has lengthened a proposed HDD by 232 feet along Pedricktown-Harrisonville Road to avoid construction in proximity to the identified sensitive environmental resource. In addition, the FWS requested that Columbia provide it with information on the HDD methods Columbia would

implement and that Columbia follow National Bald Eagle Management Guidelines for construction activities near eagle foraging habitat.

Columbia has committed to complying with FWS and NJDEP recommendations; therefore, we have concluded that constructing and operating the Project would not adversely affect this species.

We have consulted with the FWS regarding this Project; however, to date we have not received written concurrence from FWS regarding this Project. Therefore, **we recommend that:**

- **Columbia should not begin construction activities <u>until</u>:**
  - **a. the FERC staff receives comments from the FWS regarding the proposed action;**
  - **b. the FERC staff completes any necessary consultation with the FWS; and**
  - **c. Columbia has received written notification from the Director of OEP that construction or use of mitigation may begin.**

2.4.2 State Protected Species

New Jersey

In New Jersey, endangered species management is the responsibility of the NJDFW, Endangered and Non-Game Species Program. The NJDFW noted that the entire Project area is valued habitat for great blue heron, a state species of concern, but the Endangered and Non-Game Species Program provided consultation that it does not expect any adverse effect to this species from this Project (Brunatti, M. 2013). The NJNHP database identified four rare plant species within 0.5 mile of the Project: the state endangered American lotus and Carolina elephant-foot; and the state species of concern bouquet mud-plantain and Virginia pennywort. The most recent observation of any of these listed rare plants was in 1961; however, Columbia has agreed to coordinate the need for a spring/summer 2014 survey with the NJNHP and provide survey reports to the Commission upon completion. Most of the species identified are associated with Oldmans Creek. Columbia proposes to HDD this waterbody to avoid potential adverse impacts on these species. However, to ensure that these species are not adversely affected, **we recommend that:**

- **<u>Prior to construction of Loop 10345</u>, Columbia should file with the Secretary the results of its coordination with NJNHP regarding state protected species and any measures Columbia would implement to avoid and/or minimize effects to state protected species.**

Pennsylvania

In Pennsylvania, endangered species management is shared by the PADCNR, PGC, and the PFBC. The PGC indicated no known impact on species under its jurisdiction. The PFBC indicated the potential for the state threatened red-bellied turtle and the bog turtle to be present in the Project area. Columbia submitted the results of its bog turtle survey report to the PFBC and filed it with the Commission. The PFBC concurred with the survey results of no effects on the bog turtle. The PADCNR responded that Pennsylvania Natural Diversity Inventory records indicated the potential for impact on six plant species: the state endangered Tawny ironweed; the state-threatened (proposed) St. Andrew's cross, Nuttall's tick-trefoil, netted chainfern, and twisted yellow-eyed grass; and the state rare (proposed) Elliot's beardgrass. The PADCNR also

noted two state Species of Special Concern (skippers): black dash and mulberry wing, and requested a voluntary action to note if host plants utilized by the species are identified as a result of the required plant surveys. Columbia conducted field surveys for these plant species in August 2013; no listed species were identified. In addition, no habitat dominated by the noted host plant was identified during these surveys. Therefore, no direct effects on these species are anticipated.

2.5 Land Use, Recreation and Visual Resources

About 140 comments regarding effects to land use were received during the scoping period from individuals; companies and organizations; and local and state agencies. These comments addressed temporary and permanent effects to land use during construction and operation of the Project.

2.5.1 Land Use

The Project would cross six general land use types: agricultural, residential, industrial/commercial, open land, forest (wooded), and other. Agricultural land consists of active cropland, orchards, and hay fields. Residential land consists of single and multi-family dwellings, yards/maintained landscapes, and subdivisions. Industrial/commercial land consists of power or utility stations, manufacturing or industrial plants, commercial or retail facilities, railroads, and roads. Open land consists of undeveloped land with no or minimal tree cover, such as old fields and emergent and scrub-shrub wetlands. Forest consists of land with tree crown coverage of more than 10 percent. Other land consists of miscellaneous special use areas, such as land associated with schools, parks, places of worship, cemeteries, sports facilities, campgrounds, golf courses, and ball fields.

Construction and operation of the Project would result in temporary and permanent effects to land use. About 248.9 acres of land would be temporarily disturbed during construction of the Project. About 72.0 acres of land would be permanently affected by operation of the Project.

Agricultural Land

About 111.1 acres of agricultural land would be temporarily affected by construction of the Project, of which 73.1 acres are associated with the Line 10345 Loop and 38.0 acres are associated with the Line 1278 Loop. About 0.07 acre of agricultural land would be permanently converted to industrial/commercial land for use as an access road. Land use affected by the proposed Project is shown in table 2.5-1.

Agricultural land would generally be affected for one growing season. Landowners would be compensated for loss of production and crop damages during this time. If effects are experienced for more than one growing season, Columbia would either mitigate the soil disturbance or compensate for additional loss of production and crop damages. In response to landowner's comments concerning effects on agricultural lands, Columbia has developed an Agricultural Impact Minimization Plan (appendix C) that outlines the measures it would implement to minimize effects on agricultural lands. Specifically, Columbia would strip topsoil and store it separately before replacing it on top of the subsoil following pipeline installation. The pipeline would be installed with a minimum cover of 4 feet in agricultural.

TABLE 2.5-1

East Side Expansion Project Acreage Affected

Facility	Agricultural		Residential		Industrial/Commercial		Open Land		Open Water		Forest		Other		Total	
	Const. [a/]	Operation [b/]	Const. [a/]	Operation [b/]	Const. [a/]	Operation [b/]	Const. [a/]	Operation [b/]	Const. [a/]	Operation [b/]	Const. [a/]	Operation [b/]	Const. [a/]	Operation [b/]	Const. [a/]	Operation [b/]
PIPELINE FACILITIES [c/]																
Line 10345 Loop																
Pipeline ROW	46.93	0.00	3.17	1.78	8.47	4.02	6.59	0.00	0.00	0.00	10.32	5.59	3.58	2.19	79.06	13.58
ATWS	4.71	0.00	0.08	0.00	0.46	0.00	0.81	0.00	0.00	0.00	0.22	0.00	0.10	0.00	6.38	0.00
Access Roads	0.49	0.07	0.04	0.00	0.79	0.12	0.12	0.01	0.00	0.00	0.54	0.00	0.00	0.00	1.98	0.20
Preferred Yard	20.96	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.45	0.00
Subtotal	**73.09**	**0.07**	**3.29**	**1.78**	**9.72**	**4.14**	**8.01**	**0.01**	**0.00**	**0.00**	**11.08**	**5.59**	**3.68**	**2.19**	**108.87**	**13.78**
Line 1278 Loop																
Pipeline ROW	11.18	0.00	11.18	2.22	9.45	3.78	18.27	0.00	0.00	0.00	21.42	8.22	9.71	5.60	81.21	19.82
ATWS	1.44	0.00	1.38	0.00	1.38	0.00	2.45	0.00	0.00	0.00	1.64	0.00	3.13	0.00	11.42	0.00
Access Roads	0.15	0.00	0.93	0.00	2.81	0.00	0.91	0.00	0.00	0.00	0.37	0.00	2.13	0.00	7.30	0.00
Preferred Yard	25.19	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.25	0.00
Subtotal	**37.96**	**0.00**	**13.49**	**2.22**	**13.70**	**3.78**	**21.63**	**0.00**	**0.00**	**0.00**	**23.43**	**8.22**	**14.97**	**5.60**	**125.18**	**19.82**
STATION MODIFICATIONS																
Milford	0.00	0.00	0.00	0.00	2.68	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.68	0.23
Easton	0.00	0.00	0.00	0.00	4.80	2.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80	2.28
Eagle	0.00	0.00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.00
Pennsburg	0.00	0.00	0.00	0.00	1.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.99	0.00
Quakertown	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00
Wagoner	0.00	0.00	0.00	0.00	0.29	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.03
Rutledge	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00
Access Roads	0.00	0.00	0.00	0.00	3.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.06	0.00
Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**14.84**	**2.64**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**14.84**	**2.64**
PROJECT TOTAL	**111.05**	**0.07**	**16.78**	**4.00**	**38.26**	**10.55**	**29.64**	**0.01**	**0.00**	**0.00**	**34.51**	**13.81**	**18.65**	**7.79**	**248.89**	**36.24**

[a/] Construction acreages reflect a nominal 100-foot-wide construction ROW, except in areas encompassed by HDD crossings, which would not require construction ROW between the HDD entrances and exits.

[b/] ROW consisting of "greenfield" or new easement areas that are not within the existing maintained right-of-way or between HDD entrances and exits. Although permanent pipeline easement is proposed within agricultural and open lands, no change in vegetative cover type would result from the maintenance of the pipeline easement. Agricultural and open lands would be allowed to revert to pre-construction conditions, and the permanent pipeline easement would not restrict current land use in these areas. Therefore, no permanent effects would result. On the Line 1278 Loop, permanent easement in agricultural and open lands would total 5.29 and 10.32 acres, respectively. On the Line 10345 Loop, permanent easement in agricultural and open lands would total 24.72 and 3.68 acres, respectively.

[c/] Regulators, MLVs, and launchers/receivers would be constructed and operated entirely within the permanent pipeline ROW; therefore, the permanent effects are included in the acreage affected for the pipeline ROW.

Note: Totals may not equal sum of addends due to rounding.

ATWS = additional temporary workspace
ROW = right-of-way

Additionally, the wheel load analysis based on the proposed 4 feet of soil coverage over the pipeline reveals that the soil can withstand up to 18,000 pounds per square inch, which exceeds the American Association of State Highway and Transportation Officials H-20 standard of 16,000 pounds per square inch for highway wheel load (American Association of State Highway and Transportation Officials 2002). Additional landowner requests concerning depth of cover in agricultural areas would be addressed by Columbia in the easement negotiation process. Also, Columbia would ask each landowner to describe farming activities that occur on each tract and pipeline depth and soil coverage would be adjusted accordingly. All of Columbia's proposed mitigation measures for effects on agricultural lands are included in its ECS and Agricultural Impact Minimization Plan. We have reviewed the measures in these plans and find them adequate.

At the request of landowners with asparagus fields along the Line 10345 Loop between MPs 3.4 and 4.9, these properties would be crossed via HDD. Asparagus fields located near MP 6.0 would be crossed by the Line 10345 Loop; however, the Line 10345 Loop would follow Oldmans Creek Road and would only affect the edges of the field. Following construction, affected cropland would be allowed to return to its previous agricultural use. Certain deep-rooted crops may be restricted within the permanent easement. Based on the short-term effects that would result from construction and operation of the Project and Columbia's proposed mitigation, we have determined that construction and operation of the Project would not significantly affect agricultural land use.

Residential Land

About 16.8 acres of residential land would be affected by construction of the Project, of which 3.3 acres are associated with the Line 10345 Loop and 13.5 acres are associated with the Line 1278 Loop. About 4.0 acres of residential land would be within the permanent pipeline rights-of-way.

Effects on residential land use would include inconvenience caused by noise, dust, and vibration generated by construction equipment and personnel; removal of lawns and trees and other landscaping; potential damage to existing septic systems, wells, or other utilities; removal of aboveground structures such as decks, fences, gazebos, sheds, from the right-of-way; and potential increased traffic congestion and road detours.

To minimize effects on residential land use, Columbia would implement numerous mitigation measures. Columbia would communicate work schedules with landowners prior to construction; notify landowners when hydrostatic testing is scheduled near their residence; maintain residential access; and schedule work within roadways to avoid commuter traffic and effects to school bus schedules. Typical construction hours would be Monday through Saturday from 8:00 a.m. to 6:00 p.m. Traffic safety personnel would be present during construction periods and Columbia would install signs and implement safety measures in accordance with applicable state and local roadway crossing permits (see section 2.6.3). To further minimize construction-related effects to residential land use, Columbia would use special construction methods designed for working in confined areas such as residential and commercially developed areas. Columbia would implement the following general measures for all residences and other structures located within 50 feet of the construction right-of-way:

- mature trees and landscaping would not be removed from within the edge of the construction work area unless necessary for safe operation of construction equipment, or as specified in landowner agreements;
- while the trench is open, the edge of the construction work area adjacent to the residence would be safety fenced for a distance of 100 feet on either side of the residence to ensure that equipment, materials, and spoil remain within the construction work area;
- a minimum of 25 feet of separation would be maintained between the residence and construction work area for a distance of 100 feet on either side of the residence; if the facility must be within 25 feet of a residence, it would be installed such that the trench does not remain open overnight; and
- immediately after backfilling the trench, all lawn and landscaping would be restored to final restoration conditions, or temporarily restored pending weather and soil conditions or as specified in landowner agreements. If seasonal or other weather conditions prevent compliance within these time frames, temporary erosion controls (sediment barriers and mulch) would be maintained and monitored until conditions allow for restoration.

If any damages result to residential property during construction of the pipeline, Columbia would repair the damaged property or provide compensation at fair market value. Contractors hired by Columbia would receive environmental and safety training and would be instructed on how to interact with the public during construction.

In order to resolve potential landowner complaints, **we recommend that:**

- **Columbia should develop and implement an environmental complaint resolution procedure that remains active for at least two years following completion of construction of the Project. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project and restoration of the right-of-way. Prior to construction, Columbia should mail the complaint procedures to each landowner whose property would be crossed by the Project, and file a copy with the Secretary.**

  a. In its letter to affected landowners, Columbia should:

  (1) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;

  (2) instruct the landowners that if they are not satisfied with the response, they should call Columbia's Hotline; the letter should indicate how soon to expect a response; and

  (3) instruct the landowners that if they are still not satisfied with the response from Columbia's Hotline, they should contact the Commission's Dispute Resolution Division Helpline at 877-337-2237 or at ferc.adr@ferc.gov.

b. In addition, Columbia should include in its status reports during construction a copy of a table that contains the following information for each problem/concern:

(1) the identity of the caller and date of the call;

(2) the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;

(3) a description of the problem/concern; and

(4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.

Following construction, Columbia would restore residential areas to pre-construction conditions and would reseed disturbed lawns with the appropriate lawn seed mixtures, unless other arrangements are specified in the landowner agreements. Columbia would also restore ornamental shrubs and other landscape plantings as specified in the landowner agreements. Landowners would continue to have use of the right-of-way provided it would not interfere with the easement rights granted to Columbia for construction and operation of the pipeline. The permanent pipeline right-of-way would be precluded from certain activities such as construction of permanent structures or planting of large brush and trees that could damage the pipeline, obscure periodic surveillance, or interfere with potential repairs.

There are 39 residences located within 50 feet of proposed construction work space, of which 10 are associated with the Line 10345 Loop and 29 are associated with the Line 1278 Loop (see table 2.5.2). There would be no residences or buildings within 50 feet of construction workspaces for the aboveground facilities. Columbia has developed site-specific residential construction plans detailing construction activities near residences within 50 feet of construction work areas. 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. These plans are included in appendix D. We have reviewed the site-specific residential construction plans and find them acceptable with one exception. The site-specific plans state that safety fencing would be installed along the edge of the construction work area within 100 feet on either side of the residence, and the fencing should remain throughout all *open-trench phases* of construction. The safety fencing should remain in place not just during open-trench phase of construction but throughout all phases of active construction. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, Columbia should file with the Secretary a revised ECS for review and written approval by the Director of OEP clarifying that safety fencing shall remain in place for all residences within 50 feet of construction work areas throughout all active phases of construction.**

We also encourage the owners of each of these residences to provide us comments on the plan for their individual property.

Of the 39 residences located within 50 feet of proposed construction work space, 4 would experience construction workspace at a distance of 10 feet or less from their residences; MP 6.3 and MP 8.6 on the Line 1278 Loop, and MP 2.3 and MP 7.7 on the Line 10345 Loop. Due to the proximity of the workspace at these locations, we find that it is necessary for Columbia to

confirm its landowner consultation regarding the proposed site-specific mitigation plans. Therefore, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary evidence of landowner concurrence with Columbia's proposed site-specific residential construction plan for any residences located within 10 feet of the proposed construction workspace.**

Because many of the homes in proximity to the Project were constructed adjacent to existing utility corridors, with the right-of-way functioning essentially as green space, expansion of this space would not result in significant permanent effects to residential land from operation. Although construction of the Project may inconvenience homeowners, these effects would be temporary; therefore, we have determined that construction and operation of the Project would not significantly affect residential land.

TABLE 2.5-2

Residences Within 50 feet of the Construction Work Area [a/]

Facility	Milepost	Distance from Construction Work Area (feet)	Distance from Pipeline Centerline (feet)	Residential Construction Drawing (see Appendix D)
Line 1278 Loop				
	0.6	21	53	TB-6711-8800
	0.6	34	59	TB-6711-8800
	0.6	31	56	TB-6711-8800
	3.5	48	73	TB-6711-8801
	3.6	13	37	TB-6711-8802
	3.6	25	58	TB-6711-8804
	3.6	36	61	TB-6711-8803
	3.7	11	35	TB-6711-8805
	3.8	23	55	TB-6711-8806
	3.8	31	80	TB-6711-8807
	3.9	49	74	TB-6711-8808
	4.0	27	61	TB-6711-8809
	4.0	39	64	TB-6711-8810
	4.0	37	112	TB-6711-8811
	4.0	44	78	TB-6711-8812
	4.0	21	46	TB-6711-8813
	5.5	13	38	TB-6711-8814
	6.3	8	53	TB-6711-8815
	8.6	19	42	TB-6711-8817
	8.6	34	61	TB-6711-8818
	8.6	15	40	TB-6711-8820
	8.6	10	35	TB-6711-8819
	8.6	24	101	TB-6711-8821
	8.7	43	116	TB-6711-8822
	8.7	27	68	TB-6711-8823

TABLE 2.5-2

Residences Within 50 feet of the Construction Work Area [a/]

Facility	Milepost	Distance from Construction Work Area (feet)	Distance from Pipeline Centerline (feet)	Residential Construction Drawing (see Appendix D)
	8.97	14	65	TB-6711-8824
	9.0	29	60	TB-6711-8825
	9.4	15	91	TB-6711-8826
	9.4	50	75	TB-6711-8827
Line 10345 Loop				
	1.7	32	57	TB-6711-8828
	2.3	5	17	TB-6711-8829
	2.3	14	88	TB-6711-8829
	2.9	44	119	TB-6711-8829-1
	4.2	25	81	TB-6711-8830
	4.2	27	141	TB-6711-8831
	5.8	26	75	TB-6711-8832
	6.2	13	38	TB-6711-8832-1
	7.7	10	25	TB-6711-8832-2
	8.6	21	46	TB-6711-8833

[a/] The construction work area does not include the area between HDD entry and exit points.

Industrial/Commercial Land

About 38.3 acres of industrial/commercial land would be temporarily affected by construction of the Project, of which 9.7 acres are associated with the Line 10345 Loop and 13.7 acres are associated with the Line 1278 Loop, and 14.8 acres are associated with aboveground facilities. About 10.55 acres of industrial/commercial land would be within the permanent pipeline rights-of-way. A portion of the new permanent easement would continue to be used as industrial/commercial land following construction, subject to provisions contained in the right-of-way agreement between Columbia and the landowner.

Construction of the Project could result in temporary effects on commercial lands due to reduced parking and increased traffic. Several commenters expressed concern about the Project's effect on traffic. Based on reviews of Columbia's proposal and existing roads, we have determined that the existing transportation system would be minimally affected by commuting construction workers. We have also determined that additional vehicles associated with the presence of construction workers would not cause significant traffic congestion problems. To minimize construction-related traffic effects on industrial/commercial land, Columbia would implement numerous measures including:

- providing transportation to the worksite for pipeline construction employees if limited parking is available at the worksite;
- keeping at least one lane of affected roads open at all times by placing metal plates across the open trench as necessary where boring the road is not possible;
- employing a flagman or other traffic control aids, as needed; and

- identifying alternate access routes.

Construction across existing roads, highways, railroads, and other utilities would be conducted in accordance with applicable permits and easement requirements. Highways and railroads would be crossed via cased bore or HDD (table 2.5-3). The Line 10345 Loop would cross Interstate 295 and four railroads owned by Ferro Corp NJ, Conrail, SMS Line, and Salem County Transit. The Line 1278 Loop would cross two railroads, owned by Amtrak and Norfolk Southern, Interstate 76, U.S. Highway 30, and Business Highway 30.

TABLE 2.5-3

Major Roads and Railway Crossings

Facility/Road Name	County/State	Milepost	Crossing Method [a/]
Line 10345 Loop			
Ferro Corp NJ Railroad	Gloucester County, NJ	0.8	HDD
Conrail Railroad	Gloucester County, NJ	0.9	HDD
SMS Line Railroad	Gloucester County, NJ	1.1	HDD
Interstate 295	Gloucester County, NJ	4.0	HDD
Salem County Transit Railroad	Gloucester County, NJ	8.2	Cased Bore
Line 1278 Loop			
Interstate 76	Chester County, PA	1.9	HDD
U.S. Highway 30	Chester County, PA	6.3	Cased Bore
Business Highway 30	Chester County, PA	8.3	Cased Bore
Amtrak Railroad	Chester County, PA	8.3	Cased Bore
Norfolk Southern Railroad	Chester County, PA	8.5	Cased Bore

[a/] In some locations more than one road or railroad would be crossed by a single HDD.

Based on the temporary duration of effects to commercial/industrial lands and Columbia's proposed mitigation measures, we have determined that construction and operation of the Project would not significantly impact commercial/industrial land.

Open Land

About 29.6 acres of open land would be temporarily affected by construction of the Project, of which 8.0 acres are associated with the Line 10345 Loop and 21.6 acres are associated with the Line 1278 Loop. About 0.01 acres of open land would be permanently affected by operation due to construction and use of a permanent access road. Columbia indicates that no change in vegetation type would occur from maintenance of the pipeline easement in this area of open land.

Effects to open land would be limited to the duration of construction activities and include the removal of vegetation and disturbance of soils. These effects would be temporary as open lands would be allowed to return to pre-construction conditions. To minimize effects to open lands, Columbia would implement construction and restoration techniques described in its ECS.

Based on the characteristics of open lands and because these lands would be allowed to revert to pre-construction conditions immediately following construction and Columbia would implement mitigation measures to reduce impacts, we have determined that construction and operation of the Project would not significantly affect open land.

Forest Land

About 34.5 acres of forest land would be affected by construction of the Project, of which 11.1 acres are associated with the Line 10345 Loop and 23.4 acres are associated with the Line 1278 Loop. About 13.8 acres of forest land would be permanently affected by operation of the permanent pipeline right-of-way.

Construction of the Project would result in long-term effects on forest land due to clearing along the right-of-way. About 13.8 acres of forested land would be permanently converted to cleared, open land. Forested land cleared within the temporary construction right-of-way and ATWS would be allowed to re-vegetate through natural succession.

We received comments during scoping concerned that creation of new pipeline rights-of-way would increase unauthorized off-road vehicles traffic or trespass across private property. The potential for this would be most likely where the pipeline and maintained right-of-way would cross forested land. To minimize the potential for this to occur, for each manager or owner of forested lands crossed Columbia would offer to install and maintain measures to control unauthorized vehicle access to the right-of-way. These measures may include signs; fences with locking gates; slash and timber barriers, pipe barriers, or a line of boulders across the right-of-way; and plantings of conifers or other appropriate trees or shrubs across the right-of-way.

Based on Columbia's collocation of pipeline facilities and the amount of forested land affected, we have determined that construction and operation of the Project would not significantly affect forest land.

Other Land

About 18.7 acres of other land, such as schools, parks, places of worship, and ball fields, would be temporarily affected by construction of the Project, of which 3.7 acres are associated with the Line 10345 Loop and 15.0 acres are associated with the Line 1278 Loop. Of this, about 7.8 acres of other land would be permanently affected within the pipeline right-of-way by operation of the pipeline.

In response to a comment received from the Charles G. Harker Elementary School, the Line 10345 Loop would cross in front of the school between MPs 6.6 and 7.0, avoiding area where the school may expand in the future. This route would also reduce effects to agricultural and residential lands. Columbia would coordinate construction activity with the school, install temporary construction fencing around the work area, limit the duration of open ditch construction, and employ a safety watchman onsite during school hours.

Temporary effects along the Line 1278 Loop would result from vegetation clearing and limited access to certain sites during construction of the Project. Construction of the Line 1278 Loop would temporarily limit access to one of the driveways to St. Elizabeth's Roman Catholic Church, located at about MP 1.0. Columbia has committed to preparing a handout specifically to distribute to parishioners and parents of students at St. Elizabeth's Roman Catholic Church

informing them of the Project and addressing construction-related concerns. Recreation sites and other designated areas that would be affected are discussed in section 2.5.4.

To minimize effects on other land, Columbia would implement construction and restoration techniques described in its ECS. To minimize disturbance to places of worship, construction would not occur during scheduled worship. Columbia would implement various additional safety measures for construction on school property, such as employing a safety watchman, limiting duration of open ditch construction, and installing construction fences.

Based on the temporary duration of effects to other land and Columbia's proposed mitigation measures, we have determined that construction and operation of the Project would not significantly affect other land.

2.5.2 Planned Recreational, Commercial, Residential and Other Land Development

Recreational

On July 7, 2013, Downingtown Borough Council adopted the Central Chester County Bicycle and Pedestrian Circulation Plan, which serves as a guide for improving walking, bicycling, and public transportation opportunities for seven municipalities in Chester County, Pennsylvania. The plan recommends development of a multi-use trail on the northern perimeter of Lloyd Park that would extend from Lloyd Avenue to Manor Avenue along Beaver Creek. The municipalities have identified this improvement as a priority and have obtained necessary right-of-way access (Chester County Board of Commissioners 2013). The Line 1278 Loop would cross Lloyd Park east of Lloyd Avenue via the open-cut method. Construction and operation of Line 1278 Loop would not affect the planned multi-use trail.

The Line 1278 Loop would cross Fellowships Fields in Upper Uwchlan Township at MP 0.4. Construction would take place within the existing right-of-way to minimize effects to the field. No significant, long-term effects to Fellowship Fields would be anticipated; however, minor, short-term effects could occur to a parking lot located off Fellowship Road at about MP 0.5. Additional parking facilities are located on the northern side of the fields.

The Line 1278 Loop would cross Hickory Park, which is located south of Interstate 76 in Upper Uwchlan Township, Pennsylvania at MP 2.0. The park would be crossed via the Interstate 76 HDD to avoid effects.

The Line 1278 Loop would also cross Lloyd Park, located east of Lloyd Avenue in Caln Township, Pennsylvania at MP 7.7. Lloyd Park would be crossed using the open-cut method. A portion of the park designated as a dog park would be affected; however, the playground area would not be affected. Effects would be temporary and would include clearing of vegetation and prohibited access during construction. Finally, the Line 1278 Loop would also cross the East Branch of Brandywine Creek at MP 4.5, which is currently stocked with rainbow and brown trout by the PFBC, and the adjacent Struble Trail, which parallels the creek. Both Brandywine Creek and the Struble Trail would be crossed via HDD; thereby significantly minimizing potential effects on these resources.

Based on the minimization and avoidance measures proposed by Columbia, we have concluded that Project effects on recreation areas would not be significant.

Commercial

The Line 10345 Loop would be located across land (MPs 1.1 and 3.9) that has been designated for commercial development (LogistiCenter at Logan). In comments filed with the Commission, Logan Township has expressed concerns about the future development of this land. Based on the Loop's collocation with existing roads and on the edges of property boundaries, we have determined that this land's potential use for commercial development would not be adversely affected.

The Line 1278 Loop would be located near a large planned commercial development (Eagleview Corporate Center) in Upper Uwchlan Township, Pennsylvania at MP 2.1. The Line 1278 Loop would pass to the west of this property; therefore, we conclude that there would be no effects on this development from construction and operation of the Project because Columbia would avoid the property.

Residential

The Line 1278 Loop in Pennsylvania would be adjacent to subdivisions currently under construction and/or planned as future development. The Eagle Farms subdivision is 0.13 mile to the southeast of MP 0.0. The Woods at Rock Raymond is 0.25 mile from MP 7.1 within Caln Township, and is currently under construction. Woods at Clarelyn is at MP 7.9, also within Caln Township. The Project would be 350 feet south of the subdivision. Based on the distance between these subdivisions and the Project, and the Project's collocation with an existing natural gas transmission pipeline, we have determined that the Eagle Farms, Woods at Rock Raymond, and Woods at Clarelyn subdivisions would not be affected.

Other Land Development

Based on scoping comments from local stakeholders, Columbia is aware of the potential for future development behind the Charles G. Harker elementary school between MPs 6.6 and 7.0, as school officials have expressed interest in exploring expansion of the facilities to accommodate an increase in the number of students. Columbia's Project would not affect this potential development as the Line 10345 Loop would cross in front of the school.

The Line 1278 Loop would be adjacent to Shamona Creek Elementary School in Uwchlan Township, Pennsylvania, at MP 3.1. The Project is partially in an existing right-of-way through this area; therefore, we have determined the school would not be affected.

Federal and State Land Conservation Programs

The Wetlands Reserve Program is a voluntary wetlands conservation program administered by the USDA Natural Resources Conservation Service (NRCS). The Conservation Reserve Program is a voluntary agricultural land conservation program administered by the Farm Service Agency. Based on available maps and discussions with the USDA NRCS, Farm Service Agencies, and landowners contacts in New Jersey and Pennsylvania, no land enrolled in the Wetlands Reserve Program or the Conservation Reserve Program would be crossed by the Project in New Jersey or Pennsylvania.

Woolwich Township, New Jersey has developed a comprehensive Transfer of Development Rights (TDR) Program. The TDR Program is a tool for municipal planning and preservation, with the goal of protecting agricultural and environmental lands while supporting

development that is needed. The program allows owners of preservation areas to separate the development rights of their property from the property itself and sell them for use elsewhere. Developers may purchase these "credits" for use in areas deemed appropriate for growth. The Line 10345 Loop would be near several of the approved parcels associated with Woolwich Township's TDR Program. Approved TDR parcels would be crossed between MPs 5.3 and 6.9. The Township's TDR ordinance does not require the Township to recalculate the credits when an easement is acquired on a property within a Sending Area. Landowners with parcels in a Sending Area must file a deed of easement restricting the parcel to agriculture or conservation purposes. Because the TDR parcels located between MPs 6.9 and 8.2 are in a Sending Area, these TDR parcels would not be affected by construction of the Project. The location of the pipeline through these parcels would not interfere with the surface use of these properties, as farming would be permitted to continue following construction, subject to provisions contained in the right-of-way agreement, which protect operation of the Project. As discussed in section 2.5.1, Columbia would compensate landowners for loss of production and crop damages during construction and operation of the Project. Columbia has committed to maintaining communication with the municipality regarding effects on these TDR parcels.

The Line 10345 Loop would be in the vicinity of several lots under active General Development Plans within Woolwich Township. Columbia would compensate affected landowners with parcels under these plans in a similar manner as other landowners along the Project route.

New Jersey's Farmland Preservation Program was created pursuant to New Jersey's Agricultural Retention and Development Act. Preserved farms are encumbered with a Deed of Easement, which, among other things, conveys the nonagricultural development rights to the State Agricultural Development Committee, the County Agricultural Development Board, municipalities, or nonprofit organizations. The Line 10345 Loop would cross three parcels that are registered in or are in the process of being registered in New Jersey's Farmland Preservation Program. Table 2.5-4 identifies the affected parcels and construction and operation effects for the route. The Line 10345 Loop would not cross any parcels associated with New Jersey's Green Acres conservation program.

TABLE 2.5-4

Farmland Preservation Program Parcels Crossed

Tract Number	Approximate Milepost	Total Acreage	Construction Effects (acreage)	Operation Effects (acreage)
NJ-GL-024.100B	5.1-5.3	130	2.03	0.95
NJ-GL-048.000	9.0-9.1	7	0.91	0.16
NJ-GL-48.000	9.1-9.4	76	2.85	0.56
		Total	**5.79**	**1.67**
Note: All areas would be allowed to revert to agricultural use.				

Because there is no legal procedure in place by which Columbia could obtain the necessary easement rights across preserved farms, Columbia may pursue condemnation. If Columbia's Project is certificated by the Commission, Columbia would be authorized by NGA section 7(h) to exercise the right of eminent domain to acquire the necessary rights-of-way and easements for the pipeline and appurtenant facilities. Alternatively, Columbia may seek to

obtain the necessary easement rights across agricultural development areas from the fee owners, if the agricultural development areas can be preempted and deemed non-applicable to interstate natural gas pipelines. Regardless of the easement acquisition process, Columbia would restore the property of the fee owner for all farms (whether preserved or not) so that farming may continue over the pipeline after construction is complete, and the fee owner would be compensated for crop losses expected to be incurred due to interference with the crops during construction. Therefore, we conclude effects on these areas would not be significant.

Columbia's exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings must be consistent with the facilities and locations authorized by the Commission. Columbia's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

2.5.3 Special Interest Areas

There are no federal Wild and Scenic Rivers or federal or state scenic roads that would be crossed by the Project. There are no national or state parks that would be within one mile of the Project area.

The Project would be outside the coastal zones of Pennsylvania, New York, and Maryland. In New Jersey, the coastal zone includes all areas where the state has authority, through the NJDEP and the New Jersey Meadowlands Commission, to regulate land and water uses that may have significant impact on coastal resources. Among others, this includes projects that may require permitting under the Waterfront Development Law of 1914. In the Project area, NJDEP jurisdiction under the waterfront development law includes all tidally flowed waterways and adjacent upland areas extending to the first public road, railroad right-of-way, or property line that is at least 100 feet, but no more than 500 feet from the tidal waterbody. The Project would include construction within these regulated areas and therefore would require NJDEP's determination of consistency with the coastal zone program under section 307(c)(3)(A) of the Coastal Zone Management Act following review of Columbia's application for upland waterfront development.

The Line 1278 Loop would cross three properties that are part of Upper Uwchlan Township's system of wastewater reclamation areas. These areas are discussed in more detail in section 2.1.2 of this EA.

2.5.4 Visual Resources

Temporary effects to visual resources would occur during construction and could include construction equipment, cleared vegetation, and areas of disturbed soil. Following construction, the landscape would be returned to pre-construction conditions and re-vegetated as practicable, except for 72.0 acres, which would be permanently affected for operation of the pipeline, permanent access roads, and aboveground facility modifications. Permanent effects to visual resources would include maintenance of the new permanent right-of-way in an open vegetated condition and installation of 0.1 acres of a permanent access road at MP 7.2 on the Line 10345 Loop.

Pipeline Loops

About 16.03 miles out of the 19.1 miles (84 percent) of the Project would be collocated with existing utility corridors. The existing rights-of-way undergo periodic vegetation maintenance. Co-locating with existing utility corridors would reduce the Project's effect to visual resources.

Visual effects would be greatest where the pipeline routes would parallel or cross roads and the right-of-way would be visible to passing motorists; residential land where vegetation used for visual screening of existing utility rights-of-way or for ornamental value would be removed; and in forested areas. The greatest potential effect would result from the removal of large trees, which would take longer than other vegetation types to regenerate and would be prevented from re-establishing on the permanent right-of-way. Vegetation clearing would have a lesser effect in areas consisting of grasses and scrub-shrub vegetation and in agricultural crop and pasture lands, where the re-establishment of vegetation post-construction would be relatively fast (generally less than three to five years).

Aboveground Facilities

Effects to visual resources would result from construction and modification of aboveground facilities. MLVs and M&R stations would be relatively small and would not present a significant change in the visual quality of areas surrounding the pipeline right-of-way.

Some concern has been expressed by stakeholders about potential visual effects from modifications to the Milford Compressor Station. We have determined that the modifications would not result in substantial change to the current visual landscape. Columbia is committed to planting additional trees and/or shrubs at the Milford Compressor Station to increase visual screen. The number, species, and location of the plantings would be assessed upon completion of construction of the station. To ensure the screening plan would adequately address stakeholders' concerns and minimize visual effects, **we recommend that:**

- **Prior to commencing service of the modified Milford Compressor Station, Columbia should file with the Secretary a visual screening plan for review and written approval of the Director of OEP.**

With the exception of the Easton Compressor Station, there would be no expansion of the existing facility fencelines associated with any of the compressor stations or M&R station modifications. To minimize effects on visual resources from modification of aboveground facilities, Columbia would replace any visual screening that may be affected by these modifications. No significant long-term visual effects would be expected from modifications to aboveground facilities.

2.6 Socioeconomics

This section discusses the socioeconomic resources that could be affected by construction and operation of the Project, including housing, transportation, property values, and environmental justice. We reviewed socioeconomic data from publicly available resources, including U.S. Census Bureau 2010 decennial Census of the U.S. Population and the American Community Survey, an ongoing survey that annually provides inferred data from a sample population. Potential socioeconomic effects are primarily related to the number of local and nonlocal personnel that are required for construction and operation of the Project and their

impact on local socioeconomic resources. Overall, Project construction would be short-term, and only minor socioeconomic effects are anticipated during operation of the Project.

2.6.1 Population, Economy, and Employment

Table 2.6-1 provides a summary of selected demographic and socioeconomic conditions of counties and states that contain Project facilities, including Gloucester County in New Jersey; Bucks, Chester, Northampton, and Pike Counties, Pennsylvania; Orange County, New York; and Hartford County, Maryland. The counties contain a range of population densities, per capita incomes, and unemployment rates, the smallest and largest of which occur in the state of Pennsylvania. Of the counties in the Project area, Pike County, Pennsylvania has the smallest population density and per capita income and the largest unemployment rate. With the exception of Pike County, all the counties that contain Project facilities have lower unemployment rates than their respective state as a whole. Bucks County, Pennsylvania has the highest population density while Chester County, Pennsylvania has the highest per capita income and lowest unemployment rate. The top industries in the Project area are generally educational services, retail trade, professional, scientific, and management, and administrative and waste management services. In Pennsylvania, the top industries also include manufacturing.

TABLE 2.6-1

Population, Economy, and Employment

Jurisdiction	Population	Population Density (people per square mile)	Per Capita Income	Civilian Labor Force	Percent Unemployed	Top Three Industries [a/]
New Jersey	**8,834,249**	**1,012.1**	**$35,087**	**4,667,450**	**10.6%**	**E, P, R**
Gloucester County	289,167	858.1	$32,524	155,880	9.5%	E, R, P
Pennsylvania	**12,739,595**	**276.6**	**$27,741**	**6,478,772**	**9.2%**	**E, M, R**
Bucks County	626,494	1,007.2	$36,232	346,681	8.2%	E, R, M
Chester County	503,325	622.3	$40,593	273,241	6.8%	E, P, M
Northampton County	298,618	792.1	$28,700	153,876	8.8%	E, M, R
Pike County	57,258	101	$27,040	27,712	14.6%	E, R, A
New York	**19,490,373**	**357.3**	**$31,444**	**9,951,988**	**10.7%**	**E, P, R**
Orange County	374,158	446	$29,865	185,309	8.7%	E, R, P
Maryland	**5,837,378**	**470.5**	**$35,328**	**3,183,645**	**8.6%**	**E, P, PA**
Hartford County	246,839	468.4	$34,422	135,145	8.0%	E, R, P

[a/] A = Arts, Entertainment and Recreation, and Accommodation and Food Services; E = Educational Services, and Health Care and Social Assistance; M = Manufacturing; P = Professional, Scientific, and Management, and Administrative and Waste Management Services; PA = Public Administration; R = Retail Trade

Source: US Census Bureau 2013

Construction of the Project would cause a minor and temporary increase of the population in the general Project area. The 390-personnel workforce would be distributed throughout the Project area, as they would concurrently work on different Project components. Columbia's commitment to hire local construction personnel would reduce the influx of non-local workers. Non-local personnel are not expected to relocate to the Project area with their families due to the relatively short construction period. Demand on local public services would

not increase due to Project construction, because there would not be an appreciable increase in local population.

We have determined that constructing the Project would not significantly affect the local population, economy, or employment based on the size of the total workforce, the geographic area over which the total workforce would be spread, and the short-term duration of construction activities in each area. The limited workforce required during operation and maintenance of the Project would perform periodic pipeline and right-of-way inspections and would not result in significant effects to the local population, economy, and employment.

2.6.2 Housing and Property Values

Table 2.6-2 provides a summary of selected housing conditions in the counties affected by the Project. The median housing values in the counties that contain Project facilities range from $193,900 in Pike County, Pennsylvania to $309,400 in Bucks County, Pennsylvania. All the counties have a vacant housing rate of less than 9 percent with the exception of Pike County, Pennsylvania, which has a vacant housing rate of 43.4 percent.

Existing vacant rental units are anticipated to meet the limited and temporary housing needs for personnel during construction of the Project. The need for Project housing would be relatively low because Columbia is expected to require only 390 construction personnel distributed throughout the Project area and would hire local workers to the extent practical. Any effect to the area rental industry would be positive because it would result in increased demand and higher rates of occupancy. During operation, the need for housing is anticipated to be negligible and no significant effects to the local housing markets would be expected.

TABLE 2.6-2

Housing and Property Values

Jurisdictions	Total Housing Units	Median Housing Value	Vacant Housing Units	Renter Occupied Housing	Rental Vacancy Rate	Median Rent
New Jersey	**3,565,222**	**$325,800**	**10.8%**	**34.4%**	**6.8%**	**$1,156**
Gloucester County	110,569	$225,200	5.4%	19.3%	7.0%	$1,012
Pennsylvania	**5,571,122**	**$164,700**	**11.2%**	**30.4%**	**6.1%**	**$800**
Bucks County	245,877	$309,400	6.3%	22.1%	8.7%	$1,103
Chester County	193,257	$324,100	4.6%	24.9%	5.1%	$1,150
Northampton County	120.519	$212,700	7%	27.3%	6.3%	$916
Pike County	38,470	$193,900	43.4%	17.1%	3.7%	$1,126
New York	**8,116,133**	**$286,700**	**11.2%**	**46.1%**	**4.6%**	**$1,076**
Orange County	137,750	$275,700	9.0%	30.6%	4.5%	$1,139
Maryland	**2,387,867**	**$289,300**	**10.3%**	**32.9%**	**7.2%**	**$1,117**
Hartford County	96,303	$281,400	6.2%	20.9%	10.0%	$1,564

Source: US Census Bureau 2013

During construction, housing and properties would experience noise, dust, and vibration from construction equipment, disturbance to driveways, lawns, and landscaping from trenching and installation of the pipeline loops, and potential damage to septic systems, wells, and other utilities. Compensation for damages incurred to landowners would be negotiated between Columbia and the landowner during the easement acquisition and negotiation process, which is designed to provide fair compensation to the landowner for the company's right to use the property. Determination of damages to state properties would include consideration of effects to recreation, aesthetic, or natural resource value of the land. Columbia would also work with landowners and the appropriate government agencies to restore septic systems, wells, and any other utilities damaged during construction. Properties near, but not directly affected by, the Project would not be expected to incur damages. Numerous comments were received expressing concern about the effects on residential property values due to construction and operation of the Project. Several landowners also expressed concerns about potential effects of HDD locations on their property. Other landowners who believe their property value has been negatively affected could appeal to the local tax agency for reappraisal and potential reduction of taxes. The *Journal of Real Estate Literature* has reported that there is no credible evidence that proximity to natural gas pipelines reduces property values (Gnarus 2012).

One stakeholder expressed concern about potential effects on tourism from modifications to the Milford Compressor Station, specifically from the effect of the Project on air quality. A detailed analysis of air quality effects is presented in section 2.8.1 below. We conclude in that section that operation of the proposed facilities would have no significant effect on regional air quality. Therefore, we also conclude that changes to the Milford Compressor Station would have no significant effect on regional tourism.

We have determined, based on the low requirement for short- or long-term housing, the vacant housing and vacant rental rates in the Project area, and research that concludes that proximity to natural gas pipelines does not reduce property values, that construction and operation of the Project would not significantly affect housing and property values.

2.6.3 Transportation and Traffic

The local road and highway system in the Project area is identified and discussed in section 2.5. Railroad and major highway crossings would be achieved by HDD or cased bore, which would generally avoid effects to traffic during construction. Unpaved and minor roads would be typically crossed using the open-cut method, requiring temporary closure of these roads and pre-established detours around the construction area. Columbia would keep at least one lane of the minor roadway open if there are no reasonable detours, except when closure of the entire roadway is required to install the pipeline.

Construction would proceed sequentially along the rights-of-way and Columbia would coordinate the process to minimize the disturbance to each property to the maximum extent practical. Columbia would obtain road-closing permits from state and local agencies as necessary. Permit conditions would dictate the day-to-day construction activities at road crossings, appropriate road signage, safety measures, and specifications to which the roadway would be restored. Columbia would work with local commercial businesses, including those along Center Square Road in Gloucester County, New Jersey, and property managers to mitigate

effects potentially caused by roadway disruptions during business hours. In the event that maintenance and repair activities during operation of the Project necessitate road closures, Columbia would follow the same procedures described for construction of the Project.

Construction of the Project would require the delivery of materials to the site, including materials that may be oversized for the roadways. Most of the equipment, including the 40- to 60-foot lengths of pipe, would be brought to the Project area by rail or truck and placed in staging areas or directly onto the right-of-way. As a result, the Project could affect normal traffic patterns on some roads and highways. Columbia would obtain the appropriate permits for oversized vehicles. The Project would also require construction personnel to commute to and from the Project area six days per week. To minimize potential effects from personnel and roadside parking, Columbia or the contractor could provide buses to move workers from common parking areas to the construction site.

We have determined, based on Columbia's commitment to work with local commercial businesses and to obtain permits from the appropriate state and local agencies, constructing and operating the Project would not have significant socioeconomic effects to transportation and traffic.

2.6.4 Environmental Justice

Executive Order 1298 requires federal agencies to take appropriate steps to identify and address disproportionately high and adverse health or environmental effects of federal actions on minority and low-income populations. According to the CEQ environmental justice guidance under NEPA (CEQ 1997a), minorities are those groups that include American Indian or Alaskan Native; Asian or Pacific Island; Black, not of Hispanic origin; or Hispanic. Minority populations are defined where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. The CEQ guidance also directs low-income populations to be identified based on the annual statistical poverty thresholds from the U.S. Census Bureau. For the purpose of analysis in this EA, low-income populations are defined as those individuals with reported income below the poverty level.

Table 2.6-3 provides a summary of the percentage of state and county populations that we consider minority or low-income. Because the minority populations in the counties crossed by the Project area do not exceed 50 percent of the total population, and the percentage of minorities and people with income below poverty level are not significantly higher than for each county's respective state, we have determined that there are no environmental justice concerns near the Project area The pipeline route was primarily selected adjacent to existing right-of-way to the extent possible. The right-of-way was not selected to affect minority or low income areas. The Project has been presented to the public and concerns regarding environmental justice were not raised as a key focus.

TABLE 2.6-3 Environmental Justice					
Jurisdictions	**People Below the Poverty Level**	**American Indian or Alaskan Native**	**Asian or Pacific Island**	**Black, not of Hispanic origin**	**Hispanic or Latino**
New Jersey	**10.5%**	**0.2%**	**8.5%**	**13.5%**	**18.1%**
Gloucester County	7.6%	0.2%	3.0%	9.9%	5.0%
Pennsylvania	**13.6%**	**0.2%**	**2.8%**	**10.9%**	**5.9%**
Bucks County	5.8%	0.1%	4.1%	3.6%	4.4%
Chester County	6.9%	0.1%	3.9%	6.0%	6.7%
Northampton County	10.6%	0.2%	2.6%	5.0%	10.9%
Pike County	9.3%	0.1%	0.5%	4.6%	9.3%
New York	**15.6%**	**0.4%**	**7.5%**	**15.6%**	**17.9%**
Orange County	12.1%	0.4%	2.6%	10.0%	18.4%
Maryland	**10.1%**	**0.3%**	**5.7%**	**29.5%**	**8.4%**
Hartford County	8.0%	0.2%	2.5%	13.0%	3.7%
Source: US Census Bureau 2013					

2.7 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires the FERC, as lead federal agency, to take into account the effects of its undertakings on properties listed in or eligible for listing in the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Cultural resources include archaeological sites, historic standing structures, objects, districts, and traditional cultural properties that illustrate or represent important aspects of prehistory or history or that have important and long-standing cultural associations with established communities or social groups. Columbia, as a non-federal party, is assisting us in meeting our obligations under Section 106 of the NRHP and the implementing regulations found at 36 CFR 800 and following the FERC *Guidelines for Reporting Cultural Resources Investigations*.

2.7.1 Archaeological Surveys

Columbia performed background research prior to conducting field investigations. Columbia searched site files maintained in online geographic information systems (GIS) and in the offices of the applicable state entities and reviewed other resources to identify previously documented cultural resources within or near the Project. A preliminary predictive model for the Project served to stratify the area of potential effects (APE) into high, moderate, and low areas for archaeological potential.

Columbia conducted archaeological surveys in the APE for the Project, including pipeline rights-of-way, access roads, ATWS, aboveground facilities, pipe yards, and other ancillary facilities. Archaeological surveys for the pipeline rights-of-way were generally within a 200-foot-wide study corridor. Pedestrian surveys were performed in areas with greater than 50 percent surface visibility and low probability areas. Systematic shovel testing was performed for areas that exhibited less than 50 percent surface visibility within high and moderate probability areas.

New Jersey

Columbia conducted archaeological surveys in compliance with the NJDEP Historic Preservation Office (NJDEP HPO) guidelines. One previously recorded historic archaeological site (28-GL-183) and six newly identified historic archaeological sites (28-GL-429, 28-GL-431, 28-GL-432, 28-GL-434, 28-GL-435, 28-GL-436, and 28-GL-438) were identified along the current proposed route (table 2.7-1). One additional previously recorded site (28-GL-298) was not relocated during archaeological surveys. In addition, 11 artifacts were recovered from isolated contexts. Previously recorded Site 28-GL-28, a prehistoric habitation site, was not relocated in the survey corridor. Site 28-GL-436 yielded 50 historic period artifacts attributable to the late eighteenth or early nineteenth century into the twentieth century. Historic maps suggest that Site 28-GL-436 may relate to a former farm complex depicted on maps from 1849 and 1876. Site 28-GL-436 was recommended as potentially eligible to the NRHP. Columbia would avoid effects to this site through HDD. Site 28-GL-438 comprises an early twentieth century house, associated late twentieth century outbuildings, and nine artifacts recovered from shovel tests that are consistent with the twentieth century attribution of the structures. Additional window glass fragments and modern bottle glass were noted scattered on the ground surface around the buildings. The amount and range of artifacts were limited and the site was not recommended as potentially eligible to the NRHP. Columbia has not filed NJDEP HPO comments on this site with the Commission. Therefore, **we recommend that:**

- **<u>Prior to construction of Line 10345 Loop</u>, Columbia should file with the Secretary a NJDEP HPO-approved site avoidance plan for Site 28-GL-436 along with documentation of NJDEP HPO's approval.**

TABLE 2.7-1

Archaeological Sites Identified within the APE in New Jersey

Site/Isolate[a/]	Chronological Affiliation/Site Type	Site Description	Recommended NRHP Status	Recommended Action	SHPO/THPO Comments
28-GL-183	Unknown Prehistoric Isolated Find and Historic Late 19th – mid-20th century Domestic site	1 prehistoric lithic core and scatter of 155 historic artifacts near cemented stone foundation, stone wall, and brick-lined well. Severe disturbance observed in APE.	Portion of Site Within APE Not Eligible	None	SHPO Concurrence June 13, 2013
28-GL-429	Mid-to-Late 20th Century Artifact Scatter	Broad, low density scatter of artifacts including 7 historic and 24 modern items.	Not Eligible	None	SHPO Concurrence June 13, 2013
28-GL-431	Historic 20th Century Artifact Scatter	3 historic surface finds representing a 20th century diffuse refuse scatter.	Not Eligible	None	SHPO Concurrence June 13, 2013
28-GL-432	Historic Late 19th to Early 20th Century Artifact Scatter	12 historic artifacts from plow zone representing low density refuse scatter.	Not Eligible	None	SHPO Concurrence March 12, 2014
28-GL-434	Historic Late 19th to Early 20th Century Artifact Scatter	8 historic artifacts from plow zone representing diffuse, low density refuse scatter.	Not Eligible	None	SHPO Concurrence March 12, 2014
28-GL-435	Historic 20th Century Artifact Scatter	5 historic artifacts from plow zone representing diffuse, low density refuse scatter.	Not Eligible	None	SHPO Concurrence March 12, 2014
28-GL-436	Late 18th or Early 19th to 20th Century	50 historic period artifacts representing a range of site activity, near map-documented farm complex.	Potentially Eligible	Site would be avoided by HDD	SHPO Concurrence March 12, 2014

TABLE 2.7-1

Archaeological Sites Identified within the APE in New Jersey

Site/Isolate[a/]	Chronological Affiliation/Site Type	Site Description	Recommended NRHP Status	Recommended Action	SHPO/THPO Comments
28-GL-438	Early 20th to Late 20th Century	5 window glass fragments, 1 cut nail, 1 cork washer, 1 ironstone plate sherd, 1 hollow ware sherd near residence and associated outbuildings.	Not Eligible	None	Pending

[a/] Site location information provided in Confidential Reports on file with the FERC. SHPO = State Historic Preservation Office

Pennsylvania

Columbia performed archaeological surveys in compliance with Pennsylvania Historical and Museum Commission Bureau of Historic Preservation (PHMC BHP) guidelines. Two previously identified sites, 36-CH-0509 (a prehistoric period site) and 36-CH-0582 (a historic period site), were not relocated during the recent archaeological surveys. One isolated find (36CH/050) comprised of three historic ceramic artifacts was recorded and recommended as not potentially eligible to the NRHP.

A supplemental survey identified four new sites: 36-CH-0934, 36-CH-0935, 36-CH-0936, and 36-CH-0937. Two of the sites (Sites 36-CH-0934 and 36-CH-0935) are potentially eligible to the NRHP (table 2.7-2). Columbia will determine if the sites may be avoided during construction. If not avoided, Phase II testing would be performed to evaluate if the sites are eligible to the NRHP. Four isolated finds were also recorded (36CH/051, 36CH/052, 36CH/053, and 36CH/060). These were recommended as not eligible to the NRHP. Archaeological surveys at the Milford and Easton Compressor Stations resulted in no identified archaeological resources. In addition, the Eagle Compressor Station survey was covered partially by a previous survey of the Line 1278 Loop (no identified archaeological resources noted), partially by a Categorical Exclusion Agreement between Columbia Gas Transmission LLC and the PHMC BHP that eliminated the need for archaeological survey, and the remaining portion displayed disturbance that resulted from existing gas pipelines and valves, and thus no potential to contain intact archaeological resources. These aboveground facilities will not be discussed further in this section. Additional archaeological surveys performed in areas of previously unsurveyed access roads and workspaces reported no identified archaeological sites. PHMC BHP commented that no further archaeological work is necessary within these surveyed areas (PHMC BHP June 12, 2014).

TABLE 2.7-2

Archaeological Sites/Isolates Identified within the APE in Pennsylvania

Site/Isolate [a/]	Chronological Affiliation/Site Type	Site Description	Recommended NRHP Status	Recommended Action	SHPO/THPO Comments
36CH/050	Isolated historic ceramics	3 historic ceramics reflecting casual discard in agricultural field	Not Eligible	None	SHPO Concurrence June 17, 2013
36CH/051	Isolated historic artifact	1 metal item, possibly fence-related hardware	Not Eligible	None	SHPO Concurrence Pending
36CH/052	Isolated historic artifact	1 metal item, possibly fence-related hardware	Not Eligible	None	SHPO Concurrence Pending

TABLE 2.7-2

Archaeological Sites/Isolates Identified within the APE in Pennsylvania

Site/Isolate [a/]	Chronological Affiliation/Site Type	Site Description	Recommended NRHP Status	Recommended Action	SHPO/THPO Comments
36CH/053	Prehistoric period isolated artifact	Isolated artifact not in primary depositional context	Not Eligible	None	SHPO Concurrence Pending
36CH/060	Isolated historic artifact	1 hand-painted underglaze porcelain sherd	Not Eligible	None	SHPO Concurrence March 10, 2014
36CH0934 [b/]	Historic period 19th- to-20th century domestic occupation	11 historic artifacts from plow zone and a concrete slab foundation	Potentially Eligible	Avoid or Phase II Evaluation	SHPO Concurrence December 10, 2013
36CH0935 [b/]	Historic period refuse scatter and prehistoric Woodland period lithic reduction station and possible hunting locus	14 historic period artifacts and 58 prehistoric period artifacts in plow zone; 6 historic period and 14 prehistoric artifacts from below plow zone; diagnostic artifacts include Madison triangle and possible Minguannan ceramic sherd.	Potentially Eligible	Avoid or Phase II Evaluation	SHPO Concurrence December 10, 2013
36CH0936	Historic period late 19th-to-early 20th century refuse scatter	4 historic artifacts from plow zone	Not Eligible	None	SHPO Concurrence December 10, 2013
36CH0937	Historic period refuse scatter and prehistoric period lithic reduction	2 nails and 2 prehistoric artifacts in plow zone; 2 nails and 2 prehistoric artifacts in sub-plow zone context	Not Eligible	None	SHPO Concurrence December 10, 2013

[a/] Site location information provided in Confidential Reports on file with the FERC.
[b/] Resource Report 4 indicates site may be avoided.
SHPO=State Historic Preservation Office

Plan for Unanticipated Historic Properties and Human Remains

Columbia developed Plans for Unanticipated Historic Properties and Human Remains for New Jersey and Pennsylvania, respectively. These plans establish the procedures that Columbia would follow in the event that previously unreported historic properties or human remains are found during construction of the Project. Columbia provided the plans to the State Historic Preservation Offices (SHPOs) in the respective states for review. The SHPOs commented on an early version of the plans for New Jersey (May 30, 2013) and for Pennsylvania (July 1, 2013). We also commented on early versions of the plans and requested some modifications. Columbia modified the plans and re-submitted them to the SHPOs and the FERC for review. PHMC BHP concurred with the revised plan (November 8, 2013). We have reviewed the plans and find them to be acceptable for the Project.

2.7.2 Historic Architecture Surveys

The historic architecture surveys focused on identification of built resources 50 years of age or older located within the Project construction corridor of new right-of-way. The surveys also identified the potential visibility of proposed vegetative and tree cuts along the new right-of-way from nearby properties 50-years-old or older.

New Jersey

The west and east areas along the proposed Line 10345 Loop proposed for right-of-way development and tree/vegetation removal were examined during the architectural survey

conducted in June 2013. These areas included the right-of-way between MP 0.0 to MP 1.9 and MP 8.9 to MP 9.5. Supplemental survey of the preferred alignment between MP 1.9 and MP 9.0 was conducted in March 2014.

The construction of one new pig launcher at the location of an existing launcher near the Delaware River (MP 0.0) would require a minor expansion of the fenced area. The pig launcher would be low in height and screened by roadside landscaping and trees. Three built resources older than 50 years identified in the vicinity have no direct views of the launcher location. Intervening trees and other buildings block oblique views from the side elevations of the buildings towards the launcher location.

The construction of a MLV at MP 5.7 would have no direct or visual effect to properties 50 years of age or older. On the western end of the Project, Columbia would install the proposed pipeline loop under the Delaware River Railroad line using an HDD. This method would not result in effects to the railroad bed.

Trees would be removed on two properties that were style-dated to 50 years old or older, 407 Pedricktown Road and 81 Rainey Road. Review of historic aerial photographs indicated that the trees to be removed have grown since the 1960s and 1970s and are not historically associated with the two properties. The removal of trees at these locales would result in no visual effects to the historic settings of the built resources.

One structure at 2330 Oldmans Creek Road was recommended as not meeting the significance and integrity criteria to be eligible to the NRHP. Comments from NJDEP HPO on this recommendation are pending. Columbia would remove this structure, which currently is located above the centerline of a HDD area. FERC defers comment pending receipt of NJDEP HPO comments on the structure's NHRP eligibility. The pipeline alignment would cross a former railroad line. The pipeline would be bored under the Swedesboro Railroad line and would not result in effects to the railroad bed.

Between MP 5.8 and MP 8.2, the Line 10345 Loop would cross through the Woolwich Township Agricultural Historic District. The district was determined not eligible for listing in the NRHP by NJDEP HPO in June 2013; however, it may contain farms that individually may possess qualities that meet the criteria to be eligible to the NRHP. The APE follows along Oldmans Creek Road, Rainey Road, and the New Jersey Turnpike and would not result in adverse effects to built resources or landscape elements of individual farms that have the potential to be eligible to the NRHP.

We have reviewed the potential for visual effects from tree cuts and vegetation removal in the APE. The potential views of tree and vegetation removal within the APE would be restricted to narrow areas near resources that have been noted as 50 years old or older. Columbia would not remove high concentrations of large trees. Use of HDD would avoid cutting trees that are currently concentrated along the tributaries of Oldmans Creek. Portions of the APE parallel extant roads such as Harrisonville/Oldmans Creek Roads and crosses under open agricultural fields. Many of the trees that would be cut became established during the last quarter of the twentieth century and are not historically associated with the surrounding landscapes or nearby aboveground resources. We conclude that the removal of these trees would not result in effects to historic properties or landscapes.

The NJDEP HPO noted in a letter dated January 7, 2014, that one historic resource, US Route 130 Bridge identified as individually eligible for listing in the New Jersey Register of Historic Places (SHPO Opinion 12/27/2012) is within the Project's APE. Based on review of the initial survey report, NJDEP HPO noted that the Project-related work would have limited aboveground effect and that the construction of aboveground facilities would have no direct effect on built resources 50 years or older.

Pending receipt of comment from NJDEP HPO on the most recent supplemental work reported by Columbia, we do not consider the Project effects to be adverse to historic properties.

Pennsylvania

Construction of one bi-directional pig launcher/receiver within the existing fenced area of the Eagle Compressor Station would have no potential to result in visual effects to nearby historic properties. No properties older than 50 years of age are between MP 0.0 and 0.7 in the immediate vicinity of the limited tree removal areas and there would be no effect.

The Project would be collocated within the existing Line 1278 right-of-way for about 6.3 miles. Much of the remaining 3.2 miles of the Project would extend through some farmland, post-1970 residential subdivisions, post-world War II residences on the outskirts of Downingtown, and mixed use commercial and service areas.

No buildings 50 years old or older were identified between MP 0.7 and MP 1.1. The right-of-way would intersect three transportation corridors that have been previously determined eligible for listing in the NRHP by PHMC BHP: the Pennsylvania Turnpike (Interstate 76); the Pennsylvania Railroad Main Line; and the Pennsylvania Railroad Morrisville Line. Columbia would avoid effects on these historic properties by HDD under the railroad beds.

At the north end of the Line 1278 Loop, between MP 0.7 and MP 1.1, Columbia would remove trees near two historic buildings. However, the tree removal would not affect any historic characteristics that could qualify these properties as historic (e.g., 395 Pottstown Road [BHP # 65799] and the farmstead west of Pottstown Road [BHP # 22645]).

The historic architecture survey along the right-of-way between MP 5.2 and MP 8.5 north and west of Downingtown was completed in September 2013. Columbia provided the report of the historic architecture survey to PMHC BHP and to the Commission. In a comment letter of November 4, 2013, PHMC BHP requested text revisions, including new data for defined route modifications; revised mapping to show Project updates; addition of historic aerial photographs for the Project corridor; preparation of Historic Site Forms for individually selected properties and formal evaluation applying NRHP criteria for evaluation (36 CFR 60.4); and discussion with illustration of effects of the pipeline corridor to historic properties. PHMC BHP staff also accompanied Columbia's contractor during a field visit of the Line 2078 Loop corridor on January 28, 2014, during which historic resources and potential effects were discussed.

In Columbia's report of supplemental survey filed with the Commission, it noted that the installation of the Line 1278 Loop would cross three historic properties. The Project crossing of the Dolby Farm (BHP # 22645 determined eligible to the NRHP by PHMC BHP in 2003) would not alter the character-defining features of the historic property and would not diminish the aspects of integrity of location, design, setting, materials, workmanship, feeling or association. The Dowlin Farm (BHP# 22252) would undergo minor alterations to tree lines and the outer

edges of the historic wooded area but these alterations would not diminish the aspects of integrity of location, design, setting, materials, workmanship, feeling or association of the overall farm or its built resources. Valley Brook Farm (BHP# 76355) no longer retains integrity as a farm. Its associated agricultural outbuildings do not retain integrity of design, materials, workmanship, feeling, or association, though Columbia suggested that the former farm's deteriorated main house may retain some of its character-defining features. The Project would cross open agricultural fields and one area of post-1958 tree growth and the right-of-way would be restored to agricultural use following construction of the Line 1278 Loop. Pending receipt of comments from the PHMC BHP, we do not consider these effects to be adverse to the respective historic properties. In July 2014, PHMC BHP commented that it agreed that Dowlin Farm is eligible to the NRHP and the Dolby Farm retains sufficient integrity and remains eligible for listing in the NRHP. It also commented that the Valley Brook Farm exhibited a loss of integrity and is therefore not eligible to the NRHP. PHMC BHP concluded that the Project would have no effect on the following resources: Pennsylvania Railroad: Morrisville Line (Key No. 76355); Pennsylvania Railroad: Main Line (Key No. 105675) and Pennsylvania Turnpike (Key No. 122695); and would have no adverse effect on the Dolby Farm and the Dowlin Farm.

2.7.3 Consultation and Compliance with NHPA

Agency Consultation

Columbia consulted with the SHPOs in New Jersey, Pennsylvania, New York and Maryland about the Project. The NJDEP HPO and the PMHC BHP have been providing guidance and review comments as the Project progresses.

In letters dated June 13, 2013, September 30, 2103 and March 12, 2014, the NJDEP HPO concurred with the recommendations made in the Phase I archaeological survey report and the two supplemental survey reports. The NJ HPO requested protection and avoidance plans for Site 28-GL-433 and Site 28-GL-436. The NJDEP HPO also provided comments on the historic architecture survey report and one property, US Route 130 Bridge, located within the APE that is individually eligible to the NJ Register of Historic Places (SHPO Opinion 12/27/2012).

In letters dated June 17, 2013, December 10, 2013, March 10, 2014, June 12, 2014, and July 14, 2014, the PHMC BHP concurred with the recommendations of the archaeological survey report, supplemental survey reports, and an archaeological negative survey form. In a letter dated July 7, 2014, the PHMC BHP noted the following:

- Properties not eligible to the NRHP due to lack of integrity and/or lack of significance:
    - 100 Rock Raymond Road, Caln Township (Key No. 76354);
    - Downing Farmstead, Caln Township (no Key No.); and
    - Veterans of Foreign Wars (VFW), 4601 Lincoln Highway, Caln Township, (Key No. 76357).
- Property eligible for listing in the NRHP under Criterion A for agricultural significance as an example of a twentieth century gentleman's farm and concurred with the proposed NRHP boundary of 123 acres:
    - Dowlin Farm, 350 North Creek Road, E. Brandywine Township (Key No. 22252)

- Property retains sufficient integrity and remains eligible for listing in the NRHP:
    - Thomas Dolby Farm, 301 Pottstown Road (Key No. 22645)
- Property not eligible to the NRHP due to dwelling not considered well-preserved example of Colonial Revival architecture and the ruinous condition of outbuildings (SHPO disagrees with Columbia's recommendation that the farmhouse may be eligible):
    - Valley Brook Farm, 5030 Horseshoe Pike, Caln Township (Key No. 76355)
- Project would result in no effect on the following resources as the Project will not alter the characteristics that qualify them for listing in the NRHP:
    - Pennsylvania Railroad: Morrisville Line (Key No. 76355);
    - Pennsylvania Railroad: Main Line (Key No. 105675); and
    - Pennsylvania Turnpike (Key No. 122695).
- Project would result in no adverse effect to the following resources:
    - Thomas Dolby Farm; and
    - Dowlin Farm.

New York Office of Parks, Recreation, and Historic Preservation indicated in a letter dated March 25, 2012 that the Project would have no effect upon cultural resources listed in or eligible to the NRHP.

The Maryland Historic Trust indicated to Columbia via telephone communication (February 10, 2014) that the Project would not require additional survey as the Project's APE for the Rutledge Compressor Station had been previously surveyed for a different project and no cultural resources had been identified.

Columbia also provided Project information to the Gloucester County Historical Society and the Chester County Historical Society. The letters were dated April 23, 2013. No responses to these letters have been filed with the Commission.

Tribal Consultation

Columbia sent letters with Project information to 15 federally recognized Native American tribes and three New Jersey State recognized tribes on November 2, 2012. These tribes are listed in table 2.7-3.

TABLE 2.7-3

Native American Tribes Consulted

Tribe	Date	Summary	Date of Response	Response Summary
Federally Recognized Tribes				
Absentee-Shawnee Tribe of Oklahoma	November 2, 2012	Project information letter	--	--
Cayuga Nation	November 2, 2012	Project information letter	--	--
Delaware Nation	November 2, 2012	Project information letter	--	--
Delaware Tribe of Indians	November 2, 2012	Project information letter	January 1, 2013	Requested copies of survey reports

TABLE 2.7-3 Native American Tribes Consulted				
Tribe	**Date**	**Summary**	**Date of Response**	**Response Summary**
Eastern Shawnee Tribe of Oklahoma	November 2, 2012	Project information letter	--	--
Oneida Indian Nation	November 2, 2012	Project information letter	--	--
Oneida Tribe of Indians of Wisconsin	November 2, 2012	Project information letter	--	--
Onondaga Indian Nation	November 2, 2012	Project information letter	--	--
Seneca Nation of Indians	November 2, 2012	Project information letter	--	--
Seneca-Cayuga Tribe of Oklahoma	November 2, 2012	Project information letter	--	--
St. Regis Mohawk Tribe	November 2, 2012	Project information letter	--	--
Shawnee Tribe of Oklahoma	November 2, 2012	Project information letter	--	--
Stockbridge-Munsee Community of Wisconsin	November 2, 2012	Project information letter	November 27, 2012	Not aware of cultural sites within the APE.
Tonawanda Band of Seneca Indians	November 2, 2012	Project information letter	--	--
Tuscarora Nation	November 2, 2012	Project information letter	July 3, 2013	Request to be informed if any human remains, funerary, or sacred objects are uncovered during construction
New Jersey State Recognized Tribes				
Ramapough Lenape Nation	November 2, 2012	Project information letter	--	--
Powhatan Renape Nation	November 2, 2012	Project information letter	--	--
Nanticoke Lenni-Lenape Indians	November 2, 2012	Project information letter	--	--

Additionally, we sent letters inviting consultation to the above listed tribes in letters dated June 26, 2013.

The Stockbridge-Munsee Community of Wisconsin responded in a letter dated November 27, 2012 that they are not aware of cultural resources sites within the APE. The Delaware Tribe of Indians responded by letter on January 1, 2013, requesting copies of cultural resources reports. Columbia has agreed to provide these reports. The Tuscarora Nation requested in a letter dated July 3, 2013 to be informed if any human remains, funerary, or sacred objects are uncovered during construction. No other responses have been filed with the FERC.

Public Comments

Several stakeholders have filed letters with the FERC commenting on cultural resources concerns related to the Project. Mr. L. O'Rourke expressed concern that his house, listed with the Old Caln Historic Society, may have associated historic items contained within soils near the house that could be affected by the Project. Mr. P. Santucci and Ms. S. Lehotsky wrote to the FERC about potential locations of Native American artifacts along Beaver Creek and throughout Chester County that the Project could affect. As discussed above, most of the pipeline route has been surveyed for archeological sites and avoidance plans have been or are being developed for all sites potentially eligible for listing on the NRHP. Additionally, we would ensure compliance with NHPA as described below.

In December 2013, in two separate letters, Ms. P. Munoz and Mr. W. Martin informed the Commission that the town of Milford near the Milford Compressor Station has historical significance due to its association with the American Conservation Movement and they expressed concern that the Project may be deleterious to those historical values. Because the proposed upgrades would take place within the existing fenced facility, we conclude that the Project would not have an adverse effect to any historic properties or National Landmarks in the vicinity of the Milford Compressor Station.

Compliance with NHPA

Columbia is planning additional supplemental archaeological surveys in areas of the APE not yet investigated for archaeological sites. Additional information is also required regarding the Project's effects on two sites in Pennsylvania. Columbia is evaluating options for avoiding the sites or testing them to determine if they are eligible for the NRHP, if they cannot be avoided. If the sites prove to be eligible to the NRHP, Columbia would be required to prepare a treatment plan in consultation with the appropriate parties to mitigate adverse effects. The FERC would afford the ACHP an opportunity to comment on the treatment plan in accordance with 36 CFR 800.6. Implementation of a treatment plan would occur only after Certification of the Project and receipt of written notification to proceed from the FERC. Columbia is also preparing supplemental historic architecture reports for surveys performed in the Project APE that it would provide to the Commission and to NJDEP HPO and PHMC BHP for review and comment.

To ensure the FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **Columbia <u>should not begin</u> implementation of any treatment plans/measures, including archaeological data recovery, construction of facilities and/or use of staging, storage, or temporary work areas, and new or to-be-improved access roads <u>until</u>:**

  a. Columbia files with the Secretary cultural resources survey and evaluation reports, any necessary treatment plans, and the SHPOs' comments on the reports and plans;

  b. the ACHP is afforded an opportunity to comment if historic properties would be adversely affected; and

  c. the FERC staff reviews and the Director of the OEP approves all cultural resources reports and plans, and notifies Columbia in writing that treatment plans/mitigation measures may be implemented and/or construction may proceed.

  All materials filed with the Commission containing <u>location, character, and ownership</u> information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "<u>CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE</u>."

2.8 Air Quality and Noise

2.8.1 Air Quality

The Project would result in air pollutant emissions through short-term construction activities and long-term operation of the proposed pipeline loops and modified facilities. The modified facilities would include upgrades at three compressor stations in Pennsylvania and one compressor station in Maryland, and two meter stations in Pennsylvania and one meter station in New York. We received several comments with concerns regarding emissions during construction and additional operating emissions in the Project area. This section of the EA addresses the construction and operating emissions from the Project, as well as projected impacts and compliance with regulatory requirements.

Existing Air Quality

EPA has established National Ambient Air Quality Standards (NAAQS) for seven air contaminants designated "criteria pollutants," which are nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}) and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$). The NAAQS were established under the Clean Air Act of 1970, as amended in 1977 and 1990 (CAA), to protect human health (primary standards) and public welfare (secondary standards). EPA set limits under the primary standards to protect human health including sensitive populations such as children, the elderly, and asthmatics. EPA also set secondary standard limits to protect public welfare from detriments such as reduced visibility and damage to crops, vegetation, animals, and buildings. The primary standards are lower than or equal to the secondary standards for each pollutant and therefore, compliance with the primary standards satisfies the secondary standards. The EPA conducts periodic scientific reviews of the NAAQS to ensure they provide adequate protection of human health and public welfare based upon current scientific evidence. The NAAQS are summarized in table 2.8.1-1.

TABLE 2.8.1-1

National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary	Secondary	Form
CO	8-hour	9 ppm	N/A	Not to be exceeded more than once per year
	1-hour	35 ppm	N/A	
Pb	Rolling 3-month average	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$	Not to be exceeded
NO_2	1-hour	100 ppb	N/A	98th percentile, averaged over 3 years
	Annual	53 ppb	53 ppb	Annual mean
O_3	8-hour	75 ppb	75 ppb	Annual 4th highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$	Annual mean, averaged over 3 years
	24-hour	35 $\mu g/m^3$	35 $\mu g/m^3$	98th percentile, averaged over 3 years
PM_{10}	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
SO_2	1-hour	75 ppb	N/A	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	3-hour	N/A	0.5 ppm	Not to be exceeded more than once per year

ppb=parts per billion μg=microgram ppm=parts per million

Each state is required to implement and enforce air quality control regulations, known as State Implementation Plans (SIP), to ensure that air quality in the state meets the NAAQS. Each state within the Project area has established an agency to administer the SIP, as follows: the NJDEP, PADEP, the New York State Department of Environmental Conservation (NYSDEC), and the Maryland Department of the Environment (MDE).

The EPA and state agencies established air quality control regions (AQCRs) within the states for the development of the SIPs to describe how the NAAQS would be achieved and maintained. The AQCRs are intra- and interstate regions, such as metropolitan areas, where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or portion thereof, is designated based on compliance with the NAAQS. AQCR designations fall under one of three categories: "attainment" (areas in compliance with the NAAQS); "non-attainment" (areas not in compliance with the NAAQS); or "unclassifiable." The Project area spans several counties in New Jersey, Pennsylvania, New York, and Maryland that have varying attainment designations. Table 2.8.1-2 lists the non-attainment designation for criteria pollutants for the counties where Project facilities would be located.

TABLE 2.8.1-2

Attainment Status for the Counties Where Project Facilities Would be Located

Project Component	Location (County, State)	Air Quality Control Region (AQCR)	Pollutant Status	
			Attainment or Unclassifiable	Non-Attainment [a/]
Line 10345 Loop	Gloucester County, NJ	Metro. Philadelphia Interstate	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2, O_3	O_3 [b/]
Line 1278 Loop	Chester County, PA	Metro. Philadelphia Interstate	CO, NO_2, Pb, PM_{10}, SO_2	$PM_{2.5}$ (24-hr & annual), O_3 [b/]
Milford Compressor Station	Pike County, PA	Northeast Pennsylvania Interstate	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2, O_3	N/A
Easton Compressor Station	Northampton County, PA	Northeast Pennsylvania Interstate	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2, O_3	$PM_{2.5}$ (24-hr), O_3 [c/]
Eagle Compressor Station	Chester County, PA	Metro. Philadelphia Interstate	CO, NO_2, Pb, PM_{10}, SO_2	$PM_{2.5}$ (24-hr & annual), O_3 [b/]
Pennsburg M&R Station	Montgomery County, PA	Metro. Philadelphia Interstate	CO, NO_2, Pb, PM_{10}, SO_2	$PM_{2.5}$ (24-hr & annual), O_3 [b/]
Quakertown M&R Station	Bucks County, PA	Metro. Philadelphia Interstate	CO, NO_2, Pb, PM_{10}, SO_2	$PM_{2.5}$ (24-hr & annual), O_3 [b/]
Wagoner M&R Station	Orange County, NY	Hudson Valley Intrastate	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$, SO_2, O_3	$PM_{2.5}$ (24-hr & annual), O_3 [d/]
Rutledge Compressor Station	Harford County, MD	Metropolitan Baltimore Intrastate	CO, NO_2, Pb, PM_{10}, $PM_{2.5}$ (24-hr), SO_2	$PM_{2.5}$ (annual), O_3 [e/]

[a/] All counties are located in the Northeast Ozone Transport Region, which is moderate non-attainment for O_3.
[b/] Moderate for the 1997 8-hour standard and marginal for the 2008 8-hour standard.
[c/] Attainment for the 1997 8-hour standard and marginal for the 2008 8-hour standard.
[d/] Moderate for the 1997 8-hour standard.
[e/] Serious for the 1997 8-hour standard and moderate for the 2008 8-hour standard.

All Project facilities are also within the Northeast Ozone Transport Region. The Ozone Transport Region (42 USC §7511c) includes 11 northeastern states in which ozone transports

from one or more states and contributes to a violation of the ozone NAAQS in one or more other states. States in this region are required to submit a SIP, stationary sources are subject to more stringent permitting requirements, and various regulatory thresholds are lower for the pollutants that form ozone, even if they meet the ozone NAAQS.

On December 7, 2009, the EPA added greenhouse gases (GHG) to the definition of pollutant, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The GHGs that would be produced by the Project are CO_2, CH_4, and N_2O during construction and operation; hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride would not be emitted by the Project. Emissions of GHGs are quantified in terms of carbon dioxide equivalents (CO_2e) by multiplying emissions of each GHG by its respective global warming potential (GWP). The GWP is a ratio relative to CO_2 regarding each GHG's ability to absorb solar radiation and its residence time in the atmosphere. Accordingly, CO_2 has a GWP of 1 while CH_4 has a GWP of 25, and N_2O a GWP of 298. The EPA did not establish NAAQS for any listed GHGs as their impact is on a global basis and not a local/regional basis. We received comments on the amount of GHG emissions the Project would contribute. In compliance with EPA's definition of air pollution to include GHGs, we have provided estimates of GHG emissions for construction and operation, as discussed throughout this section. Impacts from GHG emissions (climate change) are discussed in more detail in section 2.10.10.

Regulatory Applicability and Compliance

The Project would potentially be subject to a variety of federal and state air quality regulations for the construction and operation of air pollutant emitting equipment. Air emissions associated with Project construction activities would be temporary and evaluated per the EPA's general conformity rule in the CAA. Air emissions associated with Project operation would result from new and modified equipment and evaluated per the applicable state and federal air permitting regulations. The PADEP, MDE, NJDEP and NYSDEC administer the regulations in their respective states, as well as the federal requirements. The federal and state regulations established as a result of the CAA that are potentially applicable to the Project are as follows:

- New Source Review;
- Federal Class I Area Protection;
- Title V Operating Permits;
- New Source Performance Standards;
- National Emission Standard for Hazardous Air Pollutants;
- Greenhouse Gas Mandatory Reporting Rule;
- Minor Source Permitting Requirements; and
- General Conformity.

The following sections summarize the applicability of various state and federal regulations to the Project for both construction and operation.

<u>New Source Review</u>

New Source Review (NSR) is a preconstruction air permitting program established under Parts C and D of the CAA. An NSR permit must be obtained prior to the commencement of construction on new major sources or major modifications to existing major sources. NSR

permitting requirements are established per two distinct programs: the Prevention of Significant Deterioration (PSD) program and the Non-attainment New Source Review (NNSR) program.

The applicability of the PSD and NNSR programs to a project is pollutant-specific and dependent upon the attainment designation where the project is located and the estimated increase in potential criteria pollutant emissions. The PSD program applies to a new major source or major modification to an existing major source for pollutants designated as attainment with the NAAQS. The goal of the PSD program is to prevent new and modified air pollutant emission sources from causing the existing air quality to deteriorate to unacceptable levels. The NNSR program applies to a new major source or major modification to an existing major source for pollutants designated as non-attainment with the NAAQS. The goal of the NNSR program is to assure that new and modified air pollutant emission sources result in a net improvement in the existing air quality.

The PSD regulations are codified under 40 CFR 52.21. Each state may allow the EPA to retain PSD authority, adopt authority of the federal PSD program or develop a state-specific PSD program that is incorporated into the SIP and approved by the EPA. In the four states where the Project would be located, each state has a SIP-approved PSD program. Unlike the PSD program, the federal regulations do not include a NNSR permitting program, but rather require each state with a designated non-attainment area to develop NNSR preconstruction air permitting regulations and incorporate them into their SIP.

The PSD and NNSR permitting programs are not applicable to construction activities and would only apply to the Project's operational emissions. The Project's activities for the pipeline loops and at the Eagle Compressor Station, Rutledge Compressor Station, Wagoner M&R Station, Pennsburg M&R Station and Quakertown M&R Station would not include new or modified equipment that would result in an increase in operational emissions and therefore, NSR permitting would not be applicable for these Project components. The Milford and Easton Compressor Stations would include new gas compressor equipment that could increase operational emissions and therefore, NSR permitting applicability must be evaluated for these two Project components.

The Milford and Easton Compressor Stations are existing facilities, each with current air permits issued by the PADEP. The Milford Compressor Station is permitted as a major source for nitrogen oxide (NO_x) emissions and a minor source for all other regulated pollutants. The Milford Compressor Station is located in an attainment area for all pollutants, but is located in the Northeast Ozone Transport Region and therefore must be evaluated for applicability to the NNSR program for ozone precursors (NO_x and volatile organic compounds [VOC]). The Easton Compressor Station is permitted as a minor source with potential emissions of all pollutants below its respective major source threshold. The Easton Compressor Station is located in a non-attainment area for $PM_{2.5}$ and ozone and would be evaluated for applicability to the NNSR program for $PM_{2.5}$ and ozone precursors (NO_x and VOC).

Columbia would decommission and remove all of the existing air pollutant emitting equipment at the Milford and Easton Compressor Stations, with the exception of a natural gas compressor engine at the Easton Compressor Station. The reduction in emissions resulting from the removal of existing equipment would result in both the Milford and Easton Compressor Stations becoming minor PSD and NNSR sources upon completion of the Project. Tables 2.8.1-3 and 2.8.1-4 provide a comparison of estimated potential-to-emit (PTE) of each

criteria pollutant at the Milford and Easton Compressor Stations, respectively, versus the applicable PSD and NNSR threshold. The PTE estimates in tables 2.8.1-3 and 2.8.1-4 account for the increase in emissions during startup and shutdown of the combustion turbines.

TABLE 2.8.1-3

Milford Compressor Station NSR Applicability

Pollutant	New Equipment PTE (tpy)	Remaining Equipment PTE (tpy)	Facility-Wide PTE (tpy)	PSD Major Source Threshold (tpy)	NNSR Major Source Threshold (tpy)
NO_x	46.20	N/A	46.20	250	100
PM_{10}	7.62	N/A	7.62	250	N/A
$PM_{2.5}$	7.62	N/A	7.62	250	N/A
CO	98.30	N/A	98.30	250	N/A
VOC	3.41	N/A	3.41	250	50
SO_2	0.31	N/A	0.31	250	50
GHGs (as CO_2e)	50,762	N/A	50,762	100,000	N/A
tpy=tons per year					

TABLE 2.8.1-4

Easton Compressor Station NSR Applicability

Pollutant	New Equipment PTE (tpy)	Remaining Equipment PTE (tpy)	Facility-Wide PTE (tpy)	PSD Major Source Threshold (tpy)	NNSR Major Source Threshold (tpy)
NO_x	57.70	13.0	70.70	250	100
PM_{10}	14.56	0.55	15.09	250	N/A
$PM_{2.5}$	14.56	0.55	15.09	250	100
CO	144.10	19.40	163.50	250	N/A
VOC	6.48	3.20	9.70	250	50
SO_2	0.59	0.02	0.60	250	50
GHGs (as CO_2e)	96,053	3,162	99,215	100,000	N/A
tpy=tons per year					

As shown in tables 2.8.1-3 and 2.8.1-4, the proposed emissions at the Milford and Easton Compressor Stations would be below the major source thresholds for PSD and NNSR, therefore, major permitting review according to PSD and NNSR would not be applicable. Source-specific PTE estimates for each emission source at the Milford and Easton Compressor Stations are provided in tables 2.8.1-9 and 2.8.1-10.

In May 2010, EPA issued the PSD GHG Tailoring Rule to incorporate PSD permitting requirements for large sources of GHG emissions. Beginning in January 2011, a new industrial facility that is a major source for at least one non-GHG pollutant and which emits or has the potential to emit at least 75,000 tons per year (tpy) of CO_2e would also be subject to GHG permitting requirements under PSD. Beginning in July 2011, the new PSD major source

threshold of 100,000 tpy of CO_2e became effective for new sources. For existing PSD major sources, the threshold for a modification is 75,000 tpy CO_2e. On June 23, 2014, the Supreme Court ruled in Utility Air Regulatory Group versus EPA that the EPA did not have the authority to "tailor" the PSD regulations. The Supreme Court ruled that a new source or modification to an existing source could not trigger PSD requirements for GHG emissions. However, a source subject to PSD requirements for one or more other PSD regulated pollutants could also be required to meet Best Available Control Technology (BACT) requirements for GHG emissions. The Easton and Milford Compressor Stations would not be PSD major sources, and therefore not subject to BACT requirements for GHG emissions.

Federal Class I Area Protection

Congress designated certain lands as Class I areas in 1977. Class I areas were designated because the air quality was considered a special feature of the area (e.g., national parks or wilderness areas). These Class I areas are given special protection under the PSD program. The Milford Compressor Station is about 203 kilometers (about 126 miles) north of the nearest Class I area, Brigantine Wilderness Area near Atlantic City, New Jersey. The Easton Compressor Station is about 150 kilometers (about 93 miles) north-northwest of the nearest Class I area, Brigantine Wilderness Area. Because the proposed emissions at these compressor stations would be below the PSD permitting thresholds and the stations are more than 100 kilometers from the nearest Class I area, the compressor stations would not be required to demonstrate compliance with the PSD Class I increments.

Title V Operating Permit

Title V of the CAA established an operating permit program for new and existing major sources of emissions. A Title V Operating Permit documents all applicable requirements for each emission source at a subject facility. The Title V regulations are codified at the federal level under 40 CFR 70. Each state is required to develop Title V permitting regulations and incorporate them into their SIP. If a facility's PTE is equal to or greater than the criteria pollutant or hazardous air pollutants (HAP) thresholds, the facility is considered a "major source." The major source threshold level is 100 tpy for criteria pollutants, 10 tpy of any single HAP, or 25 tpy of all HAPs in aggregate.

The EPA also promulgated the Title V GHG Tailoring Rule, which established permitting thresholds for GHG emissions under the Title V program. Sources with an existing Title V permit or new sources obtaining a Title V permit for non-GHG pollutants are required to address GHGs. New sources and existing sources not previously subject to Title V that have a PTE equal to or greater than 100,000 tpy CO_2e would become subject to Title V requirements.

The Title V permitting program is not applicable to construction activities and would only apply to the Project's operational emissions. Table 2.8.1-3 shows that the proposed facility-wide PTE at the Milford Compressor Station would be below the Title V thresholds for criteria pollutants and GHGs. The existing Milford Compressor Station is a major Title V source and would become a minor source upon completion of the Project. In December 2013, Columbia filed its Plan Approval application with PADEP for the Milford Compressor Station modifications. Following the Plan Approval, Columbia would file for a conversion of its Title V permit to a State-Only Operating Permit (SOP).

The Easton Compressor Station is an existing minor source operating in accordance with a SOP. The station modifications would cause the facility-wide PTE to exceed Title V major source thresholds for CO and would require a Title V permit. In December 2013, Columbia filed its Plan Approval application with PADEP for the Easton Compressor Station modifications. Columbia would file its Title V operating permit application with PADEP after the Plan Approval has been approved.

Potential total HAP emissions from the Milford and Easton Compressor Stations are 0.6 and 1.8 tpy, respectively. Therefore, the compressor stations would remain minor sources for HAPs.

New Source Performance Standards

Section 111 of the CAA authorized the EPA to develop technology-based standards that apply to specific categories of stationary sources. These standards are referred to as New Source Performance Standards (NSPS) and are promulgated under 40 CFR 60. The NSPS are not applicable to construction, only to new operational sources that meet the specific criteria established for that source category. New emission sources would not be installed at the Eagle Compressor Station, Rutledge Compressor Station, Pennsburg M&R Station, Quakertown M&R Station, or the Wagoner M&R Station. The Project would include new emission sources at the Milford and Easton Compressor Stations that fall under a NSPS source category. Table 2.8.1-5 provides a summary of the new emission sources that would be installed at the Milford and Easton Compressor Stations and the NSPS evaluated.

TABLE 2.8.1-5

NSPS Source Categories Evaluated

Location	Emission Source	NSPS
Milford Compressor Station	Two Solar Centaur 40 combustion turbines, centrifugal compressors	Subpart KKKK
	One Waukesha gas-fired emergency generator engine	Subpart JJJJ
	Gas-fired line, fuel gas and catalytic heaters	Subpart Dc
	Natural gas handling equipment	Subpart OOOO
Easton Compressor Station	Two Solar Taurus 70 combustion turbines, centrifugal compressors	Subpart KKKK
	One Waukesha gas-fired emergency generator engine	Subpart JJJJ
	Gas-fired line, fuel gas and catalytic heaters	Subpart Dc
	Natural gas handling equipment	Subpart OOOO

NSPS Subpart KKKK - Stationary Combustion Turbines

Subpart KKKK applies to stationary combustion turbines with a maximum heat input rating greater than or equal to 10 million British thermal units per hour (MMBtu/hr), which commenced construction, reconstruction, or modification after February 18, 2005. The Solar Taurus Model 70 and 40 combustion turbine gas compressors, installed respectively at the Milford and Easton Compressor Stations, have a maximum heat input rating greater than or equal to 10 MMBtu/hr and would be subject to Subpart KKKK.

Subpart KKKK limits NO_x and SO_2 emissions from subject emission units, dependent upon the maximum heat input rating of the combustion turbine. The NO_x emission limits can be satisfied either as an exhaust gas concentration limit in units of parts per million by volume, dry

basis (ppmvd) at 15 percent oxygen (O_2) or an output-based emission standard expressed in units of pounds per megawatt-hour (lb/MWh) gross energy output. The applicable NO_x emission standards for the Project are as follows:

Solar Taurus 70 (89 MMBtu/hr): 25 ppmvd at 15 percent O_2 or 1.2 lb/MWh
Solar Centaur 40 (49 MMBtu/hr): 100 ppmvd at 15 percent O_2 or 5.5 lb/MWh

The Solar combustion turbines would meet the applicable NO_x concentration emission limit through Solar's "SoLoNOx lean premix" dry low NO_x combustor technology. Vendor guaranteed NO_x emissions would be at or below the applicable limit and would be verified through an annual performance test.

The SO_2 emission limits for both the Solar combustion turbines can be satisfied either as an output-based emission limit of 0.90 lb/MWh or a fuel sulfur content limit equivalent to an SO_2 emission rate of 0.060 pounds per million Btus of heat input (lbs/MMBtu). The Project would meet the fuel sulfur limit by firing solely pipeline quality natural gas in accordance with 40 CFR 60.4365(a).

NSPS Subpart JJJJ - Stationary Spark Ignition Internal Combustion Engines

Subpart JJJJ applies to stationary spark ignition internal combustion engines that commence construction on or after January 1, 2009, for emergency engines with a maximum engine power greater than 25 hp. The Project would include a 1,034-hp emergency spark ignition internal combustion engine at both the Milford and Easton Compressor Stations. Subpart IIII imposes the following emission limits for engines larger than 130 hp and would be applicable to the emergency engines:

- NO_x: less than or equal to 2.0 grams per horsepower-hour (g/hp-hr) or 160 ppmvd at 15 percent O_2;
- CO: less than or equal to 4.0 g/hp-hr or 540 ppmvd at 15 percent O_2; and
- VOC: less than or equal to 1.0 g/hp-hr or 86 ppmvd at 15 percent O_2.

Engines and associated pollution controls would be installed that meet the applicable emission limits. Compliance with the emission limits would be verified per the requirements in the minor source permit obtained from the PADEP, as applicable.

NSPS Subpart Dc - Small Industrial-Commercial-Institutional Steam Generating Units

Subpart Dc applies to steam generating units with a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr, but less than or equal to 100 MMBtu/hr that are constructed, modified or reconstructed after June 9, 1989. "Steam generating unit" is defined under Subpart Dc as a device that combusts fuel and transfers the heat to water or any heat transfer medium. The fuel gas and catalytic heaters would satisfy the definition of a "steam generating unit" under Subpart Dc. However, the maximum heat input for each of these devices is less than 10 MMBtu/hr and therefore, these sources would be exempt from Subpart Dc.

NSPS Subpart OOOO - Crude Oil and Natural Gas Production, Transmission and Distribution

Subpart OOOO applies to certain activities associated with natural gas transmission and distribution that commence construction, modification, or reconstruction after August 23, 2011. The activities that are covered under Subpart OOOO include the following:

- centrifugal and reciprocating compressors that are located at a natural gas well site between the wellhead and the point of custody transfer to the natural gas transmission and storage segment;
- pneumatic controllers at a natural gas production site with a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 standard cubic feet per hour; and
- storage vessels with potential VOC emissions equal to or greater than 6 tpy.

The combustion turbines would be defined as centrifugal compressors in accordance with Subpart OOOO. The proposed combustion turbines would not be associated with a natural gas well site and therefore would be exempt from the requirements of Subpart OOOO. The pneumatic controllers are not located at the natural gas production sites and therefore would be exempt from the requirements of Subpart OOOO. Any new storage vessels for the Project would be either small or contain low vapor pressure materials such that potential VOC emissions from each tank would not exceed 6 tpy, and therefore would be exempt from the requirements of Subpart OOOO.

National Emission Standard for Hazardous Air Pollutants

Section 112 of the CAA authorized the EPA to develop technology based standards that apply to specific categories of stationary sources that emit HAPs. These standards are referred to as National Emission Standard for Hazardous Air Pollutants (NESHAP) and are promulgated under 40 CFR Parts 61 and 63. The NESHAP are not applicable to construction, only to new operational sources that meet the specific criteria established for that source category. New emission sources would not be installed at the Wagoner M&R Station, Quakertown M&R Station, Pennsburg M&R Station, Eagle Compressor Station and Rutledge Compressor Station, and are not discussed for NESHAP.

The Project would include new emission sources at the Milford and Easton Compressor Stations that fall under a NESHAP source category. Table 2.8.1-6 provides a summary of the new emission sources that would be installed at the Milford and Easton Compressor Stations and the NSPS evaluated.

TABLE 2.8.1-6

NSPS Source Category Summary

Location	Emission Source	NESHAP
Milford Compressor Station	Two Solar Centaur 40 combustion turbines, centrifugal compressors	Subpart YYYY
	One Waukesha gas-fired emergency generator engine	Subpart ZZZZ
	Natural gas handling equipment	Subpart HHHH
Easton Compressor Station	Two Solar Taurus 70 combustion turbines, centrifugal compressors	Subpart YYYY
	One Waukesha gas-fired emergency generator engine	Subpart ZZZZ
	Natural gas handling equipment	Subpart HHHH

NESHAP Subpart YYYY - Stationary Combustion Turbines

Subpart YYYY was promulgated on March 5, 2004 and is applicable to stationary combustion turbines, a Title V major source of HAP emissions. However, in April 2004, EPA proposed to "delist" natural gas-fired combustion turbines from the NESHAP program as EPA concluded that HAP emissions from stationary combustion turbines did not pose a hazard. In August 2004, EPA stayed (indefinitely) the combustion turbine NESHAP for natural gas-fired turbines, and any unit that fires oil less than 1,000 hours per year, pending a final decision on delisting. Therefore, NESHAP Subpart YYYY is not currently applicable to the Project's combustion turbines. The Milford and Easton Compressor Stations would also be minor sources of HAP emissions and would not be subject to Subpart YYYY should the stay be lifted.

NESHAP Subpart ZZZZ - Stationary Reciprocating Internal Combustion Engines

Subpart ZZZZ applies to stationary reciprocating internal combustion engines at both major and non-major sources of HAPs. The emergency generator engines at the Milford and Easton Compressor Stations would be subject to Subpart ZZZZ. In accordance with Subpart ZZZZ, a new engine that satisfies the requirements of NSPS Subpart JJJJ under 40 CFR 60 are deemed to be compliant with NESHAP Subpart ZZZZ. As previously discussed, Columbia would comply with NSPS Subpart JJJJ and thereby also comply with NESHAP Subpart ZZZZ.

NESHAP Subpart HHHH - Natural Gas Transmission and Storage Facilities

Subpart HHHH applies to natural gas transmission facilities that transport natural gas prior to entering the pipeline to a local distribution company or to a final end user and are a major source of HAP emissions. The Milford and Easton Compressor Stations would be minor sources of HAP emissions and would not be subject to Subpart HHHH.

Greenhouse Gas Mandatory Reporting Rule

In September 2009, EPA issued the final Mandatory Reporting of Greenhouse Gases Rule, requiring reporting of GHG emissions from suppliers of fossil fuels and facilities that emit greater than or equal to 25,000 metric tpy of GHG (reported as CO_2e). In November 2010, EPA signed a rule finalizing GHG reporting requirements for the petroleum and natural gas industry in 40 CFR 98, Subpart W. The rule does not apply to construction emissions; however, we have included the construction emissions for accounting and disclosure purposes.

The Easton and Milford Compressor Stations would be subject to the GHG Mandatory Reporting Rule if actual CO_2e emissions exceed 25,000 tpy in any year. The rule establishes reporting requirements based on actual emissions; however, it does not require emission controls. Columbia would monitor emissions in accordance with the reporting rule. If actual emissions exceed the 25,000 metric tpy CO_2e reporting threshold, Columbia would be required to report its GHG emissions to EPA.

Minor Source Permitting Requirements

Although not subject to NSR, the Project's proposed new equipment at the Milford and Easton Compressor Stations would require preconstruction approvals (Plan Approval) and operating permits in accordance with Title 25 of the Pennsylvania Code, Chapter 127 (25 PA Code Chapter 127). In December 2013, Columbia filed its Plan Approval application with PADEP for the Milford Compressor Station modifications. Following the Plan Approval,

Columbia would file for a conversion of its Title V permit to a SOP. Also in December 2013, Columbia filed its Plan Approval application with PADEP for the Easton Compressor Station modifications. Columbia would file its Title V operating permit application with PADEP after the Plan Approval has been approved.

In January 2013, the PADEP issued revised General Permit BAQ-GPA/GP-5, General Plan Approval and/or General Operating Permit for Natural Gas Compression and/or Processing Facilities (GP-5). Although GP-5 authorizes the construction and operation of natural gas-fired combustion turbine compressors, it is not applicable to those that are used on a natural gas transmission line. However, per Condition A.5 of GP-5, this General Permit "establishes best available technology requirements and authorizes the construction or modification of a natural gas compression facility." Therefore, it is anticipated that the recently issued GP-5 would provide proper guidance for the establishment of best available technology for the proposed Solar combustion turbines, emergency generator engines, and small heaters.

The proposed Solar Taurus 70 combustion turbines at the Easton Compressor Station would meet all of the best available technology requirements established in GP-5. The proposed Solar Centaur 40 combustion turbines at the Milford Compressor Station would meet all of the best available technology requirements established in GP-5, with the exception of CO emissions. The vendor's guaranteed data for CO emissions limit was proposed as best available technology for the proposed Solar Centaur 40 combustion turbines based upon the analysis in the Plan Approval application filed by Columbia in December 2013.

General Conformity

Section 176(c) of the CAA established requirements to ensure that federal actions or actions approved by federal agencies do not adversely affect a state's ability to achieve and maintain attainment with the NAAQS. Section 176(c)(1) states that a federal agency cannot approve or support any activity that does not conform to an approved SIP. Conforming activities or actions should not, through additional air pollutant emissions:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or
- delay timely attainment of any NAAQS or interim emission reductions.

Regulations governing General Conformity are promulgated under 40 CFR 93. General Conformity requirements are applicable to projects requiring federal actions that are located in areas designated as nonattainment or maintenance with a NAAQS and if emissions exceed the conformity threshold (*de minimis*) for the applicable criteria pollutant. According to the General Conformity regulations, emissions from stationary sources that are subject to any NNSR or PSD permitting/licensing (major or minor) are exempt and are deemed to have conformed.

The Project would include construction and operational activities in areas designated as nonattainment for ozone and/or $PM_{2.5}$. NO_x and VOC are regulated as ozone precursors, and SO_2 and NO_x are regulated as $PM_{2.5}$ precursors. Therefore, an applicability analysis is required to determine if any emission thresholds are exceeded for temporary (construction) and/or permanent (operational) emissions from the Project. The Milford and Easton Compressor Stations are subject to federal and/or state permitting requirements for operational emissions and

are thereby exempt from the general conformity requirements for operational emissions in accordance with 40 CFR 93.153(d)(1).

As noted earlier, portions of the Project would be located in various nonattainment areas. Therefore, we reviewed the criteria pollutant emissions expected to be generated during construction of the Project in each county, and combined in each nonattainment area, for comparison to the General Conformity thresholds in 40 CFR 93.153(b)(1). Table 2.8.1-7 provides a summary of the construction emissions by county and AQCR for comparison to the general conformity emission thresholds.

As shown in table 2.8.1-7, the cumulative construction emissions in each AQCR are below the *de minimis* levels for each criteria pollutant. Therefore, the Project would not be subject to General Conformity requirements and a General Conformity Determination is not required.

TABLE 2.8.1-7

General Conformity Applicability Review

Project Component	Location (County, State)	Ozone		$PM_{2.5}$ (and precursors)		
		NO_x	VOC	$PM_{2.5}$	NO_x	SO_2
Milford Compressor Station	Pike County, PA	11.49	0.71	3.39	11.49	0.01
Easton Compressor Station	Northampton County, PA	9.09	0.56	4.15	9.09	0.01
Northeast Pennsylvania AQCR Totals		**20.58**	**1.27**	**7.54**	**9.09**	**0.01**
Applicable General Conformity Thresholds		100	50	100	100	100
Eagle Compressor Station	Chester County, PA	2.40	0.15	0.33	2.40	0.00
Quakertown Station	Bucks County, PA	1.34	0.08	0.26	1.34	0.00
Pennsburg Station	Bucks County, PA	1.34	0.08	0.26	1.34	0.00
Line 1278 Loop	Chester County, PA	4.79	0.38	24.47	4.79	0.01
Line 10345 Loop	Gloucester County, NJ	4.79	0.38	N/A	N/A	N/A
Metropolitan Philadelphia AQCR Totals		**14.66**	**1.07**	**49.46**	**9.87**	**0.01**
Applicable General Conformity Thresholds		100	50	100	100	100
Wagoner Station	Orange County, NY	1.34	0.08	0.62	1.34	0.00
Hudson Valley AQCR Totals		**1.34**	**0.08**	**0.62**	**1.34**	**0.00**
Applicable General Conformity Thresholds		100	50	100	100	100
Rutledge Station	Harford County, MD	1.34	0.08	0.26	1.34	0.00
Metropolitan Baltimore AQCR Totals		**1.34**	**0.08**	**0.26**	**1.34**	**0.00**
Applicable General Conformity Thresholds		50	50	100	50	100

Air Quality Impacts and Mitigation

Construction Impacts and Mitigation

Emissions associated with construction activities generally include fugitive dust from soil disruption and combustion emissions from construction equipment. These emissions generally include: 1) exhaust emissions from construction equipment; 2) fugitive dust emissions associated with construction vehicle movement on unpaved surfaces; and 3) fugitive dust associated with trenching, backfilling, and other earth-moving activities. The construction equipment would include large earth-moving equipment (e.g., bulldozers, track hoes), skid loaders, trucks, and

other mobile sources. The exhaust emissions would depend on the horsepower rating of the equipment used and hours of operation. This equipment would be powered by diesel or gasoline engines that would emit NO_x, CO, VOC, PM_{10}, $PM_{2.5}$, SO_2, GHGs and HAPs. Fugitive PM_{10} and $PM_{2.5}$ emissions would result from land clearing, grading, excavation, and vehicle traffic on paved and unpaved roads. The duration of construction activities would be expected to last 2 to 10 months depending upon the location.

Potential emissions of NO_x, CO, VOC, PM_{10}, $PM_{2.5}$, SO_2, GHGs, and HAPs were quantified from construction equipment engines based on the anticipated types of non-road and on-road engines and their projected utilization levels. On-road diesel and gasoline engine emissions were estimated using factors provided in the EPA's MOVES2010b model (EPA 2013). Non-road diesel and gasoline engine emissions were estimated using factors provided in the EPA's NONROAD model (EPA 2008). Tier 2 diesel engine standards were used to provide a conservative estimate of emissions from construction equipment and do not reflect the anticipated phasing-in of more stringent emission standards. Ultra-low sulfur diesel, with a maximum sulfur content of 15 parts per million (ppm) by weight, was assumed for both the non-road and on-road diesel vehicles.

Potential fugitive PM_{10} and $PM_{2.5}$ emissions were estimated using emission factors provided in the EPA's Compilation of Air Pollutant Emission Factors (AP-42) Section 13.2.3 for Heavy Construction Operations. Fugitive particulate matter emissions are a function of the types of construction activities, area of land being disturbed, silt and moisture contents of the soil, frequency of precipitation, vehicle miles travelled, vehicle types, and roadway characteristics. Soil with higher silt content would result in higher fugitive particulate matter emissions while higher moisture content would yield lower fugitive dust emissions. Table 2.8.1-8 summarizes potential construction related emissions for all Project locations.

TABLE 2.8.1-8

Summary of Potential Construction Emissions

Project Component	Construction Activity	Potential Emissions (tons)							
		NO_x	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**GHGs**	**HAPs**
Milford Compressor Station	Construction Vehicles	11.45	3.57	0.01	0.43	0.42	0.70	1,492	0.03
	On-Road Vehicles	0.04	0.10	0.00	0.00	0.00	0.01	7	0.00
	Fugitive Dust	N/A	N/A	N/A	20.75	2.97	N/A	N/A	N/A
	Totals	**11.49**	**3.67**	**0.01**	**21.18**	**3.39**	**0.71**	**1,499**	**0.03**
Easton Compressor Station	Construction Vehicles	9.05	2.83	0.01	0.34	0.33	0.55	1,180	0.02
	On-Road Vehicles	0.03	0.08	0.00	0.00	0.00	0.01	5	0.00
	Fugitive Dust	N/A	N/A	N/A	26.17	3.82	N/A	N/A	N/A
	Totals	**9.09**	**2.90**	**0.01**	**26.51**	**4.15**	**0.56**	**1,185**	**0.02**
Eagle Compressor Station	Construction Vehicles	2.40	0.75	0.00	0.09	0.09	0.15	312	0.01
	On-Road Vehicles	0.01	0.02	0.00	0.00	0.00	0.00	1	0.00
	Fugitive Dust	N/A	N/A	N/A	1.78	0.24	N/A	N/A	N/A
	Totals	**2.40**	**0.77**	**0.00**	**1.87**	**0.33**	**0.15**	**314**	**0.01**
Quakertown Meter Station	Construction Vehicles	1.33	0.42	0.00	0.05	0.05	0.08	174	0.00
	On-Road Vehicles	0.00	0.01	0.00	0.00	0.00	0.00	1	0.00
	Fugitive Dust	N/A	N/A	N/A	1.52	0.21	N/A	N/A	N/A

TABLE 2.8.1-8

Summary of Potential Construction Emissions

Project Component	Construction Activity	Potential Emissions (tons)							
		NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	VOC	GHGs	HAPs
	Totals	**1.34**	**0.43**	**0.00**	**1.57**	**0.26**	**0.08**	**174**	**0.00**
Pennsburg Meter Station	Construction Vehicles	1.33	0.42	0.00	0.05	0.05	0.08	174	0.00
	On-Road Vehicles	0.00	0.01	0.00	0.00	0.00	0.00	1	0.00
	Fugitive Dust	N/A	N/A	N/A	1.52	0.21	N/A	N/A	N/A
	Totals	**1.34**	**0.43**	**0.00**	**1.57**	**0.26**	**0.08**	**174**	**0.00**
Line 1278 Loop	Construction Vehicles	3.85	1.28	0.00	0.15	0.14	0.22	503	0.01
	On-Road Vehicles	0.94	1.46	0.00	0.06	0.06	0.16	137	0.02
	Fugitive Dust	N/A	N/A	N/A	168.5	24.27	N/A	N/A	N/A
	Totals	**4.79**	**2.73**	**0.01**	**168.7**	**24.47**	**0.38**	**640**	**0.03**
Line 10345 Loop	Construction Vehicles	3.85	1.28	0.00	0.15	0.14	0.22	503	0.01
	On-Road Vehicles	0.94	1.46	0.00	0.06	0.06	0.16	137	0.02
	Fugitive Dust	N/A	N/A	N/A	168.5	24.27	N/A	N/A	N/A
	Totals	**4.79**	**2.73**	**0.01**	**168.7**	**24.47**	**0.38**	**640**	**0.03**
Wagoner Meter Station	Construction Vehicles	1.33	0.42	0.00	0.05	0.05	0.08	174	0.00
	On-Road Vehicles	0.00	0.01	0.00	0.00	0.00	0.00	1	0.00
	Fugitive Dust	N/A	N/A	N/A	3.92	0.57	N/A	N/A	N/A
	Totals	**1.34**	**0.43**	**0.00**	**3.97**	**0.62**	**0.08**	**174**	**0.00**
Rutledge Compressor Station	Construction Vehicles	1.33	0.42	0.00	0.05	0.05	0.08	174	0.00
	On-Road Vehicles	0.00	0.01	0.00	0.00	0.00	0.00	1	0.00
	Fugitive Dust	N/A	N/A	N/A	1.52	0.21	N/A	N/A	N/A
	Totals	**1.34**	**0.43**	**0.00**	**1.57**	**0.26**	**0.08**	**174**	**0.00**

The PADEP regulates construction-related particulate emissions through title 25 of the PA, Section 123.1 (25 PA Code 123.1). Columbia would use the following and other applicable methods to ensure compliance with 25 PA Code 123.1(c):

- use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads or the clearing of land;
- apply asphalt, oil, water, or suitable chemicals on dirt roads, material stockpiles, and other surfaces which may give rise to airborne dust;
- paving and maintenance of roadways; and
- prompt removal of soil or other material from paved streets onto which it has been transported by trucking or earth moving equipment, erosion by water, or other means.

Columbia would minimize combustion emissions from construction equipment as on-road and non-road engines must meet the EPA emission standards (40 CFR Parts 85, 86, and 89). In addition, Columbia would direct the construction contractor to limit idling and to shut off construction equipment when not in use. The construction equipment that would be used in Pennsylvania would also comply with Pennsylvania's Heavy-Duty Diesel Emissions Control

Program, specified in 25 PA Code 126, Subchapter E. Other mitigation measures that Columbia may employ include the following:

- covering open-bodied trucks while transporting materials likely to produce airborne dusts;
- minimizing the area of soil disturbance to those necessary for construction; and
- construction worker traffic would be minimized by the use of offsite parking and shuttle buses, as necessary.

Columbia would proactively implement dust suppression measures as necessary to protect persons (general public and project workforce) and property from air pollution and nuisances caused by the generation of fugitive particulate matter (dust) emissions. Dust suppression measures may be implemented based on a visual determination of need, atmospheric conditions (persistence of dry, windy conditions), and compliance with a state or local ordinance for control of fugitive dust emissions, such as Pennsylvania's model dust ordinance.[12]

We received comments regarding construction emissions and the proximity of the construction activities to residences and local businesses. While the measures described above would help control fugitive dust, we conclude that more detail is necessary given that the Project includes components in $PM_{2.5}$ non-attainment areas and because the Project crosses many roads and would be constructed near many residences and other structures. Specifically, more information regarding other mitigation measures for dust abatement in addition to spraying of water (e.g., reducing vehicle speeds where appropriate for travel on unpaved roads, using palliative in high erosion areas to control dust in residential areas and near road crossings, and training of Project personnel) is necessary. In addition, Columbia has not provided any information about accountability or individuals with authority regarding fugitive dust mitigation. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, Columbia should file with the Secretary for review and approval by the Director of OEP a Fugitive Dust Control Plan that specifies the precautions that Columbia would take to minimize fugitive dust emissions from construction activities including additional mitigation measures to control fugitive dust emissions of Total Suspended Particulates and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns. The plan should clearly explain how Columbia would implement measures, such as:**

  a. watering the construction workspace and access roads;

  b. providing measures to limit track-out onto the roads;

  c. identifying the speed limit that Columbia would enforce on unsurfaced roads;

  d. covering open-bodied haul trucks, as appropriate;

  e. clarifying that the EI has the authority to determine if/when water or a palliative needs to be used for dust control; and

  f. clarifying the individuals with the authority to stop work if the contractor does not comply with dust control measures.

[12] http://www.dep.state.pa.us/dep/deputate/airwaste/aq/permits/misc/dustord.pdf

Although not anticipated, if open burning is necessary, Columbia would follow the local ordinances on open burning, and would acquire the appropriate burn permits prior to conducting such activities.

Construction equipment would be operated generally during the day time and on an as-needed basis. Columbia would require its contractors to comply with best management practices related to air quality during construction, including the use of dust suppression (e.g., watering); using newer, cleaner operating equipment; and encouraging the use of low-emission fuels.

Once construction activities in an area are completed, fugitive dust and construction equipment emissions would subside and Project-related impact on air quality would terminate. Given the limited scope of the Project and use of our recommendation, emissions associated with the construction phase would be short-term in nature and would not result in a significant impact.

Operational Impacts and Mitigation

Long-term operational emissions would result from the proposed new combustion equipment at the Milford and Easton Compressor Stations. The pipeline loops and modifications to the other compressor and metering stations would not result in operational emissions. For these reasons, only the Milford and Easton Compressor Stations would be subject to preconstruction and operating permit requirements.

Potential emissions from the proposed combustion equipment at the Milford and Easton Compressor Stations were estimated using vendor guaranteed emission rates, expected best available technology emission rates, applicable NSPS and NESHAP emission limits and EPA AP-42.

Tables 2.8.1-9 and 2.8.1-10 summarize potential operation-related emissions for the Milford and Easton Compressor Stations, respectively. These tables also present the reduction in potential emissions from equipment to be removed from each station.

TABLE 2.8.1-9

Summary of Potential Operational Emissions – Milford Compressor Station [a/]

Source	Potential Emissions (tpy)						
	NO_x	CO	CO_2e	PM_{10} / $PM_{2.5}$	VOC	SO_2	Total HAP
Proposed New Sources							
Turbine #1	21.7	48.1	24,317	3.74	1.65	0.15	0.21
Turbine #2	21.7	48.1	24,317	3.74	1.65	0.15	0.21
Emergency Generator	1.30	0.84	266	0.02	0.03	0.001	0.16
Heater	0.32	0.27	385	0.02	0.02	0.002	0.01
Catalytic Heaters	1.24	1.04	1,477	0.09	0.07	0.009	0.02
Totals	**46.2**	**98.3**	**50,762**	**7.62**	**3.41**	**0.31**	**0.62**
Existing Sources Totals	**161.30**	**68.40**	**4,109**	**1.10**	**9.60**	**0.03**	**1.80**
Sources Removed [b/]	**-161.30**	**-68.40**	**-4,109**	**-1.10**	**-9.60**	**-0.03**	**-1.80**
Proposed PTE	**46.20**	**98.35**	**50,762**	**7.610**	**3.42**	**0.31**	**0.61**

[a/] Totals may not add due to rounding.
[b/] All existing sources removed

TABLE 2.8.1-10

Summary of Potential Operational Emissions – Easton Compressor Station [a/]

Source	Potential Emissions (tpy)						
	NO_x	CO	CO_2e	PM_{10} / $PM_{2.5}$	VOC	SO_2	Total HAP
Proposed New Sources							
Turbine #1	27.40	70.90	46,873	7.21	3.18	0.29	0.41
Turbine #2	27.40	70.90	46,873	7.21	3.18	0.29	0.41
Emergency Generator	1.30	0.84	266	0.02	0.03	0.001	0.16
Heater	0.47	0.40	564	0.04	0.03	0.003	0.01
Catalytic Heaters	1.24	1.04	1,477	0.09	0.07	0.009	0.02
Totals	**57.70**	**144.1**	**96,053**	**14.56**	**6.48**	**0.59**	**1.02**
Existing Sources Totals	**51.90**	**79.20**	**22,345**	**1.61**	**29.17**	**0.14**	**1.06**
Sources Removed [b/]	**-38.9**	**-59.80**	**-19,183**	**-1.09**	**-25.94**	**-0.12**	**-0.18**
Proposed PTE	**70.70**	**163.50**	**99,215**	**15.09**	**9.70**	**0.60**	**1.89**

[a/] Totals may not add due to rounding.
[b/] All existing sources removed with the exception of the Reciprocating Compressor Engine.

Several landowners near the Milford Compressor Station provided comments concerning higher emissions associated with the increased horsepower. As shown in table 2.8.1-9, the replacement of the older compressor units with new compressor units equipped with emissions control technology, such as "SoLoNOx lean premix" dry low NO_x combustor technology, would result in a reduction by more than 50 percent of NO_x, VOC, and total HAP emissions at the Milford Compressor Station although increasing CO, CO_2e, PM, and SO_2 emissions. Even still, the Milford Compressor Station would convert from a major Title V source to a minor source upon completion of the Project.

Landowners near the Easton and Milford Compressor Stations also filed comments concerning toxins from the compressor units resulting in the formation of acid rain. According to the EPA's Acid Rain Program, the nation's largest contributors to acid rain are SO_2 and NO_x with the largest known sources of acid deposition being electric power generation that relies on burning fossil fuels, like coal.[13] The Easton and Milford Compressor Stations do not fall in the category of power generation plants and the associated emissions of all criteria pollutants would be well below the magnitude of emissions from electric generation power plants. Therefore, we conclude that any contribution to acid rain would not be significant.

We received comments regarding VOC emissions from the storage tank at the compressor stations. As specified in sections 2.1.2 and 2.2 of this EA, any transportation, removal, and disposal of hazardous materials at the compressor stations would be handled according to Columbia's SPCC Plan. Further, Columbia would be required to comply with federal regulations, such as the NSPS Subpart OOOO, that governs storage vessels at natural gas transmission facilities. As stated previously, the potential VOC emissions from any new storage vessels would be below the federal thresholds.

[13] http://www.epa.gov/acidrain/

Nearby landowners filed comments regarding emissions from blowdowns at the Easton and Milford Compressor Stations contending that pollutants emitted during blowdown events would harm the community and environment. The PTE estimates for the compressor stations incorporates startup/shutdown emissions based on 156 cycles totaling 36 hours per year which would typically account for planned or maintenance type blowdowns. The PTE estimates are used in the federal and state air quality permitting processes and operation of the compressor stations must comply with the federal and state regulatory requirements and the EPA's NAAQS, in accordance with the Clean Air Act of 1970 and its amendments. The NAAQS were established to protect human health and public welfare and take into account sensitive populations such as asthmatics, children, and the elderly. Further, the PADEP is charged with carrying out both the state and federal air pollution control and monitoring programs, which help control emissions of pollutants, as well as measure and monitor ambient pollutant levels in Pennsylvania.

In order to provide a more thorough evaluation of the potential impacts on air quality in the vicinity of the Project, an air dispersion modeling analysis of the Milford and Easton Compressor Stations was conducted using AERMOD, which allowed for modeling of multiple emission sources at each station. AERMOD was conservatively run in screening mode using meteorological data generated by the MAKEMET utility in the AERSCREEN model. Modeling was conducted to evaluate the ambient air quality impacts resulting from the proposed emission sources at the Milford and Easton Compressor Stations as compared to the NAAQS.

The modeling assumed that the proposed emission sources at each station were each operating concurrently, with the exception of the predicted 1-hour NO_2 impacts. In accordance with EPA guidance in a memorandum dated March 1, 2011 from the EPA's Leader of Air Quality Modeling Group, to Regional Air Division Directors, modeling of 1-hour NO_2 impacts should be performed for sources that "can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations." As the emergency generator engines would operate infrequently and would not be expected to operate during periods when the compressor turbines were operating, the emergency generator engines were not modeled for 1-hour NO_2 impacts. Similarly, combined duration of a startup and shutdown of each combustion turbine would be expected to last fewer than 20 minutes and therefore, this operating scenario was not evaluated for 1-hour NO_2 impacts.

The AERMOD model predicted maximum offsite ambient concentrations for each NAAQS pollutant in the units of the applicable standard as summarized in table 2.8.1-11. Total ambient air concentrations were calculated from existing background pollutant concentrations and the model predicted maximum offsite ambient concentrations. Background concentrations were determined from ambient air monitoring stations in the vicinity of the Milford and Easton Compressor Stations.

Table 2.8.1-11 summarizes the background concentrations and the location of the ambient monitoring station for each criteria pollutant. Tables 2.8.1-12 and 2.8.1-13 summarize the Milford and Easton Compressor Station's predicted maximum offsite ambient concentrations plus background concentrations for comparison to the NAAQS for CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$, respectively.

TABLE 2.8.1-11

Summary of Milford and Easton Compressor Station Ambient Air Background Concentrations

Pollutant	Averaging Period	Background Concentration (µg/m^3)		Comments
		Milford	Easton	
CO	8-hour	1,030	1,603	Highest 2nd high (2010-2012)
	1-hour	1,488	1,946	Highest 2nd high (2010-2012)
	Monitor	Lackawanna, PA	Freemansburg, PA	
NO_2	1-hour	77.7	74.6	3-year average of 98th percentile (2010-2012)
	Monitor	Lackawanna, PA	Freemansburg, PA	
SO_2	24-hour	28.8	47.1	Highest 2nd high (2010-2012)
	1-hour	54.1	94.3	3-year average of 99th percentile (2010-2012)
	Monitor	Chester, NJ	Wilson, PA	
PM_{10}	24-hour	68.0	68.0	Highest 2nd high (2010-2012)
	Monitor	Nazareth, PA	Nazareth, PA	
$PM_{2.5}$	24-hour	21.0	25.0	Milford: 3-year average of 98th percentile (2010-2012) Easton: EPA Design Value
	Annual	7.9	9.4	Milford: Highest of 3 years Easton: EPA Design Value
	Monitor	Chester, NJ	Warren County, NJ	

µg/m^3 = micrograms per cubic meter

TABLE 2.8.1-12

Modeling Results for the Milford Compressor Station

Pollutant	Averaging Period	Project Impact [a/]	Background	Project Impact + Background	NAAQS
NO_2 b/	1-hour	29.2	77.7	106.9	188
CO	1-hour	288.5	1,488	1776.7	40,000
	8-hour	259.6	1,030	1289.9	10,000
PM_{10}	24-hour	5.3	68.0	73.3	150
$PM_{2.5}$ [c/]	24-hour	5.3	21.0	26.3	35
	Annual	0.9	7.9	8.8	12
SO_2 [d/]	1-hour	2.4	54.1	56.5	196
	24-hour	1.5	28.8	30.3	365

[a/] AERSCREEN scaling factors (from 1-hour results): 1.0 for 3-hour, 0.90 for 8-hour, 0.60 for 24-hour and 0.10 for annual.

[b/] Annual Project impacts may be estimated as 10% of the 1-hour impact. Annual background concentrations are not available from either the EPA or PADEP. Tier 2 NO_2 impacts are estimated as 80% of model-predicted Tier 1 NO_2 impacts.

[c/] Annual Project impacts are estimated as 10% of the 1-hour impact.

[d/] Based on 1.0 grain sulfur per 100 standard cubic feet of natural gas.

TABLE 2.8.1-13

Modeling Results for the Easton Compressor Station

Pollutant	Averaging Period	Project Impact [a/]	Background	Project Impact + Background	NAAQS
NO_2 [b/]	1-hour	23.1	74.6	97.7	188
CO	1-hour	272.2	1,946	2,218.3	40,000
	8-hour	245.0	1,603	1,847.7	10,000
PM_{10}	24-hour	6.0	68.0	74.0	150
$PM_{2.5}$ [c/]	24-hour	6.0	25.0	31.0	35
	Annual	1.0	9.4	10.4	12
SO_2 [d/]	1-hour	2.6	94.3	96.8	196
	24-hour	1.6	47.1	48.7	365

[a/] AERSCREEN scaling factors (from 1-hour results): 1.0 for 3-hour, 0.90 for 8-hour, 0.60 for 24-hour and 0.10 for annual.

[b/] Annual Project impacts may be estimated as 10% of the 1-hour impact. Annual background concentrations are not available from either the EPA or PADEP. Tier 2 NO_2 impacts are estimated as 80% of model-predicted Tier 1 NO_2 impacts.

[c/] Annual Project impacts are estimated as 10% of the 1-hour impact.

[d/] Based on 1.0 grain sulfur per 100 standard cubic feet of natural gas.

The results of the air dispersion modeling in tables 2.8.1-12 and 2.8.1-13 demonstrate that the operation of the Milford and Easton Compressor Stations would not result in exceedances of the NAAQS for any criteria pollutant. The analysis included both existing (background) and proposed emission sources. The modeling analysis shows that the cumulative impact of existing and proposed sources would comply with the NAAQS and consequently, would not adversely impact public health.

We received comments concerning the risk of radon exposure associated with the natural gas in Columbia's pipeline. Radon is a naturally occurring radioactive gas that is odorless and tasteless. Radon can be entrained in fossil fuels including natural gas. Because radon is not destroyed by combustion, burning natural gas containing radon can increase the level of radon within a home (Agency for Toxic Substances and Disease Registry 2010). While radon is inert, long-term (chronic) exposure to its decay products (progeny) can be carcinogenic (lung cancer), with increased risk to smokers. The EPA identifies that the average indoor radon level is 1.3 picocuries per liter (pCi/L) and recommends that indoor levels be less than 2-4 pCi/L. Also, Congress passed the Indoor Radon Abatement Act in 1988, which established the long-term goal that indoor air radon levels be equal or better than outdoor air radon levels. Outdoor radon levels average about 0.4 pCi/L.

We note that several factors limit the indoor exposure to radon from natural gas. Radon's half-life, defined as the time it takes for the element to decay to half its initial concentration, is relatively short (3.8 days). The time needed to gather, process, store, and deliver natural gas allows a portion of the entrained radon to decay, which decreases the amount of radon in the gas before it is used in a residence. Additionally, radon concentrations are reduced when a natural gas stream undergoes upstream processing to remove liquefied petroleum gas. Processing can remove an estimated 30 to 75 percent of the radon from natural gas (Johnson et al. 1973). Other research suggests that the cumulative decay of radon from wellhead to burner tip is around 60 percent (Gogolak 1980). Also, radon exposure associated with the combustion of natural gas may be lower now due to the improved ventilation and increased energy efficiency of modern

boilers, furnaces, and hot water heaters, as well as new building codes requiring venting of gas-fired stoves and ovens.

While the FERC has no regulatory authority to set, monitor, or respond to indoor radon levels, many local, state, and federal entities (e.g., the EPA) establish and enforce radon exposure standards for indoor air. Therefore, we find that the risk of exposure to radon is not significant.

Potential impacts on air quality associated with construction and operation of the Project would be minimized by strict adherence to all applicable federal and state regulations. Based on the analysis presented above, we conclude that operation of the proposed facilities would have no significant impact on regional air quality.

2.8.2 Noise

Noise from construction and operation of the Project would affect the local environment. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of the day and throughout the week. For construction activities, this variation in noise levels is caused primarily by changes in equipment operations and activity locations. For operational noise conditions, this variation is caused in part by changes in operational activities, weather conditions, and the effects of seasonal vegetative cover. The decibel (dB) is the unit of noise measurement. Because the human ear is not uniformly sensitive to noise frequencies, the "A" weighting frequency scale was devised to correspond with human hearing sensitivity. The A-weighted frequency scale uses specific weighting of a sound pressure level for the purpose of determining the human response to sound and the resulting unit of measure is the decibels on the A-weighted scale (dBA).

Applicable Noise Regulations and Ordinances

There are no noise regulations or ordinances that have been identified at the state or local level that are applicable to the Project. Our criteria to assess potential noise impacts are codified in 18 CFR 380.12(k)(2).

Federal Noise and Vibration Criteria

In 1974, the U.S. Environmental Protection Agency (EPA) published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA 1974). This publication evaluates the effects of environmental noise with respect to health and safety. The document provides information for state and local governments to use in developing their own ambient noise standards.

Two measures commonly used by federal agencies to relate the time-varying quality of environmental noise to its known effect to people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is an average of the time-varying sound energy for a specified time period. The L_{dn} is the L_{eq} 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 the greater sensitivity of people to sound during the nighttime hours. If the sound energy does not vary with time, the L_{dn} level is equal to the L_{eq} level plus 6.4 dB. The EPA has determined that in order to protect the public from activity interference and annoyance outdoors in residential areas, noise levels should not exceed an L_{dn} of 55 dBA. The FERC has adopted this criterion for new compression and associated pipeline facilities, and it is used here to evaluate the potential noise impact from

construction and operation of the Project. An L_{dn} of 55 dBA is equivalent to a continuous noise level of 48.6 dBA L_{eq} for facilities that operate at a constant level of noise.

Existing Acoustic Environment

The sound level measurement locations were chosen to document the existing ambient sound level environment for each noise sensitive area (NSA). With regard to the compressor stations, measurements were conducted when the existing stations were not in operation. The sound measurements attempted to exclude "extraneous sound" such as a car passing immediately by the measurement position or other intermittent sources. In addition, the sound measurements were typically performed during periods of minimum audible traffic noise. Insect noise was observed as dominant during nighttime monitoring periods at the Milford Compressor Station.

Construction Noise Impacts and Mitigation

Pipeline Construction

Noise would affect the local environment during the construction period along the pipeline routes and at aboveground facilities and contractor/pipe yards. The construction activities would be performed with standard heavy equipment, such as track-excavators, backhoes, bulldozers, dump trucks, cement trucks, and boring equipment; however, not all of the equipment would be used in each phase of construction.

Construction noise would vary according to equipment in use, but would be mitigated by the attenuating effect of distance and the intermittent and short-lived character. Construction is currently planned to occur during normal daytime working hours, except for limited 24-hour work associated with the blowdown, construction dewatering, and hydrostatic testing activities. HDD activities could also potentially occur on a 24-hour-per-day basis as discussed below.

Columbia indicates that there are residences within 50 feet of the construction work areas for the proposed pipeline loops. Individuals at these locations would likely hear construction noise during the daytime, but the overall impact would be temporary as pipeline construction typically moves relatively rapidly along the corridor. During Project construction, area nighttime noise levels would normally be unaffected, as most construction would be limited to daylight hours with the exceptions noted above. Table 2.8.2-1 provides sound levels of construction equipment typical to pipeline construction.

TABLE 2.8.2-1

General Pipeline Construction Noise Levels of Major Construction Equipment

Equipment Type	L_{max} at 50 Feet
Trucks	85
Crane	85
Roller	85
Bulldozers	85
Pickup Trucks	55
Backhoes	80
Source: FHWA Highway Construction Noise Handbook 2006.	

Aboveground Facility Construction

Construction at aboveground facilities would be temporary and short-term in nature, and primarily limited to daytime hours. Construction would consist of earthwork (e.g., site grading, clearing and grubbing) and construction of the site foundations and equipment, and it is assumed that the highest level of construction noise would occur during site earthwork (i.e., time frame when the largest amount of construction equipment would operate).

HDD and Direct Pipe Crossings

Columbia would use the HDD and Direct Pipe construction techniques at ten locations along the 10345 and 1278 Loops. Columbia conducted baseline sound surveys at the nearest NSAs to the HDD or Direct Pipe sites to assess the ambient noise levels at these NSAs and estimated the noise levels attributable to the drills at each NSA. Table 2.8.2-2 provides the associated noise impacts due to the HDD or Direct Pipe installation at the nearest NSAs to the entry and exit points.

As shown in table 2.8.2-2, the estimated noise attributable to HDD/Direct pipe activities could exceed our 55 dBA L_{dn} criterion at certain NSAs without employing noise mitigation measures; therefore, Columbia committed to implementing site-specific noise mitigation measures and calculate the resulting noise levels at these NSAs. These site-specific noise mitigation measures include a combination of the following:

- a temporary noise barrier around the workspace associated with the HDD entry site, which could be constructed of 0.75-inch thick plywood panels (e.g., 12 to 16 feet high), installed around two or three sides of the HDD workspace; as an alternative to a workspace barrier, HDD workspace site could be covered with a large acoustically lined tent (i.e., HDD entry side only); and
- residential-grade exhaust silencers on all engines in conjunction with any of the site HDD equipment (e.g., generators, pumps and hydraulic power unit).

In addition, Columbia would offer compensation or temporary relocation to the residents as a means of reducing the temporary HDD noise impact.

In spite of the noise mitigation measures implemented, the estimated noise attributable to the HDD or Direct Pipe activities would exceed 55 dBA L_{dn} at some of the NSAs. However, at the HDD #3 entry, HDD #5 entry and exit, HDD #6 entry, and HDD #7 exit, the existing ambient noise levels are already above 55 dBA L_{dn} primarily because the dominant noise source at these NSAs were documented at highways or roads in the ambient noise survey. At these NSAs the potential noise increase is estimated to range from 0.1 to 5.3 dB. In general, an increase of 3 dB is the threshold of noticeable difference for humans, 5 dB is clearly noticeable, and a 10-dB difference would be perceived as twice the noise. Based on the noise mitigation measures proposed by Columbia at these NSAs, we find that the noise impacts attributable to the HDD would not be significant.

The noise attributable to the HDD would meet our noise criteria at the HDD #1 entry and exit, HDD #3 exit, HDD #4 exit, HDD #5 exit, HDD #6 entry and exit, HDD #9 entry and exit, and HDD #10 entry. The potential noise increase at these NSAs would range from 0.1 to 6 dB. Even with these increases in ambient noise, we find that the HDD noise impact at these NSAs would not be significant considering that Columbia would implement site-specific measures.

TABLE 2.8.2-2

Estimated HDD or Direct Pipe Noise Impacts at Nearest NSAs

HDD No.	HDD or Direct Pipe Location	Entry/Exit	Distance (feet) & Direction to Nearest NSA	Existing Ambient L_{dn} (dBA)	Estimated HDD without mitigation L_{dn} (dBA)	Estimated HDD with mitigation L_{dn} (dBA)	HDD + Ambient L_{dn} (dBA)	Potential Noise Increase (dB)
Loop 10345								
1	MP 0.6	Entry	2,150 (NW)	48.0 [a/]	45.8	--	50.0	2.0
		Exit	675 (E)	48.0 [a/]	49.2	--	51.9	3.9
2	MP 2.9	Entry	100 (W)	52.6 [a/]	83.6	70.6	70.6	18.1
		Exit	150 (N)	54.5 [a/]	68.0	58.4	59.9	5.4
3	MP 3.5	Entry	175 (NE)	61.8 [b/]	78.5	65.6	67.1	5.3
		Exit	250 (NE)	49.1 [a/]	63.3	53.8	55.1	6.0
4	MP 5.3	Entry	150 (N)	50.2 [b/]	79.9	66.9	67.0	16.9
		Exit	400 (SE)	49.4 [b/]	58.9	51.5	53.6	4.2
5	MP 9.3	Entry	200 (NW)	61.8 [b/]	77.3	64.4	66.3	4.5
		Exit	1,200 (NE)	61.8 [b/]	43.9	--	61.9	0.1
Loop 1278								
6	MP 1.4	Entry	400 (SW)	58.4 [b/]	67.1	54.9	60.0	1.6
		Exit	350 (NW)	52.2 [b/]	56.7	47.9	53.6	1.4
7	MP 2.3	Entry	250 (NE)	53.9 [b/]	75.2	62.3	62.9	9.0
		Exit	250 (NE)	58.4 [b/]	75.2	62.3	63.8	5.4
8	MP 4.3	Entry	675 (NE)	51.3 [c/]	61.1	52.0	54.7	3.4
		Exit	225 (W)	48.2 [a/]	72.6	60.1	60.4	12.2
9	MP 7.8 (Direct Pipe)	Entry	425 (NW)	51.3 [c/]	58.9	47.1	52.7	1.4
		Exit	300 (NW)	51.3 [c/]	58.2	49.3	53.4	2.1
10	MP 8.0 (Direct Pipe)	Entry	300 (NE)	51.3 [c/]	62.2	50.3	53.8	2.5
		Exit	125 (SE)	51.3 [c/]	62.2	57.1	58.1	6.8

Source: H&K RN 2996, 2014
E = East, NW = Northwest, W = West, NE = Northeast, SE = Southeast

[a/] Natural sounds (e.g., birds, insects, leaves rustling) were the dominant noise source.
[b/] Vehicle traffic was the dominant noise source.
[c/] Ambient noise level was obtained from ambient noise at the NSA nearest to the Brandywine Creek location.

The HDD noise impacts would exceed 55 dBA L_{dn} at the HDD #2 entry and exit, HDD #4 entry, HDD #7 entry and exit, HDD #8 exit, and HDD #10 exit. The primary reason for the exceedance is because the HDD activities would be within 100 feet to 675 feet of the nearest NSAs, despite the proposed noise mitigation measures. In addition, it is unclear on whether Columbia would conduct daytime or 24-hour HDD activities at any of the HDD sites. Further, in the case of the HDDs #7 and #8, Columbia has not established the locations for the HDD entry

and exit points. Therefore, the loudest equipment at the entry-side could be at the closer NSA for these HDDs and result in greater noise-related impact on the closer NSA. At these close-by distances, it may be impractical for Columbia to reduce the noise levels attributable to the HDDs to at or below 55 dBA Ldn at the NSAs; however, Columbia has not demonstrated that it has considered all of the available and practicable noise mitigation measures at the HDD sites. Therefore, to ensure that the NSAs nearest to the at the HDD #2 entry and exit, HDD #4 entry, HDD #7 entry and exit, HDD #8 entry and exit, and HDD #10 exit are not exposed to excessive noise levels during the HDD activities, **we recommend that:**

- **Prior to construction, Columbia should file with the Secretary for the review and written approval by the Director of OEP site-specific plans detailing the additional noise mitigation measures Columbia would use to make all reasonable efforts such that the noise levels attributable to the HDD activities do not exceed an increase of 10 dB above the existing noise levels at the NSAs near the HDD #2 entry and exit, HDD #4 entry, HDD #7 entry and exit, HDD #8 entry and exit, and HDD #10 exit sites.**

Operational Noise

Operational noise from the Project would largely be confined to new and modified sound sources at the existing Milford and Easton Compressor Stations. Figure 2.8-1 is a schematic map of the Milford Compressor Station and nearby NSAs. Figure 2.8-2 is a schematic map of the Easton Compressor Station and nearby NSAs. The existing Milford Compressor Station is located in Milford Township, Pike County, Pennsylvania, and the existing Easton Compressor station is located in Forks Township, Northampton County, Pennsylvania.

Milford Compressor Station

Operational noise, inclusive of mitigation measures, from the proposed compressor unit additions at the Milford Compressor Station was predicted at nearby NSAs. The equipment at the existing compressor station would be removed and replaced with the following equipment:

- two Centaur 40 turbine driven compressor units;
- high performance turbine exhaust systems;
- high performance turbine air inlet systems;
- low noise lube oil coolers;
- low noise station gas aftercooler;
- aboveground and belowground station gas piping;
- office, motor control center and auxiliary building; and
- station standby generator.

Table 2.8.2-3 provides the results of the operational noise predictions at the closest NSAs to the modified Milford Compressor Station. The closest NSAs were identified as residences. At full-load operation, the modified compressor station would not exceed an L_{dn} of 55 dBA at the closest NSAs (H&K RN 2880, 2013).

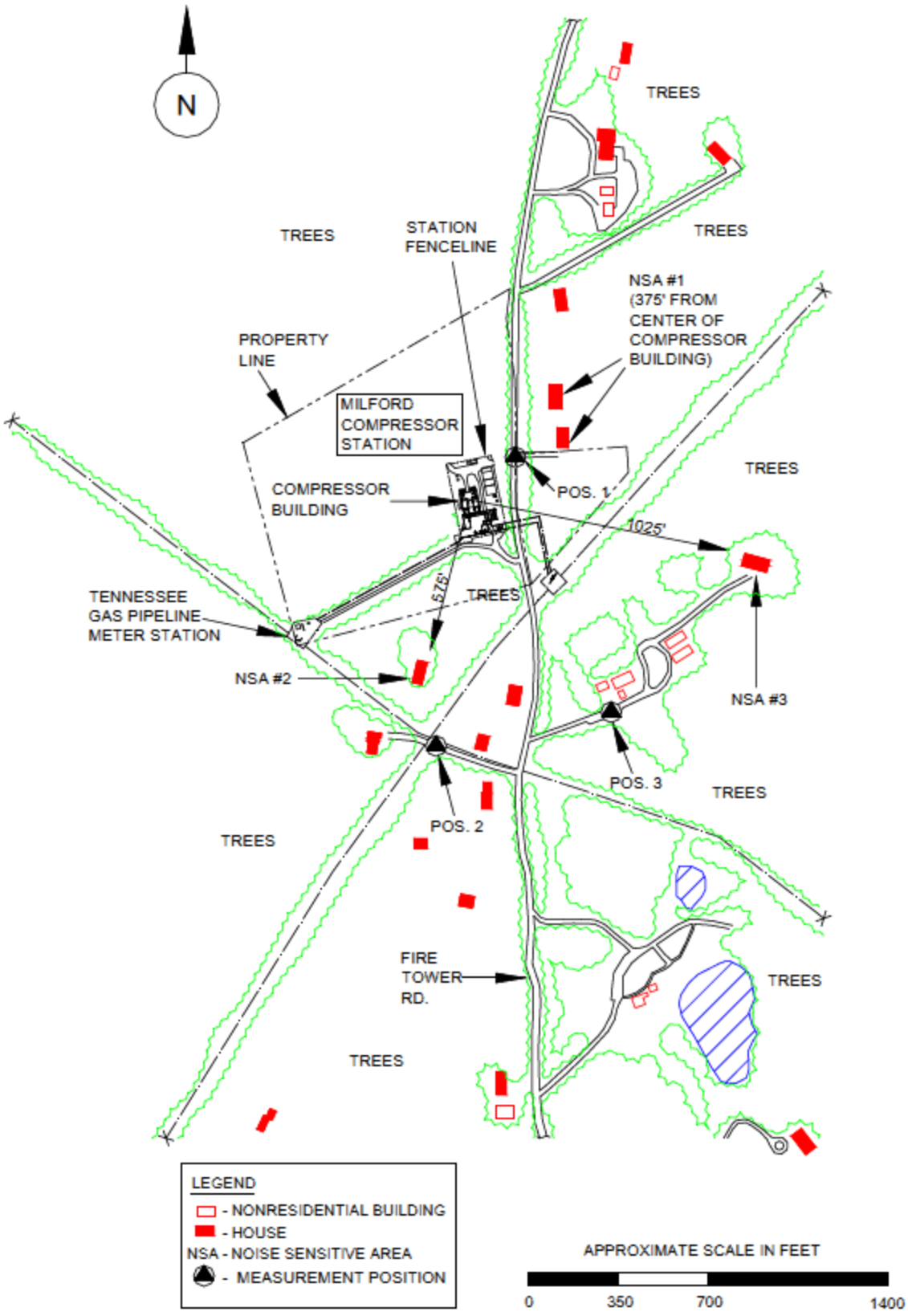

Figure 2.8-1 Milford Compressor Station and Nearby NSAs

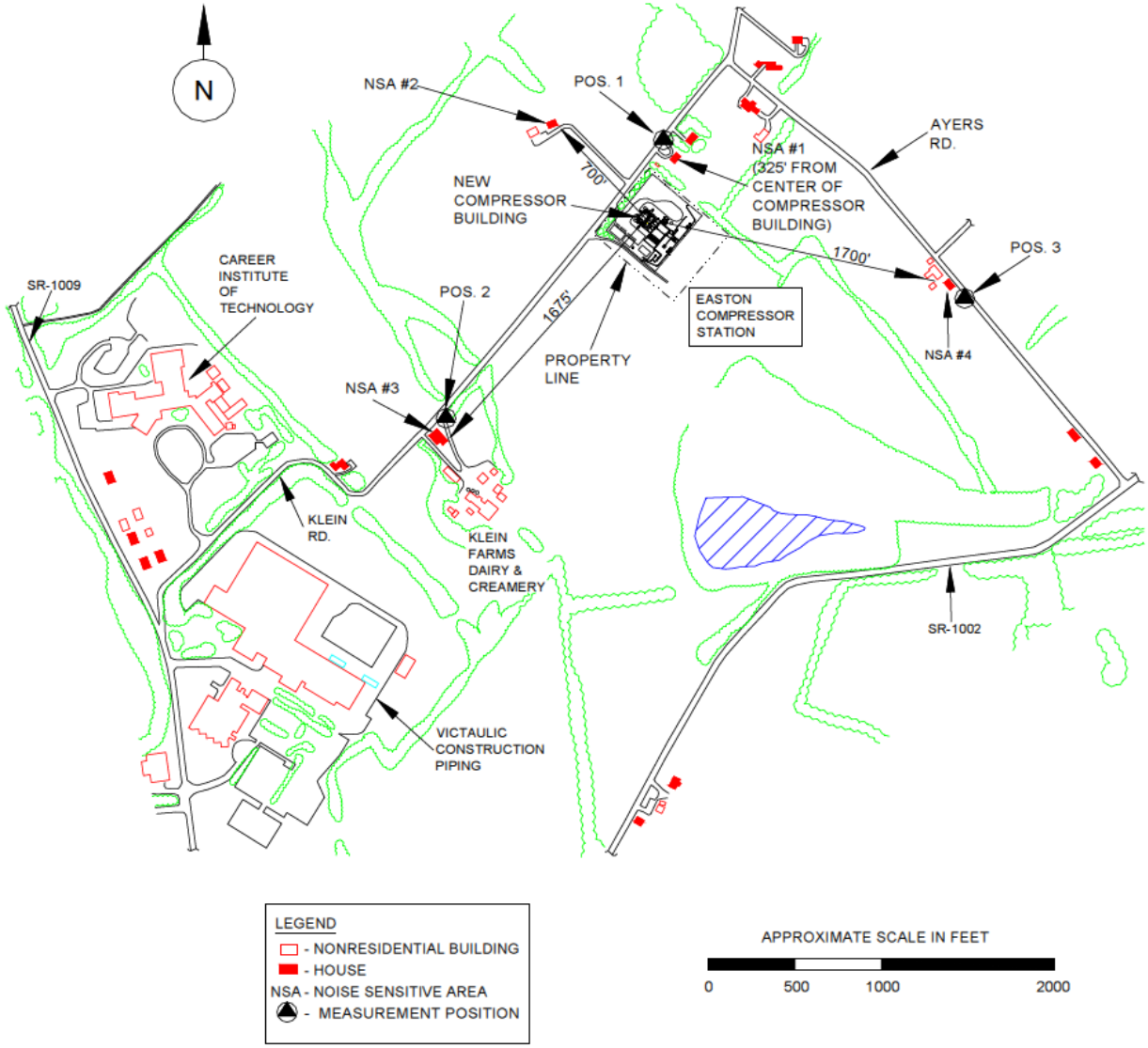

Figure 2.8-2 Easton Compressor Station and Nearby NSAs

TABLE 2.8.2-3

Operational Sound Levels at the Milford Compressor Station

NSA	Distance (feet) and Direction to the Station	Existing Baseline, dBA L_{dn} [a/, b/]	Modified Station, dBA L_{dn}	Cumulative Sound Level (Existing + Modified Station), dBA L_{dn}	Potential Increase above Baseline, dB
1	375 NE	44.3	51.3	52.1	7.8
2	575 S	47.7	46.5	50.2	2.4
3	1,025 SE	45.0	40.9	46.5	1.4

NE= Northeast, S= South, SE= Southeast

[a/] Excludes insect noise.

[b/] During the baseline noise survey the existing Milford Compressor Station was not in operation.

As shown in table 2.8.2-3, the modified compressor station at full-load operation would not exceed an L_{dn} of 55 dBA at the closest NSAs (H&K RN 2880, 2013). To verify that the operational noise predictions are accurate and to ensure that the Project operates in compliance with our guidelines, **we recommend that:**

- **Columbia should make all reasonable efforts to ensure its predicted noise levels from the modified Milford Compressor Station are not exceeded at the nearby NSAs and file a noise survey showing this with the Secretary no later than 60 days after placing the Milford Compressor Station in service. If the noise attributable to the operation of the Milford Compressor Station at full load exceeds an L_{dn} of 55 dBA at any nearby NSAs, Columbia should file a report identifying what modifications it intends to make in order to meet the predicted level within 1 year of the in-service date. Columbia should confirm compliance with this requirement by filing a second noise survey with the Secretary no later than 60 days after it installs any additional noise controls.**

Easton Compressor Station

Operational noise, inclusive of mitigation measures, from the proposed compressor unit additions at the Easton Compressor Station was predicted at nearby NSAs. Two Solar Saturn units at the existing compressor station would be removed, but the existing 650 hp reciprocating compressor unit would remain. Additional modifications at the compressor station include the following equipment additions:

- two Taurus 70 turbine driven compressor units;
- high performance turbine exhaust systems;
- high performance turbine air inlet systems;
- low noise lube oil coolers;
- low noise station gas aftercooler;
- aboveground and belowground station gas piping;
- office, motor control center and auxiliary building; and
- station standby generator.

Table 2.8.2-4 provides the results of the operational noise predictions at the closest NSAs to the existing and modified Easton Compressor Station. The closest NSAs were identified as residences. The sound levels generated by the existing Solar Saturn turbine-driven compressors and Waukesha reciprocating engine-driven compressor were estimated. Sound levels associated with the modifications and the net difference between the existing and modified station are also provided.

TABLE 2.8.2-4

Operational Sound Levels at the Easton Compressor Station

NSA	Distance (feet) and Direction to the Station	Existing Station (Saturn Units + Reciprocating. Unit), dBA L_{dn}	Modified Station		Potential Noise Change, dB
			Proposed Compressor Units at Full Load, dBA L_{dn}	Total Station (Existing Reciprocating Unit+ Proposed Compressor Units), dBA L_{dn}	
1	325 NE	66.4	52.6	56.1	-10.3
2	700 NW	58.7	45.2	49.9	-8.8
3	1,675 SW	53.4	37.5	42.6	-10.8
4	1,700 E	52.9	37.3	43.0	-9.9

NE=Northeast, NW=Northwest, SW=Southwest, E=East

At full-load operation, the proposed compressor unit additions would not exceed an L_{dn} of 55 dBA at the closest NSAs. The total station sound level (i.e., existing reciprocating engine and the proposed compressor unit additions) may exceed our 55 dBA L_{dn} criterion at NSA 1. However, as shown in Table 2.8.2-4, it is expected that sound levels at NSAs would decrease as a result of the modifications when compared to sound levels produced by the existing station (H&K RN 2881, 2013). To ensure that the Project operates in compliance with our guidelines, **we recommend that:**

- **Columbia should make all reasonable efforts to ensure its predicted noise levels from the modified Easton Compressor Station are not exceeded at the nearby NSAs and file a noise survey showing this with the Secretary no later than 60 days after placing the Easton Compressor Station in service. If the noise attributable to the operation of the Easton Compressor Station at full load exceeds an L_{dn} of 55 dBA at any nearby NSAs, Columbia should file a report identifying what modifications it intends to make in order to meet the predicted level within 1 year of the in-service date. Columbia should confirm compliance with this requirement by filing a second noise survey with the Secretary no later than 60 days after it installs any additional noise controls.**

In addition to the noise mitigation measures outlined above, Columbia intends to install unit blowdown silencers for each proposed compressor unit at the Milford and Easton Compressor Stations, with a design goal of 50 dBA at 300 feet, which would approximately equate to 48 dBA at the closest NSA. Columbia agrees to a best efforts attempt to achieve this predicted sound level for each compressor unit blowdown.

Based on the estimated sound levels and our recommendations, we conclude that the noise attributable to operation of the Milford and Easton Compressor Stations would not cause a significant impact on the existing noise environment.

2.9 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 is a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Methane has an auto-ignition temperature of 1,000 degrees Fahrenheit (°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. It is buoyant at atmospheric temperatures and disperses rapidly in air.

2.9.1 Safety Standards

The DOT is mandated to provide pipeline safety under Title 49 of the U.S. Code, Chapter 601. The DOT's Pipeline and Hazardous Materials Safety Administration's (PHMSA) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level.

Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement action. Both New Jersey and Pennsylvania are states that participate in the federal/state cooperative gas and hazardous liquid pipeline safety programs under 49 USC Sec. 60105(a). The DOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses natural gas pipeline safety issues.

Under a Memorandum of Understanding on Natural Gas Transportation Facilities (Memorandum) dated January 15, 1993, between the DOT and the FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or shall certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with Section 3€ of the Natural Gas Pipeline Safety Act. The FERC accepts this certification and does not impose additional safety standards other than the DOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert DOT. The Memorandum

also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The proposed pipeline and aboveground facilities associated with the Project must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

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

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

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For 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. Columbia’s Construction Standard PLS-101 prescribes the minimum depth of cover required for pipelines based on class location. This standard meets or exceeds those defined in 49 CFR 192 and are summarized in table 2.9-1.

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; maximum allowable operating pressure (MAOP); inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

TABLE 2.9-1 Proposed Minimum Depth of Cover for Pipelines by Class Location [a/]		
Location	**Cover (inches)**	
	Normal Excavation	**Consolidated Rock Excavation**
Class 1	30	18
Classes 2, 3, and 4	36	24
Drainage ditches of public roads and railroad crossings	36	24
Rivers, creeks and canal crossings	48	24
[a/] Based on Columbia's Construction Standard PLS-101		

The Line 10345 Loop would be constructed through about 2.22 miles of Class 1, 4.63 miles of Class 2, and 2.76 miles of Class 3 areas. The Line 1278 Loop would be constructed through about 0.13 mile of Class 1 and 5.08 miles of Class 3 areas.

The Pipeline Safety Improvement Act of 2002 requires operators to develop and follow a written integrity management program that contains all the elements described in 49 CFR 192.911 and addresses the risks on each transmission pipeline segment. Specifically, the law establishes an integrity management program that applies to all high consequence areas (HCAs).

The DOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, the HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[14] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle;[15] 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.

[14] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch gauge multiplied by the square root of the pipeline diameter in inches.
[15] The potential impact circle is a circle of radius equal to the potential impact radius.

In the second method, a HCA includes any area within a potential impact circle that contains:

- 20 or more buildings intended for human occupancy, or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within the HCAs. The DOT regulations specify the requirements for the integrity management plan at Section 192.911. Columbia has identified about 3.92 miles of HCAs along its Line 10345 Loop and 7.82 miles of HCAs along its Line 1278 Loop.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards of a natural gas pipeline emergency. Key elements to the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

The DOT requires that each operator establish and maintain liaison with appropriate fire, police and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. 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 conducts annual emergency training for its operations personnel and would invite local and neighboring county fire departments, including volunteer fire departments, if applicable, to attend and participate in a mock emergency drill as part of Columbia's training program. Columbia has existing pipelines in the Project area and has maintained communication with several police and fire departments along both the Line 10345 and Line 1278 Loops.

2.9.2 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the DOT of any significant incident and to submit a report within 20 days. Significant incidents are defined as leaks that:

- cause a death or personal injury requiring hospitalization; or
- involve property damage of more than $50,000 (1984 dollars).[16]

During the 20-year period from 1993 through 2012, there were 1,212 significant incidents reported on more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of natural gas transmission pipeline incidents may be found by examining the primary factors that caused the failures. Table 2.9-2 provides a distribution of the causal factors as well as the number of each incident by cause.

The dominant causes of pipeline incidents are corrosion and pipeline material, weld, or equipment failure constituting 47.1 percent of all significant incidents. The pipelines included in the data set in table 2.9-2 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, as corrosion is a time-dependent process. The use of both an external protective coating and a cathodic protection system,[17] required on all pipelines installed after July 1971, significantly reduces the rate of failure compared to an unprotected or partially protected pipeline.

TABLE 2.9-2

Natural Gas Transmission Pipeline Significant Incidents by Cause (1993-2012) [a/]

Cause	Number of Incidents	Percentage of Total [b/]
Corrosion	287	23.6
Excavation (includes third-party damage)	203	16.7
Incorrect Operation	32	2.6
Pipeline Material, Weld or Equipment Failure	285	23.5
Natural Force Damage	144	11.8
Other Outside Force Damage (fire, explosion, vehicle damage, previous damage, and intentional damage)	67	5.5
All Other Causes (miscellaneous unknown causes)	194	16.0
Total	**1212**	--

[a/] All data gathered from PHMSA Significant incident files, December 11, 2013. http://primis.phmsa.dot.gov/comm/reports/safety/SigPSIDet_1993_2012_US.html?nocache=8852#_ngtransall

[b/] Due to rounding, column does not total 100 percent.

Outside forces make up 34 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.

[16] $50,000 in 1984 dollars is approximately $106,000 as of January 2010 (CPI, Bureau of Labor Statistics, ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt, August 13, 2010).

[17] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current or a sacrificial anode (like zinc) that corrodes at a faster rate than the pipeline itself.

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 movements. Table 2.9-3 provides a breakdown of outside forces incidents.

Since 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

TABLE 2.9-3

Outside Forces Incidents by Cause (1993-2012) [a/]

Cause	No. of Incidents	Percent of all Incidents [b/]
Operator/contractor excavation damage	25	2.0
Third-party excavation damage	170	14.0
Previous damage due to excavation	4	0.3
Unspecified equipment damage	4	0.3
Earth movement	38	3.1
Heavy rain/floods	70	5.7
Lightning/temperature/high winds	21	1.6
Other natural force damage	2	0.1
Unspecified natural force	13	1.0
Fire/explosion	8	0.6
Vehicle (not engaged with excavation)	42	3.4
Maritime (equipment, vessel adrift, fishing or maritime activity)	6	0.4
Previous mechanical damage	5	0.4
Intentional damage	1	<0.1
Other outside force damage	4	0.3
Unspecified outside force	1	<0.1
Total	**414**	**--**

[a/] All data gathered from PHMSA Significant incident files, December 11, 2013. http://primis.phmsa.dot.gov/comm/reports/safety/SigPSIDet_1993_2012_US.html?nocache=8852#_ngtransall

[b/] Due to rounding, column does not total 100 percent.

2.9.3 Impact on Public Safety

During the scoping process for this EA, we encouraged stakeholders to comment on both environmental and safety issues. We received about 80 comments from stakeholders regarding pipeline safety. Concerns were raised regarding several pipelines in the same area, construction in the vicinity of older pipelines, pipelines in high-density areas, and the frequency of inspections, among others. As stated above, Columbia would comply with the DOT 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.

We received comments from the Delaware Riverkeeper Network regarding the maximum flow velocity for the new pipeline. The commenter alleges that gas velocities on certain segments of Columbia's system would exceed 50 feet per second (ft/s) resulting in threats to the safe operation of the pipeline facilities. The commenter does not cite any industry or government standard, regulation, or study to support its position. Specifically, the commenter alleges that three pipeline segments on Columbia's proposed or expanded system would operate with gas velocities above 50 ft/s. The commenter cites Columbia's use of a "rule-of-thumb" design condition that gas flows should not exceed 50 ft/s and extrapolates from that design factor to assert that flows above 50 ft/s are unsafe. Based upon anticipated maximum operating conditions after the expansion facilities are in service, Columbia calculates that only a single 7.77-mile, 20-inch-diameter line segment downstream of the Downingtown Compressor Station will have a calculated maximum gas velocity above 50 ft/s. Columbia calculates a maximum flow velocity of 53.6 ft/s for this segment. Columbia states that while this velocity exceeds its "rule-of-thumb" design condition, it confirmed that it is well below the estimated erosional velocity for the pipeline segment. Given, Columbia's explanation and supporting documentation, we have determined that the anticipated flow velocities on Columbia's system would not result in unsafe operating conditions. Further PHMSA, which is responsible for the safety of the interstate pipeline systems, does not specify a maximum velocity in its regulations.

The significant incident data summarized in table 2.9-2 include natural gas transmission pipeline failures of all magnitudes with widely varying consequences. Table 2.9-4 presents the average annual injuries and fatalities that occurred on natural gas transmission lines in the 5-year period between 2008 and 2012.

The majority of fatalities associated with natural gas pipelines involve local distribution pipelines. These are natural gas pipelines that distribute natural gas to homes and businesses after transportation through interstate natural gas transmission pipelines and are not regulated by the FERC. In general, distribution lines are smaller diameter pipes, plastic pipes, and older pipelines that are more susceptible to damage. In addition, distribution systems do not have large rights-of-way and pipeline markers common to the FERC-regulated natural gas transmission pipelines.

TABLE 2.9-4

Injuries and Fatalities – Natural Gas Transmission Pipelines

Year	Injuries	Fatalities
2008	5	0
2009	11	0
2010 [a/]	61	10
2011	1	0
2012	7	0

[a/] All of the public injuries and fatalities in 2010 were due to the Pacific Gas and Electric pipeline rupture and fire in San Bruno, California on September 9, 2010.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table 2.9-5 in order to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all

categories. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to other categories. In addition, the fatality rate for natural gas pipeline accidents is much lower than the fatalities from natural hazards such as lightning, tornados, or floods.

TABLE 2.9-5

Accidental Deaths by Cause

Type of Accident	Annual No. of Deaths [a/]
All injuries (unintentional)	123,706
Motor vehicle accident	42,031
Poisoning (unintentional)	29,846
Falls (unintentional)	22,631
Suffocation (unintentional)	5,997
Drowning (unintentional)	3,443
Fire/flame (unintentional)	3,286
Floods [b/]	93
Lightning [b/]	54
Tornado [b/]	74
Natural gas distribution lines [c/]	14
Natural gas transmission pipelines [c/]	2

[a/] All data, unless otherwise noted, reflects 2005 statistics from U.S. Census Bureau, Statistical Abstract of the United States: 2010 ([12]9th Edition), Washington, DC, 2009; http://www.census.gov/compendia/statab.

[b/] NOAA National Weather Service, Office of Climate, Water and Weather Services, 30 year average (1982-2011); http://www.weather.gov/om/hazstats.shtml.

[c/] PHMSA Significant incident files, December 11, 2013. http://primis.phmsa.dot.gov/comm/reports/safety/SigPSIDet_1993_2012_US.html?nocache=8852#_ngtransall

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1993 to 2012, there were an average of 61 significant incidents, six injuries and two fatalities per year. The number of significant incidents over more than 300,000 miles of natural gas transmission lines indicates the risk is low for an incident at any given location. The operation of the proposed Project would represent only a slight increase in risk to the nearby public.

2.9.4 Polychlorinated Biphenyls and Asbestos

Many older compressors had used oils containing polychlorinated biphenyls (PCBs). PCBs have been demonstrated to cause a variety of adverse health impacts. These types of oils are no longer allowed to be used, but because of past use at older compressor stations these facilities and pipelines may still have levels of PCBs above regulatory limits. Columbia's pipeline system did historically use PCB containing oils at some locations. Columbia stated that it is not aware of any PCB contamination at the Easton Compressor Station; however, Columbia did identify a potential for PCBs to occur at the Milford Compressor Station. PCBs can absorbed by paint found on engines, walls, floors, and pipe. Columbia stated it would hire a PCB-experienced contractor for demolition of this facility, and the contractor would provide a plan for handling and disposal of PCBs should they be encountered. Columbia did not provide

information regarding the potential to encounter PCBs at the tie-ins for the loops. To ensure Columbia would test and dispose of any PCB contaminated facilities in compliance with 40 CFR 761, **we recommend that:**

- **Prior to any abandonment activities at the Milford and Easton Compressor Stations, Columbia should file the following information with the Secretary for review and written approval by the Director of OEP:**

  a. identify any facilities to be abandoned or disturbed, including tie-in locations, that may be contaminated with PCBs;

  b. verify that the appropriate PCB testing would be conducted on these facilities, and discuss how any abandoned PCB contaminated facilities would be properly disposed of; and

  c. identify measures to be implemented to provide adequate worker safety for handling PCB contaminated materials.

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

- **Prior to any abandonment or construction activities, Columbia should file the following information with the Secretary for review and written approval by the Director of OEP:**

  a. identify any known facilities to be abandoned or disturbed having ACMs;

  b. develop protocols to comply with the appropriate requirements to identify ACMs that might be encountered;

  c. if facilities with ACMs would be abandoned or disturbed, identify methods to separate the ACMs for proper disposal; and

  d. develop worker protection protocols, and provide for proper disposal of ACMs.

2.10 Cumulative Impacts

In accordance with NEPA and Commission policies (included in 40 CFR 1508 and *Considering Cumulative Effects Under the National Environmental Policy Act* [CEQ 1997b]) and in response to comments expressed during the scoping, we evaluated the potential for cumulative impacts on the environment. A cumulative impact is an impact on the environment that results from adding the incremental impacts of the proposed action with the impacts of other past, present, and reasonably foreseeable future actions. Our cumulative impacts analysis considers actions that impact environmental resources affected by the proposed action, within all or part of the project area impacted by the proposed action (region of influence), and within all or

part of the time span of the impacts resulting from the proposed action. For the proposed facilities, except as noted in the following discussion, we generally consider approximately a 0.5-mile radius as the project area/region of influence for most resources impacted (not including air quality). Also, except as noted below, we consider the time span of the impacts for most resources as 1–10 years.

In table 2.10-1, we identify 14 present and reasonably foreseeable future actions whose impacts when added to the impacts of the proposed action could result in cumulative impacts. Other Columbia projects, including those identified as part of its Modernization Program, and other projects/actions (including non-traditional gas production wells [fracking] and gathering lines) in the region that were identified by either ourselves or others during our environmental review were considered, but not included because the impacts of these projects/actions occur or would occur outside the region of influence and the time span of the impacts resulting from the proposed action. We consider the impacts of past actions (including the construction and operation of adjacent interstate natural gas transmission pipelines) as part of the affected environment (environmental baseline) which has been described and evaluated throughout the preceding environmental analysis. The present and reasonably foreseeable future actions include other interstate natural gas transmission projects, commercial and residential developments, infrastructure projects, and non-jurisdictional projects associated with the proposed action.

Based on the potential impacts of constructing and operating the proposed Project, the region of influence of these impacts as described in the preceding environmental analysis, and our understanding of the potential impacts of present and reasonably foreseeable future actions, we have determined that the minor aboveground facilities/modifications in Maryland (Rutledge Compressor Station), New York (Wagoner M&R Station) and Pennsylvania (Eagle Compressor Station and Pennsburg and Quakertown M&R Stations) would not result in cumulative impacts. We have also determined that the impacts of constructing and operating the remaining facilities when added to the impacts of present and reasonably foreseeable future actions would not result in cumulative impacts on geology, socioeconomics, recreation, and cultural resources. Therefore, the aforementioned minor facilities and resources are not considered further in this analysis.

TABLE 2.10-1

Present and Reasonably Foreseeable Future Actions

Project	Description (Proponent)	Estimated Construction Date	Location Relative to the Project
Line 10345 Loop, Gloucester County, NJ			
LogistiCenter at Logan	Master-planned business park (Dermody Properties)	multiyear, phased	Logan Twp between MP 1.1 and MP 3.9
Varies, based on approved parcels	Transfer of Development Rights (TDR) parcels (Woolwich Township)	multiyear, phased	Woolwich Twp between MP 6.9 and MP 8.2
Line 1278 Loop, Chester County, PA			
Eagle Farms	Residential subdivision (Toll Brothers)	2013	West Vincent Twp 0.13 mi southeast of MP 0.0
Turnpike Reconstruction	Roadway reconstruction (PA Turnpike Commission)	2013-2016	Upper Uwchlan Twp near MP 1.9

TABLE 2.10-1

Present and Reasonably Foreseeable Future Actions

Project	Description (Proponent)	Estimated Construction Date	Location Relative to the Project
Eagleview Sewer Pump Station (SD-6-13-8163)	Commercial development (Regus)	2013	Upper Uwchlan Twp, 0.3 mi east of MP 2.2
Eagleview Corporate Center	Commercial development (Hankin Group)	2013-2014	Upper Uwchlan Twp, 0.5 mi east of MP 2.3
Shamona Creek Elementary School	Elementary school expansion (Downingtown Area School District)	Ongoing	Uwchlan Twp, 0.05 mi west of MP 3.1
Creek Road Business Park	Software company headquarters development (Creek Road Developers, LLC)	2014	Caln Twp, 300 feet south of MP 6.3
Woods at Rock Raymond	Residential subdivision (Janiec Developers and DK Builder, LLC)	multiyear, varies	Caln Twp, 0.25 mi northwest of MP 7.1
Woods at Clarelyn	Residential subdivision (Robert Bruce)	multiyear, varies	Caln Twp 0.25 mi west of MP 7.9
Brandywine Creek Replacement Project	Interstate natural gas transmission pipeline project (Transcontinental Gas Pipe Line Company, LLC)	2014	Caln Twp
Milford Compressor Station, Pike County, PA			
Northeast Upgrade Project	Tennessee Gas Pipeline, 10 miles/30-inch-diameter Natural Gas Pipeline (Pike County)	2013 (complete)	Adjacent to Milford Compressor Station
Milford Compressor Station Upgrade	Upgrades of existing electrical infrastructure	2014 - 2015	Within and adjacent to Milford Compressor Station
Easton Compressor Station, Chester County, PA			
Easton Compressor Station Upgrade	Upgrades of existing electrical infrastructure	2014 - 2015	Within and adjacent to Easton Compressor Station

Sources: Swavely 2013; Jonik 2013; Caputo 2013; McClintock 2013; Blake 2013; Mrozinski 2013; Townes 2013; DVRPC 2013; Chester County 2013; NJDOT 2013; PADOT 2013: PATurnpike 2013; Woolwich Twp. 2013.
Twp = Township

2.10.1 Soils

The present and reasonably foreseeable future actions identified in table 2.10-1 would result in the temporary disturbance and permanent loss of soils use within the region of influence. Disturbances to soils could include compaction, erosion, and modification of soils characteristics. Adding these impacts to the impacts of the proposed action would result in a cumulative impact. However, we have determined based on the impacts of the proposed action (as described in this EA) and Columbia's implementation of impact minimization measures that the impacts of the proposed action on soils when added to the impacts of other present and reasonably foreseeable future actions would not result in a significant cumulative impact on this resource.

2.10.2 Water Resources and Fisheries

Many of the present and reasonably foreseeable future actions identified in table 2.10-1 would not result in impacts on surface waters and fisheries, and would only potentially impact groundwater resources. The Brandywine Creek Replacement Project has affected Brandywine

Creek downstream of the proposed Line 1278 Loop HDD crossing, and the Northeast Upgrade Project has affected waterbodies near the Milford Compressor Station. These respective projects temporarily disturbed surface waters (water flow and quality) and fisheries; however, these impacts were both minor and localized. Potential impacts on groundwater resources include changes to water quality, quantity (infiltration), and flow. Adding the impacts on surface waters and fisheries, and the potential impacts on groundwater to the impacts of the proposed action could result in a cumulative impact. Both the Brandywine and Northeast Upgrade projects were FERC jurisdictional actions and were subject to similar impact minimization measures as Columbia's proposed Project. As such, we can confirm that those projects only resulted in minimal impacts on water resources and fisheries. Therefore, we have determined based on the impacts of the proposed action (as described in this EA) and Columbia's implementation of impact avoidance and minimization measures that the impacts of the proposed action on water resources and fisheries when added to the impacts of the Brandywine and Northeast Upgrade (and other present and reasonably foreseeable future actions) would not result in a significant cumulative impact on these resources.

2.10.3 Wetlands

Several of the present and reasonably foreseeable future actions identified in table 2.10-1 would not result in impacts on wetlands. However, a number of these actions could result in minor losses and/or permanent conversions of PEM and PSS wetlands. These actions could also result in temporary impacts on wetlands including general disturbance, and/or modification of vegetative, hydrologic, and soils characteristics. The Brandywine Creek Replacement and Northeast Upgrade Projects have temporarily and permanently impacted PEM, PSS, and PFO wetlands near proposed facilities. In most cases, impacts on wetlands have been or would be avoided, minimized and/or mitigated by permitting regulatory authorities (primarily the USACE) and in the case of the Brandywine and Northeast Upgrade projects by FERC requirements. These impacts would also be relatively minor and localized. Adding these impacts on wetlands to the impacts of the proposed action would result in a cumulative impact. However, we have determined based on the impacts of the proposed action (as described in this EA) and Columbia's implementation of impact avoidance, minimization and mitigation measures along with the USACE (and respective state agencies') required mitigation measures that the impacts of the proposed action on wetlands when added to the impacts of other present and reasonably foreseeable future actions would not result in a significant cumulative impact on this resource.

2.10.4 Vegetation and Wildlife

The present and reasonably foreseeable future actions identified in table 2.10-1 would result in the temporary and permanent loss (and conversion) of vegetation and wildlife habitat. Affected vegetation and wildlife habitat includes open, agricultural, maintained/disturbed, and wooded/forested vegetation. These actions could also result in an increase in the amount of stress, injury, and mortality experienced by wildlife that would be similar in scope to effects of the proposed action. Based on the nature of these projects – residential development expansions and long-planned commercial developments and the general disturbed character of these suburban and rural environments, we have determined that the impacts of these projects on vegetation and wildlife would be relatively minor and localized. Adding these impacts to the impacts of the proposed action would result in a cumulative impact. However, we conclude based on the impacts of the proposed action (as described in this EA), Columbia's

implementation of impact minimization measures, and state and local regulation of these actions that the impacts of the proposed action on vegetation and wildlife when added to the impacts of other present and reasonably foreseeable future actions would not result in a significant cumulative impact on these resources.

2.10.5 Threatened, Endangered, and Other Special Status Species

Based on the scope of the present and reasonably foreseeable future actions identified in table 2.10-1, the characteristics of known threatened and endangered and other special status species within the region of influence, and the types and amounts of land, vegetation, and habitat impacted by these actions, we conclude that these actions would most likely result in only minimal impacts on federally listed or other special status species. Further, any federally regulated or proposed projects would be subject to specific consultation with the FWS to ensure impacts on federally listed species are minimized. Other mitigation measures for state-sensitive species may also apply. Therefore, we have determined that the impacts of the proposed action on threatened and endangered and other special status species (as described in this EA) when added to the impacts of other present and reasonably foreseeable future actions would not result in a significant cumulative impact on listed species or other special status species.

2.10.6 Land Use and Visual Resources

The present and reasonably foreseeable future actions identified in table 2.10-1 would result in temporary disturbances/losses of use and permanent conversions of land uses. Affected land uses include residential, agricultural, commercial, industrial, and open lands. These actions would also temporarily and permanently impact visual resources. These impacts include disturbances related to the general use of construction equipment and changes to the viewshed resulting from the placement of permanent buildings/structures. Based on the nature of these projects – residential development expansions and long-planned commercial developments, we have determined that the impacts of these projects when added to the impacts of the proposed action would result in a cumulative impact. However, we have also determined based on the impacts of the proposed action (as described in this EA), and state and local regulation of these actions including local planning efforts that the impacts of the proposed action on land use and visual resources when added to the impacts of other present and reasonably foreseeable future actions would not result in a significant cumulative impact on these resources.

2.10.7 Traffic

Construction of the Project combined with other road improvements or residential and commercial developments would have the potential to create a cumulative impact on traffic in the vicinity of the Project. During construction of the Project, movement of large equipment and materials would be subject to local highway use permits that should take into account the current traffic conditions. Presumably, any of the other projects that could occur in the same timeframe would also be subject to use permits. Columbia has proposed mitigation measures to reduce the effect of the Project on local traffic, and these are described in section 2.6.3. Traffic resulting from construction of the proposed Project would be expected to result in only minor increases over current traffic conditions. Therefore, we conclude that the Project would not have a cumulative impact on traffic when combined with potential impacts associated with other road improvements or residential and commercial developments in the area.

2.10.8 Air Quality and Noise

Air Quality

The present and reasonably foreseeable future actions identified in table 2.10-1 would require the use of heavy equipment resulting in the generation of air contaminants, fugitive dust, and noise. Constructing the Project would contribute cumulatively to air quality impacts. The combined impact of multiple construction projects occurring in the same airshed and timeframe as the Project could temporarily add to the ongoing air impacts in the Project area. With the exception of the Milford Compressor Station, which is in an area designated attainment for all criteria pollutants, the Project construction activities and new equipment installations (affecting allowable operational emissions) would occur in counties that are designated nonattainment of the $PM_{2.5}$ and/or O_3 standards. Construction activities for the proposed Project facilities and pipeline replacement activities would result in temporary increases in emissions of some pollutants due to the use of equipment powered by diesel or gasoline engines. Construction activities would also result in the temporary generation of fugitive dust due to land clearing, ground excavation, and cut and fill operations. The construction equipment emissions would result in short-term fugitive emissions that would be highly localized, temporary, and intermittent. Because pipeline construction moves through an area quickly, air emissions associated with construction of the pipeline loops would be intermittent and short term. The majority of these impacts would be minimized because the construction activities would occur over a large geographical area and, in many cases, construction schedules would not directly overlap. Although these projects would result in short-term construction air emissions, they are not likely to significantly affect long-term air quality in the region.

Modifications to the compressor stations and the meter stations would be sources of air emissions during operation of the Project. Non-combustion related emissions would also occur from the pipeline and at the meter stations during normal operation. The air dispersion modeling presented in section 2.8.1 for the Milford and Easton Compressor Stations demonstrates that the cumulative air quality impacts of the modified stations added to the existing background air quality would not be significant and would not result in any violations or exceedances of the NAAQS. Based on Columbia's proposed mitigation measures and our recommendation, we do not anticipate that the construction and operation of the proposed Project facilities are expected to have a significant impact on air quality in the Project area or in the region itself. Furthermore, because the projects listed in table 2.10-1 are located over a large area, have varying construction schedules, and must adhere to federal, state, and local regulations for the protection of ambient air quality, significant cumulative impacts on air quality are not anticipated.

We received comments from landowners and the Clean Air Council regarding cumulative impacts associated with direct and indirect GHG emissions from Marcellus Shale development activities. We anticipate that Marcellus Shale development activities would result in increased long-term emissions of criteria pollutants, HAPs, and GHGs within the region. However, as noted in section 2.1.1, Marcellus Shale development activities are not present in the Project area, except for Pike County, Pennsylvania. Therefore, operation of the Project and Marcellus Shale drilling activities, could contribute cumulatively to existing air emissions to a limited extent. Further, the Clean Air Council contends that our analysis must take into the account the cumulative indirect criteria pollutant and GHG emissions associated with the increased shale gas extraction, production, and eventual combustion due to the proposed Project. We cannot

presume that any or all of the natural gas that would be transported by the Project would originate from the Marcellus Shale. Development of natural gas would occur with or without the Project and could find other avenues to market. Therefore, an analysis of the cumulative air quality impacts associated with the Project and direct and indirect emissions from the regional Marcellus Shale development activities would require highly speculative analysis on our part, at best. Further, in previous projects the Commission has determined that past and present Marcellus Shale development is not sufficiently causally related to FERC-regulated projects to require inclusion in our cumulative impact analysis. The Commission has also previously found that Marcellus Shale development is both widespread and uncertain in nature and timing, making it highly difficult and speculative to identify and quantify cumulative impacts of possible future drilling related to pipeline projects. Nevertheless, the Project and the Marcellus Shale development activities would need to comply with federal, state, and local air regulations, which may require controls to limit the emission of certain criteria pollutants, HAPs or GHGs. Therefore, we have determined that constructing and operating the Project would not result in a significant cumulative impact on regional air quality.

Noise

The Project and other projects listed in table 2.10-1 would all produce noise during construction. Some of the projects listed in the table may be longer-term actions, resulting in some degree of ongoing noise disturbance. However, noise impacts during the proposed Project's construction phase would be localized and would attenuate quickly as the distance from the noise source increases. Because construction would proceed as a moving assembly line along the proposed loops, the duration of construction activities, and therefore noise impacts, at any one location would be limited and short term. As such, this noise would be a temporary annoyance to noise receptors in the vicinity of the proposed Project, even if other projects are underway as well. Because the impact of noise is highly localized and attenuates quickly as the distance from the noise source increases, we have determined that the Project would not result in a significant cumulative impact.

2.10.9 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The Intergovernmental Panel on Climate Change (IPCC) is the leading international, multi-governmental scientific body for the assessment of climate change. The United States is a member of the IPCC and participates in the IPCC working groups to develop reports. The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP). Thirteen federal departments and agencies participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

The IPCC and USGCRP have recognized that:

- globally, GHGs have been accumulating in the atmosphere since the beginning of the industrial era (circa 1750);

- combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests is primarily responsible for this accumulation of GHG;
- these anthropogenic GHG emissions are the primary contributing factor to climate change; and
- impacts extend beyond atmospheric climate change alone, and include changes to water resources, transportation, agriculture, ecosystems, and human health.

In May 2014, the USGCRP issued a report, *Climate Change Impacts in the United States*, summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP 2014). The report includes a breakdown of overall impacts by resource and impacts described for various regions of the United States. Although climate change is a global concern, for this cumulative analysis, we focus on the potential cumulative impacts of climate change in the Project area.

The USGCRP's report notes the following observations of environmental impacts that may be attributed to climate change in the Northeast region:

- average temperatures have risen about 2 °F between 1895 and 2011 and are projected to increase another 1 to 8 °F over the next several decades with more frequent days above 90 °F;
- areas that currently experience ozone pollution problems are projected to experience an increase in the number of days that fail to meet the federal air quality standards;
- an increase in health risks and costs for vulnerable populations due to projected additional heat stress and poor air quality;
- precipitation has increased by about 5 inches and winter precipitation is projected to increase 5 to 20 percent by the end of the century;
- extreme/heavy precipitation events have increased more than 70 percent between 1958 and 2010 and are projected to continue to increase;
- sea levels have risen about 1 foot since 1900 and are projected to continue increasing 1 to 4 feet by 2100 stressing infrastructure (e.g., communications, energy, transportation, water, and wastewater);
- severe flooding due to sea-level rise and heavy downpours is likely to occur more frequently;
- crop damage from intense precipitation events, delays in crop plantings and harvest, and heat stress negatively affect crop yields;
- invasive weeds are projected to become more aggressive due to their benefit of higher CO_2 levels;
- a change in range, elevation, and intra-annual life cycle events of vegetation and wildlife species; and
- an increase in carrier habitat and human exposure to vector-borne diseases (e.g., Lyme disease or West Nile virus).

The GHG emissions associated with construction and operation of the Project are discussed in more detail in section 2.8.1. Emission of GHGs from the proposed Project would not have any direct impacts on the environment in the Project area. Currently, there is no standard methodology to determine how a project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment.

2.10.10 Conclusions About Cumulative Impacts

Construction and operation of the Project would not contribute to cumulative long-term effects. Even when considered in light of 14 other projects planned or ongoing within 0.5 mile of the Project, the Project effects would be permanent but with limited effect. The Project would not result in long-term cumulative effects.

3.0 ALTERNATIVES

In accordance with NEPA and Commission policy, we evaluated alternatives to the Project to determine whether they would be reasonable and environmentally preferable to the proposed action. These alternatives included the no action alternative, system alternatives, and pipeline route alternatives and variations[18]. The evaluation criteria used for developing and reviewing alternatives were:

- technical and economic feasibility and practicality;
- significant environmental advantage over the proposed action; and
- ability to meet the Project's stated objective.

Information used to evaluate alternatives to the Project included comments from the public and regulatory agencies, data and analyses provided by Columbia in its application and supplemental filings, publicly available resource information, and analyses prepared for similar projects. We note that Columbia's proposed pipelines would be collocated primarily with existing pipeline and other utility rights-of-way.

Based on our review of maps, reports, site visits, and input from agencies and stakeholders, we requested during the Pre-filing Process that Columbia consider numerous route alternatives and variations. Columbia's application incorporated several of these alternatives and variations, which were analyzed in Section 2 as segments of the proposed route.

For example, Columbia refined the Line 10345 Loop during pre-filing by adopting an Oldmans Creek Route Variation, including an extended HDD, based on input from stakeholders in the area of Oldmans Creek Road. This variation minimizes effects to agricultural fields, residences, and protected wildlife. Columbia also adopted the Swedesboro Station Approach Variation in order to avoid effects to a residential septic system.

Columbia revised its proposed Line 1278 Loop in response to the FERC staff input and stakeholder concerns received during the pre-filing review. Modifications incorporated into the proposed route affect fewer residences, cross fewer parcels of land, and have fewer impacts on the environment. Columbia proposes to use a trenchless direct bore technology to avoid effects to forested wetland and to cross Beaver Creek. During the scoping period for the Project, Columbia learned of a planned development of a parcel that the Line 1278 Loop would cross south of Highway 30 in Caln Township. The landowner of the parcel located at the intersection of Waterplan Way and Parkside Drive had an approved land development plan that included construction of a headquarters building for a software company. Columbia worked with the property owner, land developer, and Caln Township and revised its route to avoid the parcel.

Columbia has also adopted a number of minor adjustments along the Line 1278 Loop during the Pre-filing Process. These would avoid anchor cables for a radio tower (MPs 0.04 to 0.07), avoid a leach field (MPs 0.52 to 0.65), and avoid unfavorable geotechnical conditions near the end of an HDD (MPs 1.5 to 2.4). Minor modifications would also provide additional ATWS

[18] In evaluating alternatives for Columbia's proposed pipelines we reviewed both route alternatives and route variations. Route alternatives generally follow a different alignment for a long segment of the proposed route. Route variations differ from route alternatives in that they are generally short deviations identified to avoid or reduce impacts on specific, localized resources that may include residences, site-specific terrain conditions, wetlands, or specific landowner concerns.

for pipe stringing for the Hunters Ridge HDD (MPs 2.77 to 3.08). In addition, Columbia would use an ATWS on the east side of the existing Lines 1278 and 1896 at MPs 3.10 to 3.50 to avoid construction activity on the embankment along the road into the back side of Shamona Creek Elementary School. Columbia modified the location of the HDD ATWS on the south side of the Brandywine Creek HDD (MPs 4.10 to 5.10) and would relocate an access road to the HDD site from Creek Road. At a landowner's request, Columbia revised the MLV for the Line 1278 Loop from the north to the south side of the entrance for the school bus parking lot near MP 7.1. Between MPs 7.7 to 8.3, Columbia would construct two separate segments of the Line 1278 Loop using the Direct Pipe Method. Minor adjustments to the ATWS are proposed to accommodate this method, including adding ATWS at the northern and southern ends of the overall section. An additional access turnoff (AR-PA-CH-02A) is proposed near the VFW facility at the southern end. We have determined that no new sensitive resources would be affected by these minor modifications, which are now incorporated into the proposed Project design.

3.1 No Action Alternative

If the Commission were to deny Columbia's application, the Project would not be built and the environmental effects described throughout this EA would not occur. Under this alternative, Columbia would not be able to provide natural gas transmission service to meet increased market demand. Other pipeline systems in the Project area do not have the ability to provide the necessary transportation capacity without constructing new facilities, which could result in similar or greater environmental effects. Additionally, we are not aware of any alternative energy projects, such as solar, wind, or energy efficiency projects, that would meet Columbia's stated objective. Therefore, we have determined that implementing the No Action Alternative would not meet the Project's stated objective and is not a reasonable alternative.

3.2 System Alternatives

System alternatives to the proposed action would make use of existing, modified, or proposed pipeline systems to meet the stated objectives of the Project. A reasonable system alternative would make it unnecessary to construct all or part of the Project. No reasonable system alternatives were identified that would make it unnecessary to construct the whole Project.

3.2.1 System Alternatives to the Line 10345 Loop

We evaluated the use (and modification) of the existing Line 10345 as a system alternative to the Project. With the exception of a 7.4-mile section on the east side of the Delaware River that consists of a 16-inch-diameter pipe, the Line 10345 consists of a 20-inch-diameter pipeline. According to Columbia, the 16-inch-diameter section is currently a bottleneck for natural gas transport and would need to be modified in order to meet the Project's purpose. Possible system alternatives include (1) a new compressor station at the beginning of the 16-inch section; or (2) replacement of the 16-inch-diameter pipe with a larger diameter pipe.

According to Columbia, a new compressor station would need to be within about 3.8 miles of the west side of the Delaware River to meet system requirements. Similarly, a compressor station on the east side of the river would need to be within about 0.5 mile of the river. If the compressor station were to be located on the west side of the river, it would cause gas velocities in the 16-inch section of Line 10345 to exceed acceptable levels. A new

compressor station within 0.5 mile of the east side of the river would not meet current national standards for ambient air quality (non-attainment) for multiple criteria air pollutants. Therefore, we have determined that constructing a new compressor station would not provide a significant environmental advantage over the proposed Line 10345 Loop.

Replacing the existing Line 10345 with a larger diameter pipeline would be constructible, but according to Columbia would require a delivery outage for up to five months during construction that would result in a significant effect on customers. Columbia's Line 10345 currently serves South Jersey Gas at two delivery points (Swedesboro and West Deptford). The firm transportation commitment at these delivery points is 69.8 thousand dekatherms per day (MDth/d); however, Columbia informed us that the current 90-day average is 85.5 MDth/d. None of this transportation, which supplies power generation, manufacturing, and natural gas distribution markets, would be possible for the several months that would be required to replace the existing Line 10345. Additionally, replacement would require the disturbance of a congested easement (Center Square Road) resulting in environmental impacts greater than the proposed action. A lift-and-lay replacement would require at least a 100-foot-wide right-of-way for the entire 7.4 miles of pipeline to be replaced. The pipeline right-of-way would require about 90 acres, not including acreage for ATWS. The required right-of-way for the 9.6-mile loop would require 174.93 acres during construction and 46.89 acres during operation, but construction would not require any delivery outages. Based on this information, we have determined the potential outages required to replace the existing pipeline and the congested workspace make a lift-and-lay option with a larger diameter pipe unfeasible.

3.2.2 System Alternatives to the Line 1278 Loop

We evaluated the use (and modification) of the existing Line 1278 as a system alternative to the Project. The Line 1278 consists of a 14-inch-diameter pipeline between the Eagle and Downingtown Compressor Stations. To transport additional volumes of natural gas between these two compressor stations, we assessed two alternatives: (1) replacing this section of Line 1278 with a 30-inch-diameter pipe; and (2) adding compression at one or more compressor stations.

The use of additional compression to accommodate the required volume of natural gas to be transported by the Project is limited by the MAOP of the existing pipeline. The current design requires both stations to discharge at the pipeline MAOP. Additional compression would result in the exceedance of MAOPs. Therefore, we have determined that this alternative is not technically feasible.

Replacing the existing Line 1278 with a larger diameter pipeline would be constructible, but according to Columbia would require an outage for up to five months during construction, resulting in a significant effect to customers. Replacement would require a 100-foot-wide right-of-way for the entire 8.9 miles of pipeline to be replaced, about 108 acres, not including additional acreage for ATWS. In comparison, the Line 1278 Loop would require 158.51 acres during construction and 40.59 acres during operation but would not result in outages. Columbia has indicated that Line 1278 serves not only firm transportation markets north of the Eagle Compressor Station, but also ensures reliability of firm transportation in the immediate Project area if compression at the Downingtown Compressor Station is offline. Current transportation on Line 1278 ranges up to 206 MDth/d, with a current 90-day average of 15.5 MDth/d. Supplies for power generation, manufacturing, and natural gas distribution markets would not be possible

for the several months required to replace the existing Line 1278. Additionally, replacement would require land disturbance along the entire route, resulting in environmental impacts similar to the proposed action. Therefore, we have determined that the potential outages required to replace the existing pipeline and the congested workspace make a lift-and-lay option with a larger diameter pipe unfeasible.

3.2.3 System Alternatives to Compressor Station Upgrades/Modifications

We evaluated additional looping of Line 1278 as an alternative to the proposed compression at the Milford Compressor Station. Columbia determined, using natural gas hydraulic modeling software (SynerGEE), that a pipeline loop could be constructed in place of the incremental horsepower at the Milford Compressor Station. Pipeline loops considered include:

- 31.8 miles of 36-inch-diameter loop;
- 33.1 miles of 30-inch-diameter loop; or
- 42.5 miles of 20-inch-diameter loop.

The pipeline loop lengths would begin at the Milford Compressor Station and extend southward.

Similarly, we evaluated additional looping as an alternative to the proposed compression at the Easton Compressor Station. Columbia determined using SynerGEE that a pipeline loop could be constructed in place of the incremental horsepower at the Easton Compressor Station. Pipeline loops considered include:

- 49.3 miles of 36-inch-diameter loop;
- 49.7 miles of 30-inch-diameter loop; or
- 60.8 miles of 20-inch-diameter loop.

Based on our review and independent analysis of these looping alternatives, we have determined that the environmental impacts of constructing any of the pipeline loops noted above would be significantly greater than the environmental impacts of adding incremental horsepower to an existing compressor station.

3.3 Route Alternatives

3.3.1 Line 10345 Loop

Based on our review of the Project and comments submitted by the public, we identified and evaluated two alternatives to the Project to minimize residential impacts: the Center Square Road Route Alternative and High Hill Road Route Alternative (Figure 3.3-1). Table 3.3-1 presents a comparison of these two alternatives with the proposed route.

The Center Square Road Route Alternative would follow Center Square Road due southeast to the west side of the New Jersey Turnpike where it would turn due northward, parallel to the turnpike, to its terminus at the Swedesboro Station. The Center Square Route Alternative would extend for 7.4 miles with 4.8 miles adjacent to existing Columbia right-of-way and 1.6 miles adjacent to other utility or road rights-of-way. The construction right-of-way disturbance would be 73 acres, while the permanent right-of-way would require 24 acres.

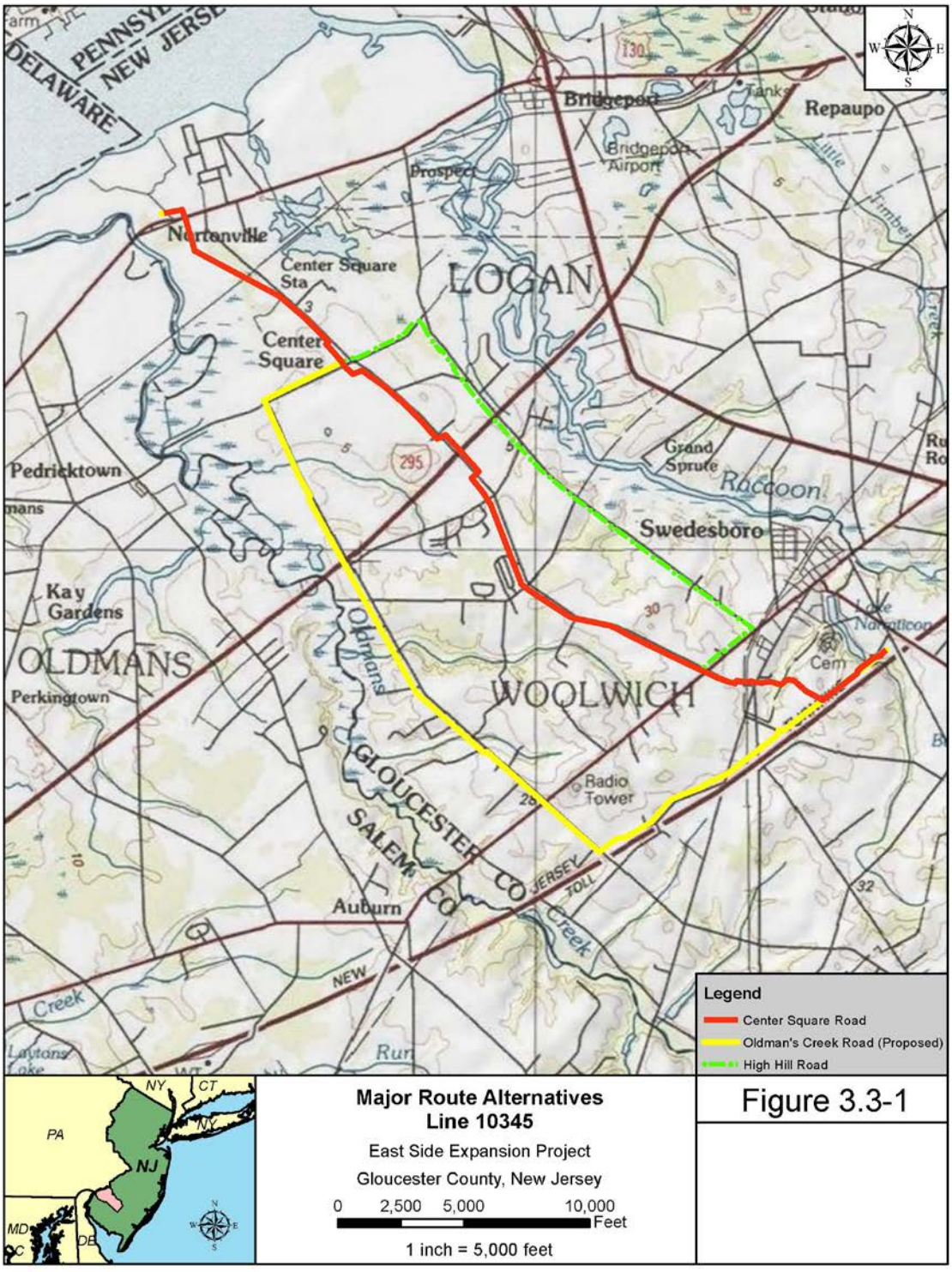

Figure 3.3-1 Major Route Alternatives Line 10345

TABLE 3.3-1

Comparison of Line 10345 Loop Major Route Alternatives (MPs 0.0 to 9.6)

Factor	Oldmans Creek Road (Proposed)	Center Square Road	High Hill Road	Information Sources [a/]
Length (miles)	9.6	7.4	8.2	B
Length adjacent to existing Columbia ROW (miles)	1.8	4.8	2.4	B
Length adjacent to other utility or road ROWs (miles)	5.0	1.6	4.9	B
Construction ROW (acres) [b/]	96	73	79	A, B
Permanent ROW (acres) [b/]	40	24	40	A, B
Construction impact on forest/woodland (acres) [b/]	14	11	19	A, B, E
Operation impact on forest/woodland (acres) [b/]	7	4	10	A, B, E
Construction impact on recreational land (acres) [b/]	0	0	0	A, B, E
Operation impact on recreational land (acres) [b/]	0	0	0	A, B, E
Construction impact on wetlands (acres) [b/]	3.3	4.9	5.9	A, B, C
Operation impact on wetlands (acres) [b/]	1.6	2.9	4.0	A, B, C
Construction impact on forested wetlands (acres) [b/]	1.2	1.7	2.7	A, B, C
Operation impact on forested wetlands (acres) [b/]	0.8	0.9	2.0	A, B, C
Waterbody crossings (no.)	8	2	2	A, B
Previously recorded cultural resources within footprint (no.) [c/]	12	10	11	A, F
Parcels crossed (no.)	62	60	88	B, G
Residences within 50 feet of construction ROW (no.)	7	36	20	A, E
Apartments within 50 feet of construction	0	0	4	A, E
Commercial buildings within 50 feet of construction ROW (no.)	2	8	21	A, E
Road crossings (no.)	19	18	19	A, E
Opinion of Construction Costs (Millions)	41.8	36.8	44.8	

[a/] Sources of information: A = alignment sheets/engineered plans; B = GIS data; C = NWI maps; D = field survey; E = aerial photograph interpretation; F = consultation with regulatory authorities; G = tax maps.

[b/] Based on engineered footprint. ROW= right-of way

[c/] Numbers presented for cultural resources sites are data used for comparison information only. Numbers presented for cultural resources sites are data used for comparison information only. Sites have not been confirmed and may not be affected. No representation of eligibility for the NRHP is included.

The High Hill Road Route Alternative would follow Center Square Road to its intersection with Pedricktown Road, where it would turn northwest and parallel Pedricktown Road about 0.7 mile to its intersection with High Hill Road. The High Hill Road Route Alternative would then parallel High Hill Road in a southeasterly direction for about 3.4 miles to its intersection with Auburn Avenue, where it would turn southwest, parallel to Auburn Avenue for 0.5 mile before rejoining the Center Square Road route. The High Hill Road Route Alternative would be largely on the northeastern edge of the developed land in this area, also crossing forested land, agricultural land, and wetlands. The alternative would extend for 8.2 miles with 2.4 miles adjacent to existing Columbia right-of-way and 4.9 miles adjacent to other utility or road right-of-way.

The proposed route would affect fewer wetlands during construction (3.3 acres) and operation (1.6 acres) than both the Center Square Road Route (4.9 acres and 2.9 acres) and the High Hill Road Route (5.9 acres and 4.0 acres). In addition, there are 7 residences within 50 feet of construction work space along the proposed route when compared to the Center Square Road Route (36) and the High Hill Road Route (20). The proposed route would also impact 2 commercial buildings within 50 feet of construction work spaces when compared to the Center Square Road Route (8) and the High Hill Road Route (21), resulting in less impacts on businesses in the area. Though the proposed route is longer and would affect more land than the Center Square Road Route and High Hill Road Route, it would have significantly less impact on residences and businesses in the area. In addition, the proposed route would have fewer wetland impacts than both the Center Square Road Route and the High Hill Road Route. Therefore, we have determined that neither of the alternatives would result in a significant environmental advantage over the proposed action.

3.3.2 Line 1278 Loop

Based on our review of the Project and comments submitted by the public, we identified and evaluated two alternatives to the Project to minimize residential impacts: the East and West Alternatives (Figure 3.3-2). Table 3.3-2 presents comparison information for the proposed route and the East and West Alternatives.

The East Alternative would depart from the Eagle Compressor Station and would head east across mixed-use land about 0.9 mile to Chester Springs Road. The East Alternative would then turn nearly due south for about 1.5 miles and intersect with Lionville Station Road. The East Alternative then would follow the east side of Lionville Station Road before crossing Interstate Highway 76 to parallel Gordon Drive to its intersection with East Uwchlan Avenue. At this intersection, the East Alternative would turn southwest and parallel East Uwchlan Avenue, then West Uwchlan Avenue for about 3.3 miles. At the intersection of West Uwchlan Avenue and Winding Way, the East Alternative would turn due south for about 2.4 miles before turning back to the west for 2.4 miles to its terminus at the Downingtown Compressor Station.

The West Alternative would depart from the Eagle Compressor Station and head generally west paralleling the east-west road north of the Fellowship fields and a water treatment facility. The West Alternative would cross Pottstown Pike and traverse an open field until intersecting the northern extent of Milford Road. The West Alternative would parallel Milford Road in a southwesterly direction, crossing the Pennsylvania Turnpike, and then it would turn northwest to parallel the turnpike until its intersection with Styer Road. At Styer Road, the West Alternative would parallel the road southwest until turning south along the west side of Marsh Creek Reservoir. The West Alternative would continue to traverse southward on the west side of the reservoir until reaching Highway 282. The West Alternative then would turn south paralleling Highway 282 for about 2.9 miles until reaching Highway 30, where it would turn west along the north side of Highway 30 to Rock Raymond Road. At Rock Raymond Road, the West Alternative would cross Highway 30 to the south, then cross an open field to Lloyd Avenue. The West Alternative would then follow Lloyd Avenue and Poorhouse Road to its terminus at the Downingtown Compressor Station.

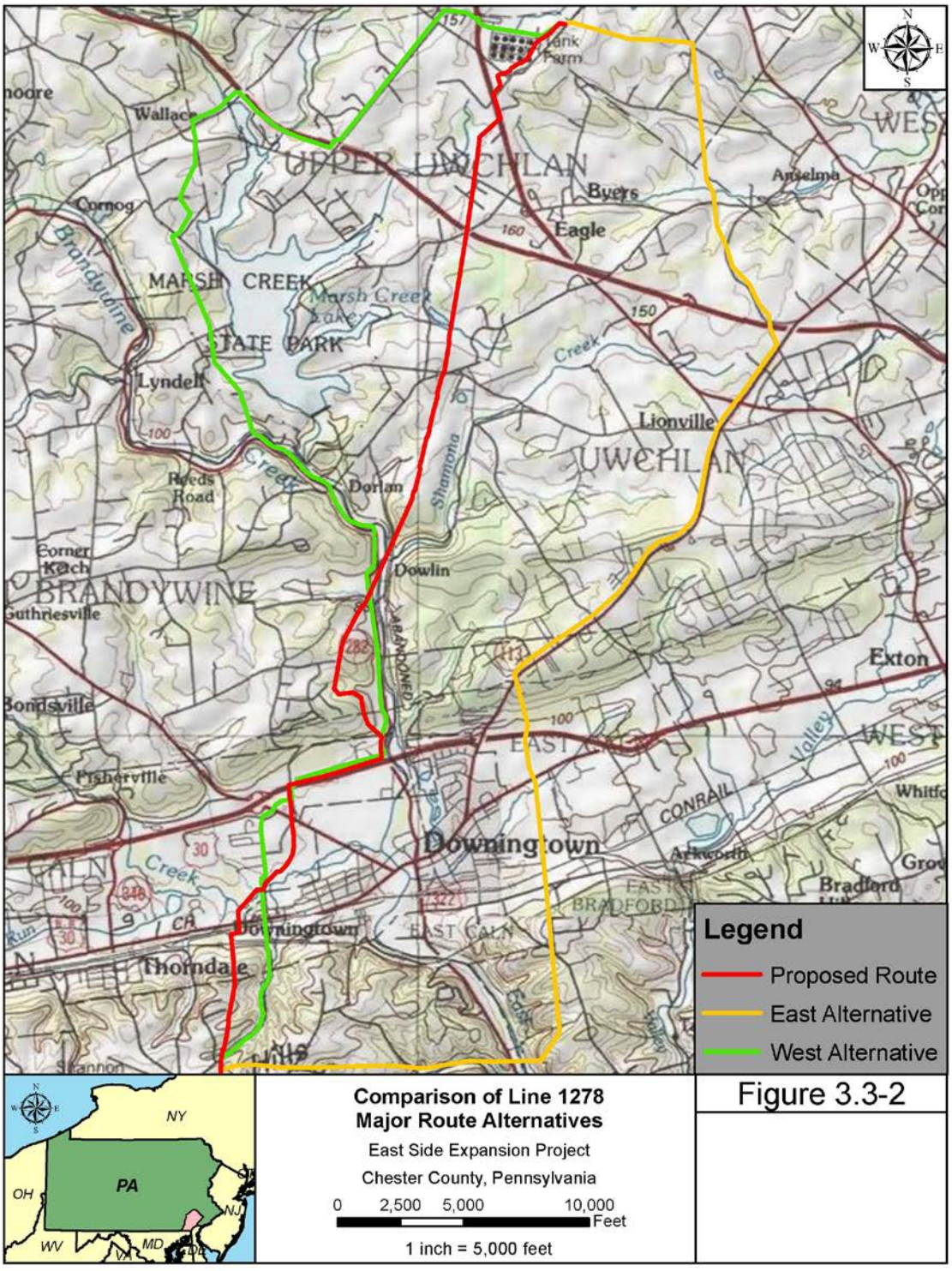

Figure 3.3-2 Comparison of Line 1278 Major Route Alternatives

TABLE 3.3-2

Comparison of Line 1278 Loop Major Route Alternatives (MPs 0.0 to 9.5)

Factor	Proposed Route	East Alternative	West Alternative	Information Sources [a/]
Length (miles)	9.5	12.1	12.4	B
Length adjacent to existing Columbia ROW (miles)	7.26	0.0	0.0	B
Length adjacent to other utility or road ROWs (miles)	0.8	4.3	8.6	B
Construction ROW (acres) [b/]	116	147	150	A, B
Permanent ROW (acres) [b/]	58	73	75	A, B
Construction impact on forest/woodland (acres) [b/]	23.43	46	53	A, B, E
Operation impact on forest/woodland (acres) [b/]	8.22	23	28	A, B, E
Construction impact on recreational land (acres) [b/]	3	0	0	A, B, E
Operation impact on recreational land (acres) [b/]	2	0	0	A, B, E
Construction impact on wetlands (acres) [b/]	2.5	1.6	1.8	A, B, C
Operation impact on wetlands (acres) [b/]	0.92	0.8	1.0	A, B, C
Construction impact on forested wetlands (acres) [b/]	2.7	1.1	0.5	A, B, C
Operation impact on forested wetlands (acres) [b/]	1.0	0.6	0.2	A, B, C
Waterbody crossings (no.)	24	0	4	A, B
Previously recorded cultural resources within footprint (no.) [c/]	6	15	8	A, F
Parcels crossed (no.)	114	193	95	B, G
Residential Land Impact (acres)	13.49	28.1	21.5	A, E
Residences within 50 feet of construction ROW (no.)	54	107	66	B, E
Commercial Land Impact (acres)	14.8	36.2	25.7	A, E
Commercial structures within 50 feet of construction ROW (no.)	21	58	11	
Road crossings (no.)	36	41	26	A, E
Opinion of Construction Costs (Millions)	50.8	74.3	76.2	

[a/] Sources of information: A = alignment sheets/engineered plans; B = GIS data; C = NWI maps; D = field survey; E = aerial photograph interpretation; F = consultation with regulatory authorities; G = tax maps.

[b/] Based on non-engineered footprint. Assumed construction ROW of 100 feet and permanent ROW of 50 feet. This applies also to the original route.

[c/] Numbers presented for cultural resources sites are data used for comparison information only. Sites have not been confirmed and may not be affected. No representation of eligibility for the NRHP is included.

The proposed route would extend for 9.5 miles, while the East Alternative would extend for 12.1 miles and the West Alternative would extend for 12.4 miles, resulting in less land disturbance during construction and operation. The proposed route would require 116 acres for construction and 58 acres would remain as permanent right-of-way. The East Alternative would require 147 acres for construction and 73 acres would remain as permanent right-of-way. The West Alternative would require 150 acres for construction and 75 acres would remain as permanent right-of-way. Effects to forested areas would be 23.4 acres for the proposed route compared with 46 acres for East Alternative and 53 acres for West Alternative. The proposed route would be within 50 feet of fewer residences (54) than the East Alternative (107) and West Alternative (66). Based on the effects of constructing the East Alternative or the West Alternative when compared with the proposed route as identified in table 3.3-2, we have

determined that neither of these alternatives would result in a significant environmental advantage over the proposed action.

3.4 Route Variations

We evaluated several route variations to further minimize impacts on site-specific resources along the proposed route. These were considered in areas where the pipeline deviated moderately from the proposed route and where site-specific conditions required minor modifications to the proposed route or construction method.

3.4.1 Line 10345 Loop

Wetland W107NJ

This route variation would avoid effects to forested wetland at MP 9.46, but it would affect 1.34 acres of forest while the corresponding segment of the proposed route would affect only 1.14 acres of forest. Additionally, the variation would require construction on state land within the right-of-way of the New Jersey Turnpike. Based on these factors, we have determined that this route variation does not provide a significant environmental advantage over the proposed route.

3.4.2 Line 1278 Loop

Hunters Ridge Route Variation

In response to comments from landowners and other stakeholders, we evaluated a route variation on the Line 1278 Loop between MPs 2.2 and 3.0 (Modified Mid-Atlantic) to minimize or avoid impacts on the subdivision.

The Modified Mid-Atlantic Route Variation would depart from the Line 1278 route at about MP 2.2 in a forested area south of the athletic fields at Hickory Park, traversing in an east-southeast direction for less than 0.2 mile before joining the existing Sunoco Logistics pipeline, which it would parallel southeastward for about 0.3 mile to Stockton Drive. The Modified Mid-Atlantic route would then parallel Stockton Drive generally southward for 0.3 mile before turning southwest to the wastewater irrigation field on the northwest side of Township Line Road and then skirt the edge of the irrigation field land to its intersection with the existing Line 1278.

In comparison to the corresponding segment of the proposed route, the Modified Mid-Atlantic route would require more land (15 acres as compared to 3 acres for the proposed route) and would result in greater effects to forested area (6.3 acres compared with 0.01 acre for the proposed route). The Modified Mid-Atlantic route would also result in permanent effects on the wastewater irrigation field. Based on these factors, we have determined that this route variation does not provide a significant environmental advantage over the corresponding segment of the proposed route.

Welsh Ayres Variation (HDD) and Deer Drive Variation (HDD)

Between about MPs 3.4 and 4.0, the Line 1278 Loop in Pennsylvania would cross moderately dense residential development between Noble Drive to the north and Welsh Ayres Way to the south. Similarly, between about MPs 8.3 and 8.9, Lines 1278 and 1896 cross moderately dense commercial and residential development in the vicinity of Highway 30B, Deer

Drive, and Katie Lane and the proposed route would follow the Line 1896 right-of-way through this area to avoid effects to residential properties.

In an attempt to minimize effects to the residences in these two areas, we evaluated use of HDDs. Columbia has stated that HDDs would require about three months to complete, whereas conventional open-cut construction would most likely be completed in one month. During the time required to complete the HDDs, local residents in close proximity would experience many large construction-related vehicles hauling equipment, water, and drilling mud on the streets of the residential development. While Columbia would take appropriate steps to minimize noise and other nuisance factors for the duration of the HDDs, the affected residences nearest the drill entry and exit locations would experience more than two additional months of disturbance when compared to conventional construction techniques. By contrast, conventional construction would be largely confined to Columbia's existing right-of-way through the residential development. Columbia is currently conducting detailed civil surveys in the areas of proposed conventional construction to determine locations where the construction workspaces may be further reduced, allowing trees and other mature landscaping to be left in place. The cost of HDD construction would be significantly greater than that of conventional construction, and the duration of disruptions to local residents would be more than doubled. Based on these factors, we have determined that these alternative construction methods do not provide a significant environmental advantage over the proposed route.

Blakely Road-Rock Raymond Route Variations

In response to comments received from landowners, we evaluated two route variations between about MPs 5.5 and 7.2, the Creek Road Alternative and Alternative 5C, to avoid or minimize affects in this area.

The Creek Road Alternative would deviate from the proposed route at about MP 4.8 near the intersection of Creek Road and Dowlin Forge Road and continue southward along Creek Road until rejoining the proposed route at about MP 6.2.

Alternative 5C would depart from the existing Line 1278 in a wooded area behind the residences at the end of Helm Way, progressing southeast through a wooded area about 0.2 mile to the back side of the residential lots at the end of Blakely Road, then turning south for approximately 0.2 mile to land owned by the Downing Ridge Homeowners Association, turning westward to pass behind the Downing Ridge and Downing Forge residential subdivisions for about 0.6 mile to rejoin the existing Line 1278 right-of-way.

Based on our review of these alternatives, we have determined that the Creek Road Variation as proposed would not be feasible due to construction requirements for the proposed Brandywine Creek HDD. A modified version of this variation would transfer impacts from one residence to another and therefore would not provide a significant environmental advantage. Therefore, we do not consider this route further. A comparison of the proposed route and the 5C route variation is provided in table 3.4.1.

Route variation 5C would be shorter by 0.19 acre than the corresponding segment of the Project route, but would affect 4.2 acres more forested land during construction and 1.6 acres more forest land would remain within the permanent right-of-way. Route variation 5C would be located within 25 feet of nine residences compared with two for the Project and it would be

within 50 feet of 28 residences, while the corresponding segment of the proposed route would be within 50 feet of two residences.

TABLE 3.4-1

Comparison of Blakely Road-Rock Raymond Route Variation (MPs 5.5 – 7.2)

Factor	Proposed Route	Route Variation 5C	Information Sources [a/]
Length (miles)	1.68	1.49	B
Length adjacent to existing Columbia right-of-way (miles)	0	0.18	B
Length adjacent to other utility or road ROWs	0	0.11	B
Construction ROW (acres) [b/]	18.2	18.1	A, B
Permanent ROW (acres)	10.1	8.1	A, B
Construction impact on forest/woodland (acres) [b/]	9.3	13.5	A, B, E
Operation impact on forest/woodland (acres) [b/]	4.9	6.5	A, B, E
Construction impact on recreational land (acres) [b/]	2.5	0	A, B, E
Operation impact on recreational land (acres) [b/]	1.3	0	A, B, E
Construction impact on wetlands (acres) [b/]	0.53	0.53	A, B, C
Operation impact on wetlands (acres) [b/]	0.38	0.02	A, B, C
Construction impact on forested wetlands (acres) [b/]	0.49	0	A, B, C
Operation impact on forested wetlands (acres) [b/]	0.35	0	A, B, C
Waterbody crossings (no.) – Open Cut/HDD	5/1	2/0	A, B
Previously recorded cultural resources within footprint (no.) [c/]	2	0	A, F
Parcels crossed (no.)	14	11	A, B, G
Residences within 50/25 feet of construction ROW (no.)	2/2	28/9	A, E
Commercial buildings within 50/25 feet of construction ROW (no.)	1/1	0/0	A, E
Road crossings (no.)	5	3	A, E

[a/] Sources of information: A= alignment sheets/engineered plans; B = GIS data; C= NWI maps; D = field survey; E = aerial photograph interpretation; F = consultation with regulatory authorities; G = tax maps.

[b/] Based on engineered footprint.

[c/] Numbers presented for cultural resources sites are data used for comparison information only. Sites have not been confirmed and may not be affected. No representation of eligibility for the NRHP is included.

Based on these factors, we have determined that this variation does not provide a significant environmental advantage over the proposed route.

McLaughlin Variation

We evaluated two route variations near MP 7.5 based on comments expressing concerns about the Line 1278 Loop's potential effects on future development. We evaluated moving the pipeline to the east side of Rock Raymond Road onto property owned by the Downingtown School District and to the west side of the property away from planned development. Based on our review of these route variations, we have determined that neither variation would result in significant environmental advantage when compared to the corresponding segment of the

proposed route. Also, the proposed route, adjacent to Rock Raymond Route is collocated with an existing road right-of-way and should not significantly impact future development.

Wetland W400PA Variation

To shorten the crossing of the forested wetland W400PA, located south of Highway 30 in Downingtown, Pennsylvania, we evaluated a route variation between MPs 6.4 and 7.0 that would cross the wetland at a narrower location. Although the variation would reduce wetland impact from 0.5 acre to 0.2 acre, it would increase total land disturbance by 23 percent from 5.93 acres to 7.32 acres and would increase the effect to recreational land (baseball and softball fields behind the Downingtown middle and high schools) by 52 percent from 2.34 acres to 3.55 acres. Based on these factors, we have determined that this variation does not provide a significant environmental advantage over the proposed route at this wetland crossing.

Wetland W214PA Variations

To avoid crossing a forested wetland (W214PA) located south of Ayerwood Drive in Downingtown, Pennsylvania, we evaluated two route variations between MPs 8.0 and 8.4. These are Variation 1 and Variation 2. Table 3.4-2 presents comparative information about the variations.

TABLE 3.4-2

Comparison of Wetland 4214PA Variations (MPs 8.0 – 8.4)

Factor	Proposed Route	Variation 1	Variation 2	Information Sources [a/]
Length (miles)	0.39	0.40	0.46	B
Length adjacent to existing Columbia right-of-way (miles)	0	0.06	0	B
Length adjacent to other utility or road ROWs	0	0	0.44	B
Construction ROW (acres) [b/]	4.19	3.74	2.96	A, B
Permanent ROW (acres)	2.26	2.00	2.21	A, B
Construction impact on forest/woodland (acres) [b/]	0.83	0.09	0	A, B, E
Operation impact on forest/woodland (acres) [b/]	0.45	0.05	0	A, B, E
Construction impact on recreation land (acres) [b/]	0.37	0.37	0.56	A, B, E
Operation impact on recreation land (acres) [b/]	0.13	0.13	0.29	A, B, E
Construction impact on wetlands (acres) [b/]	0.92	0	0	A, B, C
Operation impact on wetlands (acres) [b/]	0.56	0	0	A, B, C
Construction impact on forested wetlands (acres) [b/]	0	0	0	A, B, C
Operation impact on forested wetlands (acres) [b/]	0	0	0	A, B, C
Waterbody crossings (no.) – Open Cut/HDD	2/0	0/0	0/0	A, B
Parcels crossed (no.)	9	12	12	A, B, G
Residences within 50/25 feet of construction ROW (no.)	1/1	4/2	3/3	A, E
Commercial buildings within 50/25 feet of construction ROW (no.)	1/1	1/1	5/1	A, E
Road crossings (no.)	1	1	3	A, E

[a/] Sources of information: A= alignment sheets/engineered plans; B = GIS data; C= NWI maps; D = field survey; E = aerial photograph interpretation; F = consultation with regulatory authorities; G = tax maps.

[b/] Based on engineered footprint.

Variation 1 would skirt the wetland just outside the southeastern edge, avoiding all wetland effects. Variation 1 would be nearly the same length as the corresponding segment of

the proposed route, but would disturb less land (3.74 acres compared with 4.19 acres disturbed by the proposed route). Effects to forestland would decrease from 0.83 acre to 0.09 acre. However, Variation 1 would cross 12 parcels while the corresponding segment of the proposed route would cross 9 parcels, and would be located within 50 feet of four residences, including two within 25 feet while the proposed corresponding segment would be within 50 feet of one residence and within 25 feet of same residence.

Variation 2 would avoid the wetland by turning south along the east side of Lloyd Avenue, crossing the property of the Grace Church and the side or front yards of several homes along Lloyd Avenue before reaching the parking lot of the CVS store at the corner of Lloyd Avenue and Lincoln Highway. The variation would then turn east, crossing Lloyd Avenue and passing through the parking lots of a strip of businesses on Lincoln Highway before rejoining the proposed route in front of the VFW. Variation 2 would be longer than the corresponding segment of the proposed route by 0.07 acre, but would disturb less land (2.96 acres compared to 4.19 acres that would be affected by the proposed route), due to the requirement to reduce the construction workspace in the yards of the houses along Lloyd Avenue. Variation 2 would require construction within 25 feet of three residences and within 50 feet of five commercial buildings (compared to the proposed route that would be within 50 feet of one residence and within 25 feet of same residence). Variation 2 would result in increased disruption to residents and businesses along Lloyd Avenue and Lincoln Highway.

Our comparative analysis indicates that Variations 1 and 2 do not provide significant environmental advantage over the corresponding segment of the proposed route. The proposed route would result in less disruption to local residences and stakeholders.

4.0 CONCLUSIONS AND RECOMMENDATIONS

We conclude that approval of the East Side Expansion Project would not constitute a major federal action significantly affecting the quality of the human environment based on the environmental analysis presented herein, Columbia's application and supplements, and implementation of Columbia's proposed and our recommended mitigation measures. We recommend that the Commission Order contain a finding of no significant impact and that the following mitigation measures be included as conditions of any Certificate the Commission may issue.

1. 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 has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Project. This authority shall allow:

   a. the modification of conditions of the Order; and

   b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions, as well as the avoidance or mitigation of adverse environmental impacts resulting from Project construction, operation, and activities associated with abandonment.

3. **Prior to any construction or abandonment activities,** Columbia shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel would be informed of the EIs' authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EA, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction,** 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 or sheets.

Columbia's exercise of eminent domain authority granted under the 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 the NGA section 7(h) does not authorize it to increase the size of its natural gas pipelines or aboveground facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. 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 *Commission's Upland Erosion Control, Revegetation and Maintenance Plan*, and/or minor field realignments per landowner needs and requirements that do not affect other landowners or sensitive environmental areas such as wetlands.

   Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;

   b. implementation of endangered, threatened, or special concern species mitigation measures;

   c. recommendations by state regulatory authorities; and

   d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the Certificate and before construction or abandonment 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);

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:

(1) the completion of all required surveys and reports;

(2) the environmental compliance training of onsite personnel;

(3) the start of construction and/or abandonment; and

(4) 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 **biweekly basis until all abandonment, construction, and restoration activities are complete.** On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on Columbia's efforts to obtain the necessary federal authorizations;

b. the construction status of the Project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;

c. a listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions or permit requirements imposed by other federal, state, or local agencies);

d. a description of corrective actions implemented in response to all instances of noncompliance, and their cost;

e. the effectiveness of all corrective actions implemented;

f. a description of any landowner/resident complaints that may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and

g. copies of any correspondence received by Columbia from other federal, state, or local permitting agencies concerning instances of noncompliance, and Columbia's response.

9. **Prior to receiving written authorization from the Director of OEP to commence construction or abandonment of any Project facilities,** Columbia shall 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 abandoned, constructed, and/or installed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or

    b. identifying which of the certificate conditions 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 construction of Line 1278 Loop**, Columbia shall file with the Secretary for review and written approval by the Director of OEP, the geotechnical report for MPs 7.8 to 8.1, and any resulting plan to account for potential ground subsidence at this location. (*EA section 2.1.1*)

13. **Prior to construction**, Columbia shall file with the Secretary a revised ECS for review and written approval by the Director of OEP that includes the following:

    a. a statement that burial of construction debris, including large rocks and stumps, within the construction work area is an unacceptable method of disposal;

b. a statement that final grading will be completed within 20 calendar days of backfilling (10 days in residential areas), weather and soil conditions permitting;

c. a definition of vegetation success in agricultural areas that is consistent with the Commissions 2013 Plan (revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise);

d. a statement that mowing and clearing of riparian areas is prohibited between April 15-August 1 of any year; and

e. a statement clarifying that safety fencing shall remain in place for all residences within 50 feet of the construction work areas throughout all active phases of construction. (*EA section 2.1.2 and 2.5.1*)

14. **Prior to construction of Line 1278 Loop**, Columbia shall file with the Secretary for review and written approval by the Director of OEP a site-specific plan for crossings of Beaver Creek that identifies the proposed trenchless construction techniques. (*EA section 2.2.1*)

15. **Prior to construction of Line 10345 Loop and Line 1278 Loop**, Columbia shall file with the Secretary a revised table identifying the location by milepost of all private wells within 150 feet of pipeline construction or blasting activities. Columbia shall conduct, with the well owner's permission, pre- and post-construction monitoring of well yield and water quality for these wells. **Within 30 days of placing the facilities in service**, Columbia shall file a report with the Secretary discussing whether any complaints were received concerning well yield or water quality and how each was resolved. (*EA section 2.2.2*)

16. **Prior to construction of Line 10345 Loop**, Columbia shall file with the Secretary for review and written approval by the Director of OEP the sensitive joint-vetch impact avoidance plan along with any proposed mitigation. Columbia shall also provide FWS comments on the plan. (*EA section 2.4.1*)

17. Columbia shall not begin construction activities **until**:

    a. the FERC staff receives comments from the FWS regarding the proposed action;

    b. the FERC staff completes any necessary consultation with the FWS; and

    c. Columbia has received written notification from the Director of OEP that construction or use of mitigation may begin. (*EA section 2.4.1*)

18. **Prior to construction of Loop 10345**, Columbia shall file with the Secretary the results of its coordination with NJNHP regarding state protected species and any measures Columbia will implement to avoid and/or minimize effects to state protected species. (*EA section 2.4.2*)

19. Columbia shall develop and implement an environmental complaint resolution procedure that remains active for at least two years following completion of construction of the Project. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project and restoration of the right-of-way. **Prior to construction**, Columbia shall mail the complaint procedures to each landowner whose property would be crossed by the Project, and file a copy with the Secretary.

a. In its letter to affected landowners, Columbia shall:

(1) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
(2) instruct the landowners that if they are not satisfied with the response, they should call Columbia's Hotline; the letter should indicate how soon to expect a response; and
(3) instruct the landowners that if they are still not satisfied with the response from Columbia's Hotline, they should contact the Commission's Dispute Resolution Division Helpline at 877-337-2237 or at ferc.adr@ferc.gov.

b. In addition, Columbia shall include in its biweekly status report a copy of a table that contains the following information for each problem/concern:

(1) the identity of the caller and date of the call;
(2) the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;
(3) a description of the problem/concern; and
(4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved. (*EA section 2.5.1*)

20. **Prior to construction**, Columbia shall file with the Secretary, for review and written approval by the Director of OEP, revised site-specific residential construction plans that state that safety fencing shall remain in place throughout all active phases of construction. (*EA section 2.5.1)*

21. **Prior to construction**, Columbia shall file with the Secretary evidence of landowner concurrence with Columbia's proposed site-specific residential construction plan for any residences located within 10 feet of the proposed construction workspace. (*EA section 2.5.1*)

22. **Prior to commencing service of the modified Milford Compressor Station**, Columbia shall file with the Secretary a visual screening plan for review and written approval of the Director of OEP. (*EA section 2.5.4*)

23. **Prior to construction of Line 10345 Loop**, Columbia shall file with the Secretary a NJDEP HPO-approved site avoidance plan for Site 28-GL-436 along with documentation of NJDEP HPO's approval.

24. Columbia shall **not begin** implementation of any treatment plans/measures, including archaeological data recovery, construction of facilities and/or use of staging, storage, or temporary work areas, and new or to-be-improved access roads **until:**

a. Columbia files with the Secretary cultural resources survey and evaluation reports, any necessary treatment plans, and the SHPOs' comments on the reports and plans;

b. the ACHP is afforded an opportunity to comment if historic properties would be adversely affected; and

c. the FERC staff reviews and the Director of the OEP approves all cultural resources reports and plans, and notifies Columbia in writing that treatment plans/mitigation measures may be implemented and/or construction may proceed.

All materials filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein

clearly labeled in bold lettering: **"CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE."** (*EA section 2.7.3*)

25. **Prior to construction**, Columbia shall file with the Secretary for review and written approval by the Director of OEP a Fugitive Dust Control Plan that specifies the precautions that Columbia would take to minimize fugitive dust emissions from construction activities including additional mitigation measures to control fugitive dust emissions of Total Suspended Particulates and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns. The plan shall clearly explain how Columbia would implement measures, such as:

    a. watering the construction workspace and access roads;

    b. providing measures to limit track-out onto the roads;

    c. identifying the speed limit that Columbia would enforce on unsurfaced roads;

    d. covering open-bodied haul trucks, as appropriate;

    e. clarifying that the EI has the authority to determine if/when water or a palliative needs to be used for dust control; and

    f. clarifying the individuals with the authority to stop work if the contractor does not comply with dust control measures. (*EA section 2.8.1*)

26. **Prior to construction**, Columbia should file with the Secretary for the review and written approval by the Director of OEP site-specific plans detailing the additional noise mitigation measures Columbia would use to make all reasonable efforts such that the noise levels attributable to the HDD activities do not exceed an increase of 10 dB above the existing noise levels at the NSAs near the HDD #2 entry and exit, HDD #4 entry, HDD #7 entry and exit, HDD #8 entry and exit, and HDD #10 exit sites. (*EA section 2.8.2*)

27. Columbia shall make all reasonable efforts to ensure its predicted noise levels from the modified Milford and Easton Compressor Stations are not exceeded at the nearby NSAs and file noise surveys showing this with the Secretary **no later than 60 days after placing the Milford and Easton Compressor Station in service**. If the noise attributable to the operation of the Milford and Easton Compressor Stations at full load exceeds an L_{dn} of 55 dBA at any nearby NSAs, Columbia shall file a report identifying what modifications it intends to make in order to meet the predicted level **within 1 year of the in-service date**. Columbia shall confirm compliance with this requirement by filing a second noise survey with the Secretary **no later than 60 days after it installs any additional noise controls**. (*EA section 2.8.2*)

28. **Prior to any abandonment activities at the Milford and Easton Compressor stations**, Columbia shall file the following information with the Secretary for review and written approval by the Director of OEP:

    a. identify any facilities to be abandoned or disturbed, including tie-in locations, that may be contaminated with PCBs;

b. verify that the appropriate PCB testing would be conducted on these facilities, and discuss how any abandoned PCB contaminated facilities would be properly disposed of; and

c. identify measures to be implemented to provide adequate worker safety for handling PCB contaminated materials. *(EA section 2.9.4)*

29. **Prior to any abandonment or construction activities**, Columbia should file the following information with the Secretary for review and written approval by the Director of OEP:

    a. identify any known facilities to be abandoned or disturbed having ACMs;
    b. develop protocols to comply with the appropriate requirements to identify ACMs that might be encountered;
    c. if facilities with ACMs would be abandoned or disturbed, identify methods to separate the ACMs for proper disposal; and
    d. develop worker protection protocols, and provide for proper disposal of ACMs. (EA section *2.9.4)*

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6.0 LIST OF PREPARERS

Federal Energy Regulatory Commission

Saint Onge, Ellen – Project Manager – Project Description, Cultural Resources, Conclusions and Recommendations

M.A., Anthropology, University of Maryland, College Park
B.A., Anthropology, University of Maryland, College Park

Peconom, John – Deputy Project Manager – Surface Water, Vegetation, Wetlands, Wildlife, Threatened and Endangered Species, Alternatives, Cumulative Impacts

M.S., Environmental Biology and Management, University of California at Davis

Rana, Anthony – Geology and Groundwater

M.S., International Development, 2012, Tulane University
Graduate Studies, Hydrogeology and Geochemistry, 1988, Oklahoma State University
B.S., Geology, 1984, New Jersey City University

Kopka, Robert – Soils

M.S., Soil Science, 1990, Cornell University
B.S., Agronomy, 1987, Delaware Valley College of Science and Agriculture

Johnson, Gertrude – Air Quality and Noise, Pipeline Safety

B.S., Mechanical Engineering, 2003, Virginia Commonwealth University

Tetra Tech, Inc.

Marshall, Sydne – Tetra Tech Project Manager, Project Description, Cultural Resources, Cumulative Impacts, Alternatives, Conclusions and Recommendations

Ph.D., Anthropology, 1981, Columbia University
M.Phil. (Master of Philosophy), 1975, Anthropology, Columbia University
M.A., Anthropology, 1974, Columbia University
B.A., Anthropology, 1972, The American University

Sparks, Sean – Tetra Tech Deputy Project Manager, Soils, Safety

B.A., Environmental Studies, 2005, Lake Forest College

Babcock, Steve – Air Quality

B.S., Chemical Engineering, 1988, Tufts University

Fischl, Joe – Wildlife, Threatened and Endangered Species

M.S., Ecology, 1983, Rutgers University
B.S., Wildlife Biology, 1976, Rutgers University

Gorini, Jennifer – Socioeconomics
M.C.R.P., Master of City and Regional Planning, 2011, Rutgers University
B.S., Coastal and Marine Policy and Management, 2009, University of Rhode Island

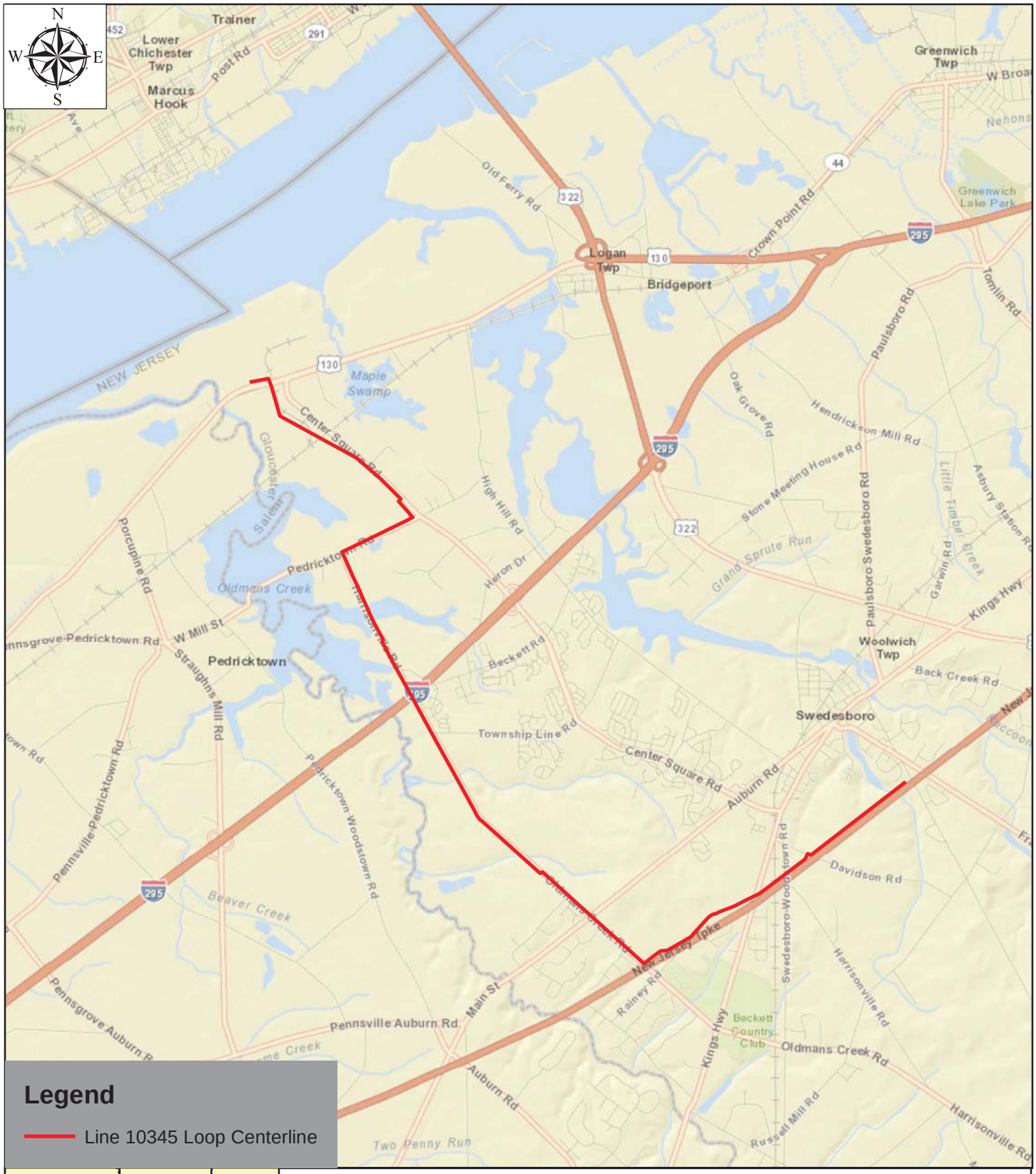
Miller, Rachel – Geology, Groundwater
M.S., Water Resources, 1987, University of Kansas
B.S., Geology, 1980, University of Kansas

Schaeffer, John – Surface Water
M.A., Biology, 1987, The William Patterson College of New Jersey
B.S., Biology, 1980, The William Patterson College of New Jersey

Schils, Nathalie – Land Use, Recreation
B.A., Environmental Studies; International Relations, 2012, Tufts University

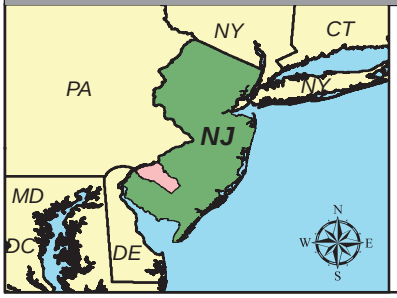
Pellerin, Tricia – Noise
M.E.Sc, Chemical and Biochemical Engineering, 2005, University of Western Ontario
B.E.Sc, Chemical and Biochemical Engineering, 2002, University of Western Ontario

Appendix A
Facility Maps



Legend

Line 10345 Loop Centerline

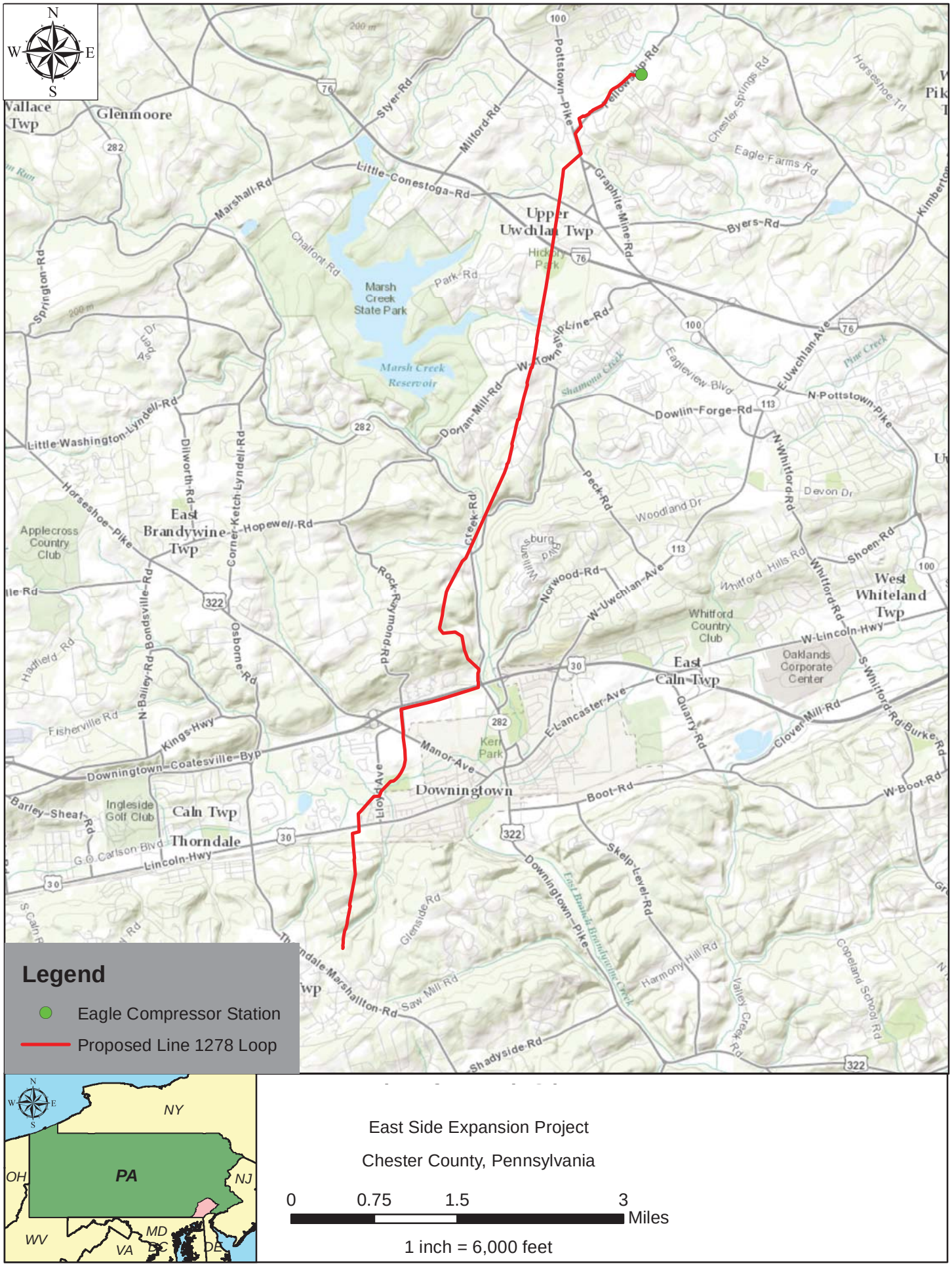


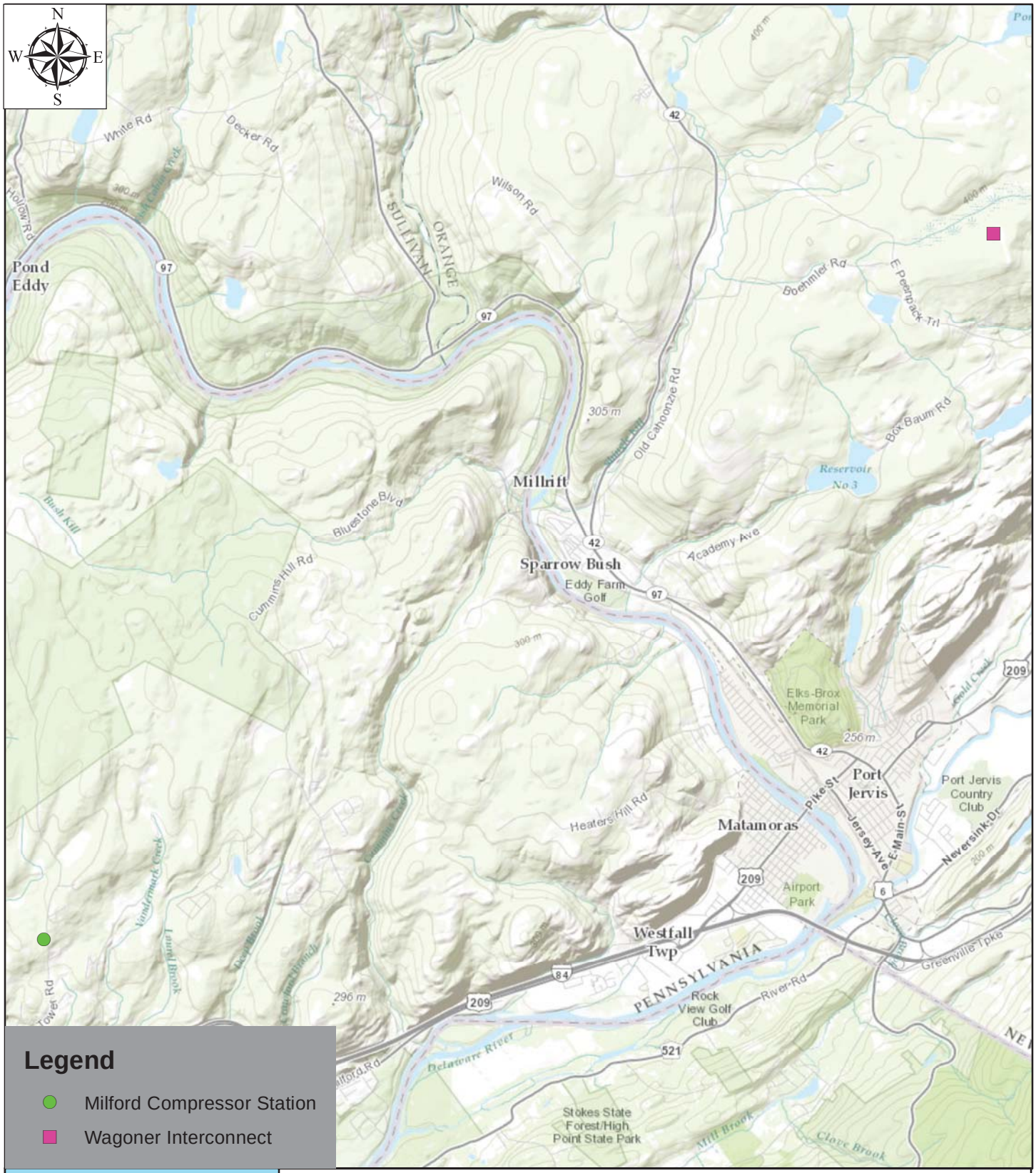
East Side Expansion Project

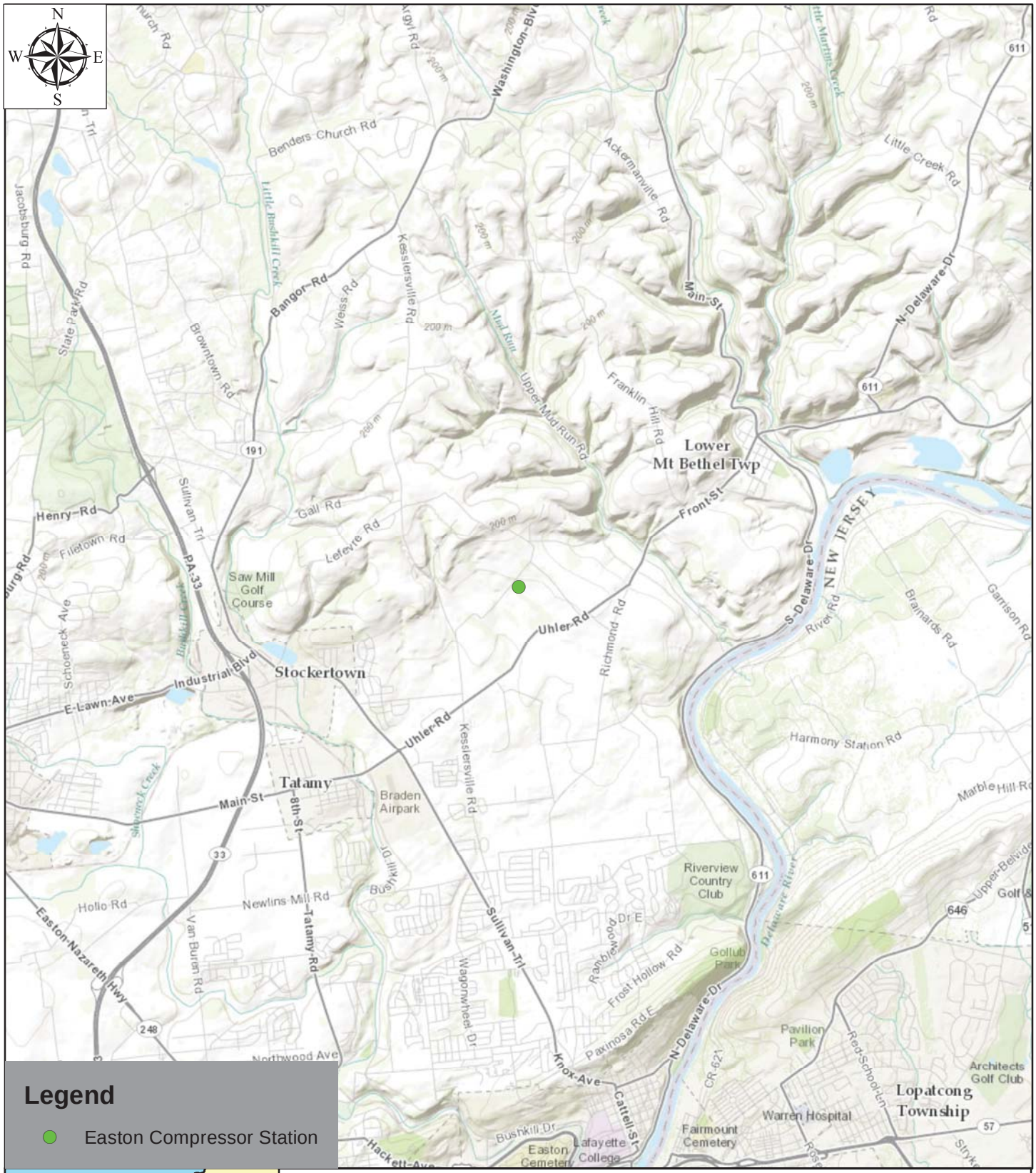
Gloucester County, New Jersey

0 0.75 1.5 3 Miles

1 inch = 6,000 feet


N
W
E
S
Legend
Eagle Compressor Station
Proposed Line 1278 Loop
NY
PA
OH
NJ
WV
MD
VA
DC
DE
East Side Expansion Project
Chester County, Pennsylvania
0
0.75
1.5
3
Miles
1 inch = 6,000 feet


N
W
E
S
White Rd
Decker Rd
Hollow Rd
Pond Eddy
97
SULLIVAN
ORANGE
Wilson Rd
42
Boehmler Rd
Peenpack Trl
Old Cahoonzie Rd
Box Baum Rd
305 m
Millrift
Reservoir No 3
Bush Kill
Bluestone Blvd
Cummins Hill Rd
Sparrow Bush
Eddy Farm Golf
Academy Ave
300 m
Elks-Brox Memorial Park
256 m
209
Port Jervis
Port Jervis Country Club
Pike St
Jersey Ave
E Main St
Neversink Dr
Matamoras
Heaters Hill Rd
Airport Park
6
Westfall Twp
PENNSYLVANIA
84
Rock View Golf Club
River Rd
Greenville Tpke
296 m
Delaware River
521
Milford Rd
Stokes State Forest/High Point State Park
Mill Brook
Clove Brook
Vandermark Creek
Laurel Brook
Tower Rd
Legend
Milford Compressor Station
Wagoner Interconnect
NY
VT
MA
CT
PA
NJ
OH
WV
MD
East Side Expansion Project
Pike County, Pennsylvania
Orange County, New York
0
0.75
1.5
3
Miles
1 inch = 6,000 feet



Legend

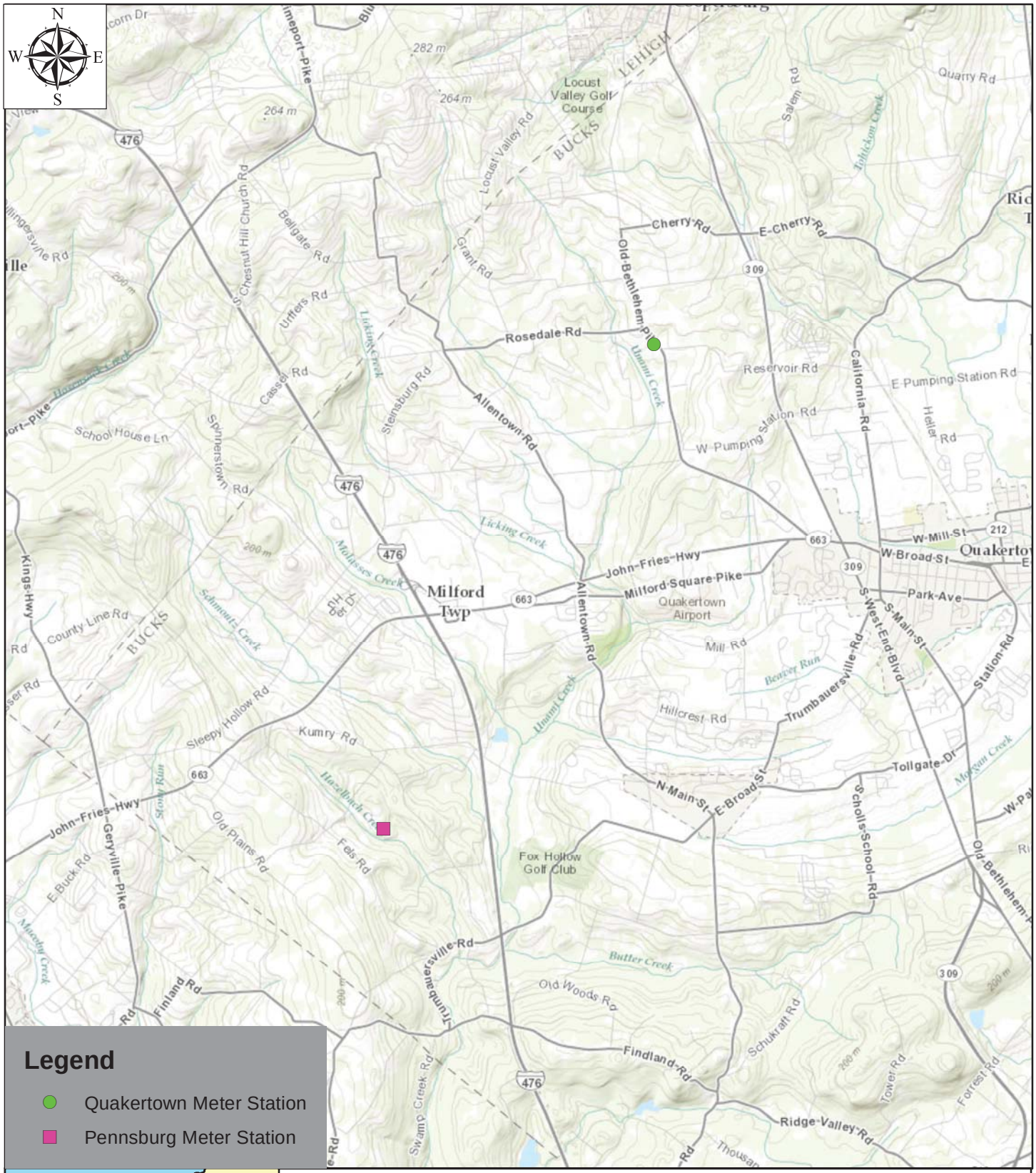
- Easton Compressor Station

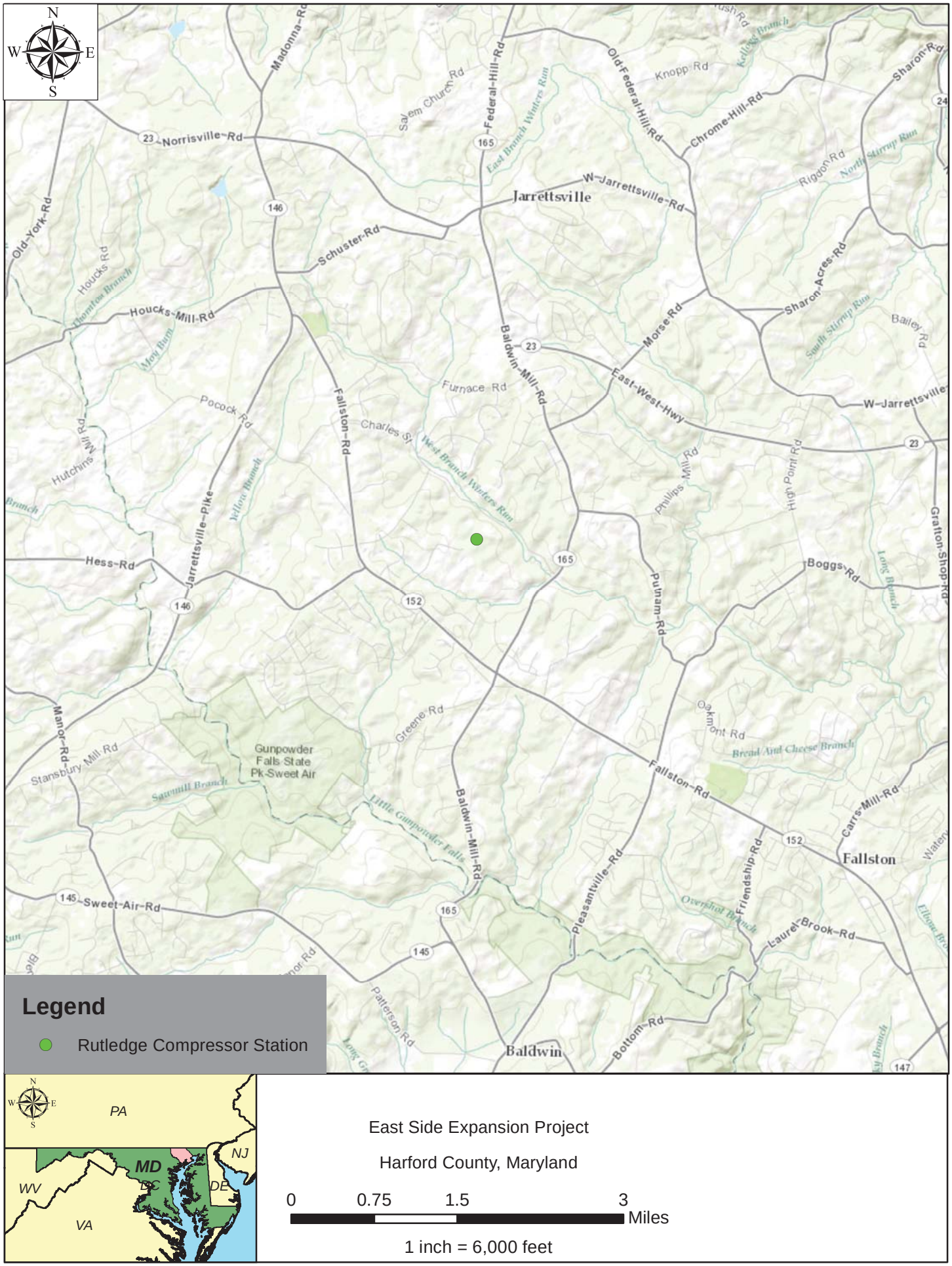
East Side Expansion Project

Northampton County, Pennsylvania

0 0.75 1.5 3 Miles

1 inch = 6,000 feet


Legend
Quakertown Meter Station
Pennsburg Meter Station
Milford Twp
Quakertown Airport
Fox Hollow Golf Club
Locust Valley Golf Course
Rosedale Rd
Old Bethlehem Pike
Cherry Rd
E Cherry Rd
Reservoir Rd
E Pumping Station Rd
W Pumping Station Rd
Allentown Rd
John Fries Hwy
Milford Square Pike
W Mill St
W Broad St
Park Ave
S West End Blvd
S Main St
Station Rd
Trumbauersville Rd
Hillcrest Rd
Mill Rd
Kumry Rd
Sleepy Hollow Rd
Tollgate Dr
N Main St
E Broad St
Scholls School Rd
Old Bethlehem Pike
Findland Rd
Old Woods Rd
Schukraft Rd
Ridge Valley Rd
Geryville Pike
Old Plains Rd
Fels Rd
E Buck Rd
Finland Rd
Trumbauersville Rd
Swamp Creek Rd
Cassel Rd
Urffers Rd
Bellgate Rd
S Chestnut Hill Church Rd
Grant Rd
Locust Valley Rd
Steinsburg Rd
Spinnerstown Rd
School House Ln
Kings Hwy
County Line Rd
Schmoutz Creek
Licking Creek
Unami Creek
Beaver Run
Hockendauqua Creek
Stony Run
Muddy Creek
Butter Creek
Morgan Creek
Tohickon Creek
California Rd
Heller Rd
Salem Rd
Quarry Rd
Locust Valley Golf Course
BUCKS
LEHIGH
476
309
663
212
282 m
264 m
200 m
NY
PA
NJ
OH
WV
MD
VA
DC
DE
East Side Expansion Project
Northampton County, Pennsylvania
0 0.75 1.5 3
Miles
1 inch = 6,000 feet


N
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Legend
Rutledge Compressor Station
PA
NJ
MD
DC
DE
WV
VA
East Side Expansion Project
Harford County, Maryland
0
0.75
1.5
3
Miles
1 inch = 6,000 feet
Jarrettsville
Baldwin
Fallston
Norrisville Rd
Old York Rd
Houcks Mill Rd
Schuster Rd
Madonna Rd
Federal Hill Rd
Old Federal Hill Rd
Chrome Hill Rd
Knopp Rd
Sharon Rd
W Jarrettsville Rd
Rigdon Rd
Sharon Acres Rd
Morse Rd
Baldwin Mill Rd
East West Hwy
Furnace Rd
Charles St
Pocock Rd
Fallston Rd
Jarrettsville Pike
Hess Rd
Phillips Mill Rd
High Point Rd
Grafton Shop Rd
Boggs Rd
Putnam Rd
Greene Rd
Oakmont Rd
Bread And Cheese Branch
Carrs Mill Rd
Friendship Rd
Pleasantville Rd
Laurel Brook Rd
Bottom Rd
Manor Rd
Stansbury Mill Rd
Gunpowder Falls State Pk-Sweet Air
Sweet Air Rd
Patterson Rd
Bailey Rd
Hutchins Rd
Houcks Rd
Mill Rd
Salem Church Rd
Kellogg Branch
East Branch Winters Run
North Stirrup Run
South Stirrup Run
Thomtree Branch
Moy Burn
Yellow Branch
West Branch Winters Run
Long Branch
Sawmill Branch
Little Gunpowder Falls
Overlook Branch
Elbow Branch
23
146
165
152
145
147

Appendix B
Columbia's Environmental Construction Standards

ENVIRONMENTAL CONSTRUCTION STANDARDS

August 2013
(Modified to comply with state and local regulations applicable to the East Side Expansion Project and the revised FERC Plan and Procedures (Docket No. AD12-2-000, 2013)

Columbia Gas Transmission
Charleston, West Virginia

TABLE OF CONTENTS

I. INTRODUCTION

Columbia is committed to complying with the applicable environmental rules and regulations of federal, state, and local governments. Columbia's goal is to meet these requirements in the pursuit of a cleaner, safer environment for future operations.

Recognizing this goal, it is Columbia's policy that all construction, operation and maintenance activities be conducted in a safe manner that minimizes impacts on stream and wetland ecosystems, wildlife habitat, cultural resources and the human environment. To this end, Columbia has prepared these Environmental Construction Standards (ECS). The ECS provides the minimum requirements to be applied to all construction, operation and maintenance activities.

This ECS has been updated to incorporate the FERC Plan and Procedures, as amended (FERC Docket No. AD12-2-000; May 2013) (Attachment A), and Project-specific items and other state-specific best management practices. Text boxes and strikethrough text has been incorporated to show appropriate changes to these standards. Appropriate standards have been incorporated per the Pennsylvania Chapter 102 and Chapter 105 Regulations.
Additionally, erosion control measures have been adapted in accordance with the Pennsylvania Department of Environmental Protection (PADEP) *Erosion and Sediment Control Pollution Control Program Manual* (Technical Guidance Number 363-2134-008; March 2012) and the New Jersey Soil Erosion and Sediment Control Act (N.J.S.A 4:24-39).

The general objective of this ECS is to provide Columbia personnel and Columbia's contractors with instructional information, complete with a practical approach to environmental concerns, which can arise before, during and after facility construction. More specific objectives include:

- minimize impacts to environmentally sensitive areas;
- use the minimum land required for safe and efficient construction, operation, and maintenance of the facilities;
- prevent erosion and sedimentation during construction; and
- complete construction in a safe and timely manner.

Words and/or phrases which have special meaning (shown in **bold** at first occurrence in text) and acronyms have been defined in Definition of Terms Section VIII.

The intent of the ECS is to confine project-related disturbance to the identified **construction work areas** and to minimize erosion and enhance revegetation in those areas. Any project-related ground disturbance (including erosion) outside of these areas is subject to compliance with all applicable survey[1] (see superscript note 1) and mitigation requirements.

The ECS is focused primarily on pipeline related construction, operation, and maintenance. However, it can be equally applied to all Columbia facilities, for example, storage facilities including well locations, compressor stations, horizontal directional drill locations and measurement/regulation stations. This ECS shall be used as the base

document from which Columbia will build individual project-specific Environmental Management and Construction Plans (EM&CP) as called for in Columbia's Policy and Procedure, Plan 120-10. The EM&CP may include written recommendations from the local soil conservation authorities or land management agencies for both temporary and permanent erosion control and revegetation specifications. ~~Federal, State and local agencies having regulations more stringent than this ECS shall supercede[2] (see superscript note 2)~~

II. UPLAND CONSTRUCTION

A. General

This chapter describes typical upland pipeline construction.

The upland pipeline construction spread operates as a moving assembly line performing specialized procedures in an efficient, planned sequence. **Attachment B** presents this typical upland pipeline construction sequence along with typical pipeline construction details. These construction details provide the contractor with a detailed description of what is to expected in order to protect human health and the environment. In addition, special construction crews install and alter fences, bore under roads and railroads, install stream and **wetland** crossings that are not done by conventional upland techniques, and construct valve settings and meter/regulator stations.

While construction work is ongoing, the construction work area will be kept clean of all rubbish and debris resulting from the work. Non-hazardous materials and waste shall be disposed of in an approved landfill. Hazardous waste shall be disposed of in accordance with Columbia policies (Plan 120.03 and 120.04) and federal, state and local regulations.

B. Right-of-Way Width

For 14-inch or larger diameter pipelines on new alignments, Columbia typically utilizes a 50-foot wide permanent right-of-way (ROW) and an additional 50-foot wide temporary construction ROW as illustrated in **Attachment B**. After the construction work area is restored, the temporary work areas are allowed to revert to its previous uses. The permanent ROW is maintained as Columbia's permanent ROW for the facility. **Attachment B** also illustrates the typical pipeline construction work area when paralleling existing facilities.

The East Side Expansion Project ROW will consist of a 100-foot wide construction ROW.

In addition, there may be instances where extra work areas are needed for topsoil conservation, side hill construction, equipment staging, pipe and material storage, borrow and disposal areas, temporary and permanent access, and related construction activities. Such areas will be identified in the project plans and will undergo all required environmental and cultural resources reviews prior to use. In contrast, pipelines may be constructed through confined areas such as extremely steep and narrow ridges. Alternate construction methods may be

required in narrow construction work area situations to safeguard workers, equipment, the pipeline, and the environment.

Extra work areas referred to in the ECS are referenced as "Additional Temporary Workspaces" (ATWS) throughout the East Side Expansion Environmental Report.

For non-pipeline construction activities, such as storage well locations and station projects, the construction work area and permanent ROW may vary and can be dependent on property lease, property owner agreements, and/or local topography. For example, the construction work area for a typical storage well is 200 feet by 200 feet and the permanent ROW is a 300-foot radius around the well.

C. Clearing

Minimal clearing is allowed for the installation of erosion controls. However, all erosion control devices shall be installed prior to the commencement of major earth disturbing activities.

The construction work area is cleared to the width specified in the ROW agreements or EM&CP, whichever is less, during clearing operations, all brush and trees will be felled into the construction work area to prevent off-construction work area damage to trees and structures.

The clearing crew and related equipment and equipment necessary for installation of equipment crossings will be permitted a single pass through streams prior to equipment crossing installations unless the stream is a **high quality stream** or designated as an **exceptional value water**. Federal, State and local agencies having regulations more stringent than this shall supercede[2] (see superscript note 2).

Fords (a road crossing of a stream utilizing the existing stream bed) are prohibited on all streams within high quality (HQ) watersheds.

Should substantial soil disturbance take place during clearing install temporary erosion and sedimentation controls as described in section D-3.

1. Wood Products

Wood Products (i.e., sawlogs, pulpwood or cordwood) are the property of the landowner unless otherwise specified. They will not be used for any purpose unless permission is first obtained from the landowner. When the landowner requests salvage of these materials or approves wood products to be stockpiled and left on site, they will be stockpiled just off the edge of the construction work area, but not within 50 feet of streams, floodplains, or wetlands. Equipment stacking the wood products will not leave the construction work area. Usable timber that measures at least 10 inches in diameter at the butt will be cut into pole lengths or as otherwise negotiated with the landowner. Off-site disposal of materials for beneficial reuse must not result in adverse environmental impact

and is subject to compliance with all applicable survey, landowner or land management agency approval, and permit requirements.

2. Brush

All cleared brush will be disposed of by one of the following methods:

- Brush may be piled just off the edge of the construction work area but not within 50 feet of streams, floodplains or wetlands. Equipment stacking the brush will not leave the construction work area. Brush piles will be constructed a maximum of 12 feet wide and compacted to approximately 4 feet high, with periodic breaks at a minimum of every 200 feet to permit wildlife travel. The landowner should be consulted to determine acceptable brush pile locations along the construction work area. Landowner approval is required for this method.

- Burning of brush is an acceptable practice where permitted by law, although it is not the preferred method of brush disposal due to atmospheric conditions, wildlife population densities and the access to 911 emergency services in rural setting. Should burning take place, the necessary burning permits will be obtained, and fires will be of reasonable size and located and patrolled so that they will not spread off the construction work area.

- The brush may be chipped and given away, buried, or thinly spread (less than 2 inches thick) over the construction work area or blown off the construction work area (per landowner agreement and approvals) except in **agricultural lands** or within 50 feet of streams, floodplains, or wetlands. Chipping will be limited to those areas where agreed to with the landowner. During **restoration**, soil will be augmented by the addition of 12 to 15 pounds of nitrogen per ton of chips to aid revegetation*.

- Brush may be hauled off-site. Off-site disposal of materials for beneficial reuse must not result in adverse environmental impact and is subject to compliance with all applicable survey, landowner or land management approval and permit requirements.

*One ton of chips spread 1 inch thick cover approximately $^{1}/_{4}$ acre.

Grubbing should not be conducted within 50 feet of streams until the stream crossing is ready to be completed and dry crossing methodologies are installed (dam and pump, flume).

3. Fence Crossings

Where it is necessary to remove fences, adequate temporary fences or gates ~~as illustrated in **Attachment B**~~ will be installed **immediately** or in accordance with landowner agreement. Such temporary fences or gates will be kept closed, except when necessary for construction purposes per landowner agreement. Once construction is completed, permanent fence repairs will be completed. All fences that have been cut or removed will be permanently repaired during restoration to match the original type of the fence as much as possible. Where there is any doubt as to the usability of old fence material, new material will be used in making repairs. Fence repairs will be subject to the approval of the landowner.

D. Grading

Grading is necessary to provide a smooth and even surface for safe and efficient operation of construction equipment. Grading will be the minimum amount necessary and includes prompt installation of erosion control devices such as interceptor diversions, **sediment filter devices**, and equipment crossings at streams to minimize soil loss and subsequent sedimentation.

1. Tree Stump and Rock Removal and Disposal

Tree stumps and large rocks will be cut, graded or removed as necessary to permit construction and to provide adequate clearance for mechanical equipment and other vehicles. Tree stumps that are adjacent to roads will be cut close to the ground or removed.

Stumps and large rocks will be disposed of in the following manner with landowner approval. Disposal of materials for beneficial reuse must not result in adverse environmental impact and is subject to compliance with all applicable survey, landowner or land management agency approval and permit requirements.

- buried within the construction work area except in agricultural, residential, or wetland areas;
- windrowed just off the edge of the construction work area with landowners' permission. Windrows will be a maximum of 12 feet wide with periodic breaks a minimum of 200 feet apart;
- hauled from the site and disposed of in an approved landfill or other suitable area.

2. Topsoil Conservation

Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus soil side method) in:

a. cultivated or rotated croplands, and managed pastures;

b. residential areas;
c. hayfields; and
d. other areas at the landowner's or land managing agency's request.

In deep soils (more than 12 inches of topsoil), segregate at least 12 inches of topsoil. In soils with less than 12 inches of topsoil make every effort to segregate the entire topsoil layer. Segregated topsoil may not be used for padding the pipe, constructing temporary slope breakers or trench plugs, improving or maintaining roads, or as a fill material. **Attachment B** illustrates topsoil conservation techniques.

The topsoil will be stockpiled separately from all subsoil and will be replaced last during backfilling and **final grading**. Stabilize topsoil piles and minimize loss due to wind and water erosion with use of sediment barriers, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary. Where topsoil is stripped from the entire construction ROW, an additional 25-foot wide temporary work area may be used for topsoil storage with landowners' permission and appropriate environmental approvals. The **Inspector** will determine if additional erosion control devices are needed in topsoil storage areas.

In residential areas, topsoil replacement (i.e., importation of topsoil) is an acceptable alternative to topsoil segregation.

3. Erosion Control Devices

All erosion control devices shall be installed prior to the commencement of major earth disturbing activities.

~~Temporary erosion controls will be installed immediately after or during the initial disturbance of soil~~. The most effective and versatile erosion control devices are ~~interceptor diversions (temporary slope breakers)~~ waterbars and sediment filter devices as illustrated and described in **Attachment B** and other approved devices. ~~Temporary diversions~~ Waterbars will be maintained during the construction phase until final diversions are installed. Where required grading has significantly reduced the slope, the Inspector may require fewer temporary diversions consistent with the table in **Attachment B**.

Waterbars shall be placed at the appropriate spacing in accordance with state regulations. Waterbars shall be left in place after permanent stabilization has been achieved (with the exception of those located in agricultural or residential areas).

At a minimum, install and maintain temporary sediment barriers (silt fence, super silt fence, compost filter sock ~~staked hay or straw bales, compacted earth, sand bags, or other appropriate materials~~) across the entire construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody, wetland, or road crossing until revegetation is successful.

Leave adequate room between the base of the slope and the sediment barrier to accommodate ponding of water and sediment disposition.

Super silt fence may be used to control runoff from some small disturbed areas where the maximum slope lengths for silt fence cannot be met.

Compost filter socks shall be utilized within High Quality watersheds.

All temporary erosion control devices, including roadside ditches, will be inspected near the end of each work day or after each storm (rain) event that results in run-off ~~of 1/2 inch or greater~~, to ensure proper functionality . Any devices damaged beyond functioning will be repaired **promptly**.

A maintenance program shall be implemented which provides for operation and maintenance of erosion and sediment controls and the inspection of erosion and sediment controls on a weekly basis and after each runoff event, including the repair or replacement of erosion and sediment controls to ensure effective and efficient operation.

4. Temporary Road Entrances

Temporary road entrances as illustrated in **Attachment B** will be installed during grading where the construction work area crosses public roads when needed to maintain safe conditions and to prevent tracking soil and mud onto public roads. These installations are designed to remove mud from vehicle tires and tracks before accessing the road. In addition, public roads will be swept, shoveled or scraped as necessary to keep the road surface safe. ~~If the public road is gravel, the temporary entrance is not required to be graveled.~~ Typical erosion control measures at road crossings are illustrated in **Attachment B**. If no access is required onto the roadway the installation of a construction entrance is not required, however, safety fencing should be installed across the ROW and signs designating “no entrance” can be erected to avoid any unintentional entrances. Temporary road entrances will be secured at the end of each workday.

Rock construction entrances shall be constructed in accordance with applicable permits and approvals. Rock construction entrances shall be a minimum of 100 feet in length in high-quality watersheds. Sediment shall be removed from these entrances by a vacuum truck on a daily basis or through the installation of a wheel

E. Access Roads

Typically, Columbia requires access roads to the construction and staging areas. New access roads will be built only if existing access is inadequate. The access roads will be a maximum ~~25~~ 15-foot wide with additional width in tight turns and at intersections with public roads (this additional width must be included in the environmental surveys). The roads will either be temporary (used for access during construction only)

or permanent (used during and after construction for operation and maintenance of the facilities). All public roads are available for use as access roads without further environmental review. However, all private access roads intended for use are subject to environmental reviews. Safe and accessible conditions will be maintained at all roadway crossings and access points during construction and restoration. The use of tracked equipment will be minimized on public roadways. Any soil or gravel spilled or tracked onto roadways will be removed daily or more frequently as necessary to maintain safe road conditions. Any damage to roadway surfaces, shoulders, or bar hitches will be repaired.

Access roads will be graveled and graded as needed.

Access road gradient will be as flat as local topography will practically allow. By breaking or changing grade frequently, fewer erosion problems will be encountered than on long, straight, continuous gradients. Interceptor diversions and/or other erosion and sediment control devices will be installed as needed.

Temporary access roads will be underlain with geotextile fabric as illustrated in **Attachment B**. The roadbed should be cleared of small stubs because these tend to puncture the fabric, thereby allowing fine particles to mix with the gravel. Geotextile fabric not required at existing, graveled access road, Gravel may be left in place after construction upon landowner request.

Roads will cross streams and wetlands as close as possible to right angles. Road gradients approaching these crossings will be flattened to decrease runoff velocity. Runoff will be dispersed just prior to the crossing by means of an interceptor diversion with a sediment filter device at the outlet. Where conditions permit, new roads will be located at least 25 feet from any stream or wetland except at crossing locations. ~~Culverts will be sized and placed to permit water flow under the access road.~~

Culvert modifications are not allowable, unless specifically permitted. Where necessary, culverts will be matted for the safe passage of construction equipment. Wetlands across access roads will be matted. No gravel will be placed in streams and wetlands.

Cross drain culverts may be installed and/or modified along access roads which will direct stormwater drainage. These cross drains would be installed temporarily during construction and removed. Cross drains would not be associated with any streams or wetland crossings.

After construction, temporary access roads (including any additional width used for construction) will be graded and left intact for the landowner's benefit, or removed and the area restored using the same specifications as applied to the construction work area.

F. Residential Areas

The following mitigation measures will be implemented for all residences within 50 feet of the construction work area:

- mature trees and landscaping will not be removed from within the edge of the construction work area unless necessary for safe operation of construction equipment or as specified in landowner agreements;

- immediately after backfilling the trench, all lawn and landscaping will be restored to final restoration, or temporary restoration pending weather and soil conditions or as specified in landowner agreements. If seasonal or other weather conditions prevent compliance with these time frames, maintain and monitor temporary erosion controls (sediment barriers and mulch) until conditions allow completion of restoration;

- while the trench is open, the edge of the construction work area adjacent to the residence will be safety fenced for a distance of 100 feet on either side of the residence to ensure that equipment, materials and spoil remain within the construction work area;

- a minimum of 25 feet will be maintained between the residence and construction work area for a distance of 100 feet on either side of the residence. If construction activities must take place less than 25 feet of a residence, the trench or open excavation shall not remain open overnight.

G. Trenching

1. Trenching Specifications

Typically, the trench will not remain open for more than 30 days in any area unless authorized by the Inspector (additional restrictions for stream and wetland areas are provided in Section III).

- As the trench is completed, trenchline breakers as illustrated in **Attachment B** will be installed promptly at every second temporary interceptor diversion at a minimum. Topsoil will not be used to construct the breakers. The breakers reduce water velocity and erosion of the trench bottom. The breakers will be maintained promptly.

  Trench plugs will be installed within the trench in accordance with appropriate spacing provided by the appropriate state agency. Trench plugs shall also be installed on either side of streams and wetlands. Trench plug materials shall consist of foam, clay, bentonite or concrete filled sacks.

- Sediment filter devices will be installed around spoil storage areas before digging bore pits, stream crossings, and as necessary wetland crossings.

- If it is necessary to pump water from the trench or bore pits, the water will be pumped into a sediment trap/filter bag as illustrated in **Attachment B**, or through a sediment filter device such as a series of terra tubes and then discharged into a well vegetated upland area where the water will filter back into the ground Sediment logs or flocculent logs shall be placed at least 10 feet from any stream or wetland in order to minimize erosion and subsequent sedimentation of streams or wetlands. Water impounded in the trench will not be released directly or by overland flow into any **waterbody** or wetland. Trench dewatering shall be conducted as to not cause erosion or result in heavily silt laden water flowing into a waterbody or wetland.

When the trench must remain open for a greater length of time, appropriate erosion controls and safety measures will be employed as directed by the Inspector.

2. Blasting

All drilling and blasting will be done in a cautious manner, and suitable precautions will be taken to avoid injury or damage to persons, livestock, or other property.

If blasting is necessary within 150 feet of residential or commercial buildings, an independent contractor will be hired to perform pre- and post-blast structural inspections and, if necessary, seismographic monitoring.

In those instances where blasting has the potential to affect water quantity/quality from domestic or agricultural wells or springs in the proximity of the construction work area, Columbia will conduct pre- and post-blasting (within two months of construction work restoration) testing of water wells within an appropriate distance (typically 150 feet) of the pipeline with landowner permission. These tests may include a pump inspection, flow rate, and bacteriological cultures. If a water well is damaged as a result of Columbia's activities, Columbia will provide a temporary source of water and/or compensate the owner.

3. Temporary Construction Access over the Trenchline

Where access across the trenchline is required, temporary facilities such as trench plugs and fences, wooden mats or steel plates will be constructed or installed to permit safe crossing of livestock, vehicles, equipment, and persons from one side of the trench to the other.

4. Drainage Tile and Irrigation Facilities

Attempt to locate existing drain tiles and irrigation systems. Columbia personnel will contact landowners and/or the local National Resource Conservation Service (NRCS) to determine the locations of future drain tiles that are likely to be installed within 3 years of the authorized

construction, if planned, the pipeline will be installed at a sufficient depth to accommodate the drainage tile. For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s) and within US Department of Transportation (DOT) specifications. Mark locations of drain tiles damaged during construction.

Engage qualified drain tile specialists, as needed to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialists from the project area, if available. Drainage tile removed, cut, broke, or otherwise damaged during construction will be repaired or replaced ~~as illustrated in **Attachment B**~~. Temporary measures approved by the Inspector will be taken to provide suitable drainage until permanent repairs are made. Repair damaged drain tiles to their original or better condition. Do not use filter-covered drain tiles unless the local soil conservation authorities and landowner agrees.

Water flow will be maintained in crop irrigation systems unless shutoff is coordinated with affected parties.

H. Backfilling Specifications

Backfilling will follow pipe lowering as closely as practical. Topsoil will not be used to pad the pipe. Soil that has been excavated during construction and not used for backfill will be evenly spread over the cleared construction work area or removed from the site and properly disposed. All waste materials such as barrels, cans, drums, stumps, coating and wrap, rubbish, waste, or other refuse will not be placed in the trench.

Trenchline barriers as illustrated in **Attachment B** will be placed in the trench prior to backfilling to prevent water movement and subsequent erosion. An engineer or similarly qualified professional shall determine the need for and spacing of trenchline barriers. Otherwise, trenchline barriers shall be installed at the spacing illustrated in **Attachment B** and up-slope of any permanent waterbars ~~interceptor diversions~~.

Excess rock, including blast rock, may be used to backfill the trench to the top of the existing bedrock profile. Care should be taken to not damage the pipeline.

I. Final Grading, Restoration and Stabilization

After construction activities, all disturbed areas will be stabilized with either (1) final grading and restoration; or (2) **temporary stabilization** measures in order to prevent erosion and sedimentation until final grading and restoration can be completed.

Upon temporary cessation of an earth disturbance activity or any stage or phase of an activity where a cessation of earth disturbance activities will exceed 4 days, the site shall be immediately seeded, mulched, or otherwise protected from accelerated erosion and sedimentation pending future earth disturbance activities.

1. Final Grading

~~Final grading will be completed within 20 calendar days of backfilling (10 days in residential areas), weather and soil conditions permitting. Should unsuitable soil conditions persist, or be expected to persist, for more than 20 calendar days (10 days in residential areas), the Inspector will record the conditions and require the installation of temporary stabilization measures, and final grading and restoration will be delayed until conditions allow. In no case shall final grading be delayed beyond the end of the next recommended seeding season.~~

If final grade can be established, but conditions are not ideal for permanent seeding, the Inspector will specify application of temporary stabilization measures (including temporary seeding), and may also consider concurrent application of final seed mix and mulch as provided in Table 2a or per the local conservation authority.

All graded areas shall be permanent stabilized immediately upon reaching finished grade.

All disturbed area shall be restored to pre-construction contours.

During final grading, soil over the trench may be mound to allow for future settling. Where fill in the trench or major depressions have settled below ground level, additional fill will be added as needed, and the area brought to final grade. The Inspector may approve a temporary travel lane in the construction work area where needed to facilitate the remainder of construction and/or restoration. This travel lane must be restored when access through the area is no longer required.

Conserved topsoil will be returned during final grading.

Excess rock will be removed from at least the top 12 inches of soil to the extent practicable in all actively cultivated or rotated agricultural land, hayfields, pastures, residential areas, and other areas at the landowner's request. The size, density and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. Diligent efforts will be made to remove rocks greater than 4 inches if, off-construction work areas do not contain rocks greater than 4 inches. The landowner may approve other rock size provisions in writing.

Final erosion control devices including ~~interceptor diversion/slope breakers~~ waterbars will be installed during final grading. Sediment filter devices needed to protect off-construction work area resources will be installed or rebuilt promptly after final grading. Final interceptor diversions will not be installed in agricultural or pasture land without landowner's consent.

2. Soil Compaction Testing

Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to identify approximate preconstruction conditions. Use U.S. Army Corps of Engineers-style cone penetrometers or other appropriate devices to conduct tests.

Plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

Perform appropriate soil compaction mitigation in severely compacted residential areas.

3. Restoration

All graded areas shall be permanently stabilized immediately upon reaching finished grade.

Restoration ~~as defined in Definition of Terms – Section VIII,~~ will begin ~~within 6 days~~ immediately after ~~of~~ final grading, weather and soil conditions permitting. Fertilizer and lime will be disked into the soil (except rocky soils) to a depth of 3 to 4 inches to prepare a seedbed. In rocky soils, fertilizer and lime may be incorporated into the soil with tracked equipment. Seeding and mulching the construction work area will promptly follow seedbed preparation. Ensure that mulch is adequately anchored to minimize loss due to wind and water. Mulch tacifiers used in accordance with the manufacturers recommendations may be used as an alternative. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.

The typical application rates for lime, fertilizer, seed and mulch are listed in **Attachment B**. They will be used unless the ROW agreement, permit, or local NRCS provides project-specific recommendations. If Tall Fescue is used, plant endophyte free certified seed.

If hydroseeding is utilized, lime and fertilizer applications should be equivalent to **Attachment B** unless ROW agreement, permit or the local NRCS provides project specific recommendations. Hay or straw mulch shall be applied in accordance with **Attachment B** over hydroseeding. Hydromulch can be used in conjunction with (for texture purposes) but not substituted for hay or straw mulch. **Scarify** the seedbed to facilitate lodging and germination of seed.

Uniformly apply and cover seed in accordance with the written recommendations of the local soil conservation authorities or land management agencies.

Base seeding rates on Pure Live Seed. Use seed within 12 months of seed testing or per supplier specifications. Treat legume seed with an inoculant specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method. If the above recommendations are not available for conventional seeding, use 4 times the manufactures recommended rate of inoculant. For hydroseeding, use 10 times the recommended rate of inoculant.

In the absence of recommendations from the local conservation authority, a seed drill equipped with a cultipacker is preferred for application, but broadcast or hydroseeding can be used at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker, roller or other suitable means after seeding. In rocky soils or where site conditions may limit the effectiveness of this equipment, other alternatives may be approved by the environmental inspector.

Restoration will not be performed in agricultural lands from the beginning of the spring thaw through May 15 unless requested by the landowner. Restoration will be coordinated with the landowner's planting schedule. Grazing deferment plans will be developed with willing landowners, grazing permittees, and land management agencies as appropriate to minimize grazing disturbance of revegetation efforts.

Permanent seeding, liming, and fertilizing may be performed by the landowner. The Inspector will ensure that the restoration is satisfactory and consistent with the regulatory requirements for permanent revegetation.

Restore all turf, ornamental shrubs, and specialized landscaping in accordance with the landowner's request, or compensate the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.

~~Jute netting~~ Erosion control blanket as illustrated in **Attachment B** or equivalent and approved by the Inspector shall be used on **steep slopes** to help stabilize the slope.

Erosion control blanketing shall be installed on all slopes 3H:1V or steeper and within 50 feet of a surface water and on all other disturbed areas specified in the Project Permits. Temporary sediment barriers (compost filter sock in high-quality watersheds or silt fence in non high-quality watersheds) should be installed directly above erosion control blanketing at surface waters.

Restoration shall be considered successful if the right-of-way surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the landowner or land managing

agency), revegetation is successful, and proper drainage has been restored.

The disturbed areas will not be considered stabilized until a minimum uniform 70% vegetative cover of erosion resistant perennial species has been achieved and final inspection by the Conservation District is completed.

Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation is similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation shall be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.

4. Temporary Stabilization

When the Inspector determines that temporary stabilization measures are required, they will be completed as soon as possible. The seeding and mulching rates are provided in **Attachment B**. Consideration will be given to the following when determining if temporary stabilization measures are to be implemented:

- ~~if final grading and installation of permanent interceptor diversions or slope breakers will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas);~~
- Adverse weather conditions are anticipated.
- Resources within or outside the construction work area are to be protected.
- Construction or restoration activity is interrupted or has ceased for more than 4 days.

If temporary stabilization measures are utilized, final grading and/or restoration must commence once weather and soil conditions permit.

Apply mulch in accordance with the specifications outlined in this section however, during temporary restoration; increase mulch application on all slopes (8 percent or more) within 100 feet of waterbodies and wetlands to a rate of 6,000 lbs/acre (3 tons). Mulch shall not be placed in wetland areas unless required in writing by the appropriate land management or state agency.

5. Restoring Man-Made Structures

All existing man-made installations that are disturbed or damaged during construction shall be repaired or replaced and left in equivalent or better condition than they were found prior to construction, unless alternative arrangements with landowners dictate otherwise.

Man-made installations on existing ROW that are disturbed or damaged during construction will be addressed consistent with Columbia's encroachment policy.

6. Off-Road Vehicle (ORV) Control

Columbia will discuss with each landowner and park manager along new ROW (not adjacent to existing ROW) in forest lands the need for ORV control. If requested, one or more of the following ORV control measures will be installed:

- Plant conifers (pine trees) across the construction work area. The spacing of trees and length of construction work area planted should provide for adequate facility maintenance, but should be sufficient to limit access and to screen the ROW from view. Trees will not be planted within 5 feet on either side of the pipeline.

- Install a slash and timber barrier, a pipe barrier, or a line of boulders across the construction work area to restrict vehicle access.

- Install a locking gate with fencing extending a reasonable distance to prevent bypass.

- Install "No Trespass" signs.

J. Noise Impact Mitigation and Dust Control

Construction equipment will be properly muffled and maintained to avoid producing excessive noise near **noise sensitive areas**.

Efforts will be made to control dust at sensitive areas such as residential areas and road crossings. At a minimum, water trucks will be used to dampen the work area and minimize fugitive dust from migrating off-site.

K. Hydrostatic Testing

Typically, Columbia verifies a facility's integrity by hydrostatic testing. Water can be drawn from local sources (streams, ponds, public water supplies) and in a manner that will minimize impacts to the environment and other existing users, while maintaining adequate stream flow. Water from state designed *high quality streams* or *exceptional value waters*, waterbodies which provide habitat for federally listed threatened or endangered species, or streams utilized as public water supplies will not be used unless other water sources are not readily available and the appropriate federal, state or local agency permits its use.

Intake hoses will be screened to minimize the potential for entrainment of fish.

Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.

All required federal, state and local approvals for the withdrawal and/or discharge of hydrostatic test water will be obtained prior to such activities.

Maintain adequate flow rates to protect aquatic life and provide water for downstream withdrawals by existing users.

Comply with all approval/permit conditions which may include notifying the appropriate state agency of withdraw/discharge, collection of samples in accordance with permit conditions where required, and discharging in a manner to meet all discharge parameters where required.

All welds will be radiographically inspected or hydrostatically tested before pipe installation under waterbodies or wetlands.

The discharge of the hydrostatic test water will be performed in a manner that minimizes erosion. The energy of the released test water will be dissipated by discharging the water:

- into a well-vegetated upland area;
- into a tank(s)
- into a body of water (with all required permits and meeting all conditions); or
- through sediment filter devices or a sediment trap to filter out various particulate matter or allow it to infiltrate through the soil.

If necessary, regulate the water discharge rate, use energy dissipation device(s); and/or install sediment barriers to prevent erosion, scour, suspension of sediments, or excessive streamflow. During the discharge, the Inspector must ensure that erosion and sedimentation are properly controlled.

Do not discharge into waters from state designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or streams utilized as public water supplies unless the appropriate federal, state or local agency grants permission.

Hydrostatic testwater discharges are not allowed without applicable discharge permits. In the event were public water will be used as the source of water, declorination measures may be required

This guidance is for hydrostatic testing of new pipe. Permitting requirements associated with hydrostatic testing of used pipe can be extensive. Contact the NRP Group prior to testing any used pipe.

III. STREAM AND WETLAND CROSSINGS

A. Stream Crossings

1. General

The main objective of any waterbody crossing is to construct the pipeline in a manner, which minimizes erosion and subsequent sedimentation into the waterbody. Crossings will be constructed as close as possible to right angles with the waterbody channel. Adequate downstream flow rates will be maintained at all times to protect aquatic life and prevent the interruption of existing downstream uses. Each waterbody crossing will be treated as a separate construction entity, such that trenching, pipe installation, backfilling and temporary stabilization or final restoration are completed in the minimum number of consecutive calendar days possible.

Whenever a time limit is imposed on a crossing procedure, that time limit is only applicable to trenching (except blasting), lowering in, and backfilling. Clearing, grading and equipment crossing installation and removal activities are not included as part of the separate construction entity. Construction equipment will not be allowed in the water except as provided in this Section.

Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, crossings must be constructed during the following time windows:

- Coldwater Fisheries - June 1 through September 30
- Coolwater and Warmwater Fisheries - June 1 through November 30

Streams designated as Trout Stocked Fisheries (TSF) have an allowable construction window of June 16-Feburary 28.

Columbia will notify in writing authorities responsible for potable water supplies at least one week, or as required by state or local regulation, prior to any waterbody crossing.

When water levels are temporarily high, the Inspector will direct that starting any waterbody crossing be postponed until water levels subside.

Any extra work areas will be located at least 50 feet away from the water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. Where topographic conditions do not permit a fifty-foot setback, contact the Natural Resources Permitting group for approval. All extra work areas must be located at least 10 feet from the water's edge and limited to the size needed to construct the crossing. Pipe assembly for the waterbody crossing is

usually performed in the extra work areas prior to or concurrently with trenching.

Columbia has identified several locations where variances are requested for the use of ATWS within 50 feet of a stream or wetland. See Resource Report No. 8 of the Environmental Report.

Standards relating to spill prevention at waterbodies are contained in Section IV, “Spill Prevention”.

If construction activities parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody and the right-of-way, except at the crossing location or where maintaining this offset will result in greater environmental impact. Where waterbodies are adjacent to the construction right-of-way and the right-of-way slopes towards the waterbody, install sediment barriers along the edge of the down gradient side of the construction right-of-way as necessary to contain spoil within the right-of-way prevent sediment flow into the waterbody.

Waterbody buffers (extra work area setbacks, refueling restrictions, etc.) must be clearly marked in the field with signs and/or highly visible flagging until construction related ground disturbing activities are completed.

2. Crossing Techniques

Columbia typically utilizes either the dry-ditch (flume pipe) wet-ditch; or Dam and Pump techniques to install pipelines across waterbodies. **Attachment B** illustrate these methods. **Upland construction** techniques may be used for **intermittent waterbody** crossings without perceptible flow at the time of the crossing, provided that a culvert is **promptly** installed to carry stormwater flow across the trench area and the erosion and sediment control devices illustrated in **Attachment B** are installed.

a) Minor Waterbodies

For crossings of coldwater fisheries and coolwater and warmwater fisheries considered significant by the state, or federally designated as critical habitat, install the pipeline using the dry-ditch method or Dam and Pump method, unless approved otherwise in writing by the appropriate state agency.

For other **minor waterbody** crossings, complete instream construction in the waterbody using the wet-ditch method within 24 hours (except for blasting and pneumatic chipping; see Section III.6.). Limit use of equipment operating in the waterbody to that needed to construct the crossing.

b) Intermediate Waterbodies

The wet-ditch method can be used for **intermediate waterbody** crossings. Only the equipment necessary for excavating the trench, lowering-in the pipe, and backfilling the trench is allowed in the waterbody. Columbia will attempt to complete trenching and backfill work in the waterbody within 48 hours, unless site-specific conditions make completion within 48 hours infeasible.

For crossings of coldwater fisheries and coolwater and warmwater fisheries considered significant by the state, or federally designated as critical habitat 10 to 30 feet in width, install the pipeline using the dry-ditch method or Dam and Pump method, unless approved otherwise in writing by the appropriate state agency.

c) Major Waterbodies

Due to their sensitive nature, **major waterbody** crossings will have site-specific construction plans approved by the Natural Resource Permitting group. Directional drilling may be considered as an alternative for these crossings.

3. Clearing

Tree and brush clearing will be performed as previously described in Section II, "Upland Construction". All cleared materials will be disposed of at least 50 feet from the water's edge.

All disturbed areas within 50 feet of top-of-bank shall be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized.

4. Grading

Grading equipment will not enter the water to grade the banks. Waterbody banks will be graded only where, and as much as, necessary to permit safe and efficient operation of construction equipment. During grading operations, sediment filter devices will be installed across the entire construction right-of-way promptly and as close to the water as practical. Removable sediment filter devices must be installed across the travel lane. These removable sediment filter devices, if removed during the day, must be re-installed by the end of the work day or when heavy precipitation is imminent. All disturbed areas within 50 feet of the water's edge will be promptly mulched. The mulch will be maintained until the waterbody crossing restoration is complete. Spoil from grading will be piled at least 10 feet from the stream banks and immediately protected with sediment filter devices so that it will not erode into the waterbody. On waterbody crossings with approaches sloped 5 percent or greater, interceptor diversions will be installed 50 feet from the water's edge to divert surface runoff into adjacent vegetation. If vegetation is sparse or

nonexistent, a sediment filter device will be installed at the discharge of the diversion. Install a sediment filter device across the entire construction right-of-way at the base of slopes 5 percent or greater where the base of the slope is less than 50 feet from a stream. Leave adequate room between the sediment filter device and base of the slope for sediment deposition.

Construction equipment bridges consisting of culvert(s) ~~with clean rock fill~~ of non-erodable material or equipment pads as illustrated in **Attachment B** will be installed during grading operations at all waterbodies. For proper culvert installation, the Inspector may permit grading/excavating equipment to enter the water. ~~Equipment bridges are not required at minor waterbodies that do not have a state-designed fishery classification (for example, agricultural or intermittent drainage ditches). However, if an equipment bridge is used, it must be constructed in accordance with this ECS. Construct equipment bridges to maintain unrestricted flow and to prevent soil from entering the stream.~~

5. Trenching

Notifications to applicable jurisdictional agencies will be made at least 2 days prior to any trenching in waterbodies, or as specified in permits

Prior to trenching within the waterbody, water impounded in the upland trench will be pumped into a sediment trap (**Attachment B**) and/or properly installed filter bag (**Attachment B**) and/or a series of terra tubes, sediment logs or flocculent logs, or a heavily vegetated upland area where the water can filter back into the ground. Prevent the flow of spoil or heavily silt-laden water into any waterbody.

Sediment filter devices for trench spoil will be installed prior to commencing trenching activities. Sediment filter devices can be temporarily removed from the trench line only to allow trenching activities to proceed.

All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction ROW at least 10 feet from the water's edge or in additional extra work areas.

For all new construction activities, the minimum depth of cover for all waterbody crossings is 48 inches in normal soils and 24 inches in consolidated rock.

Temporary trench plugs will be used at all ~~non-flumed~~ waterbody crossings to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody. Trench plugs must be of sufficient size to withstand upslope water pressure.

Trench plugs shall also be installed on either side of streams and wetlands. Trench plug materials shall consist of foam, clay, bentonite or concrete filled sacks.

For dry ditch method crossings, use sand bag or sand bag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required in to achieve an effective seal). In addition, do not remove flume pipe during trenching, pipelaying, or backfilling activities, or initial streambed restoration efforts.

6. Blasting

During the pre-planning of waterbody crossings, an evaluation will be made concerning the need for blasting. If the evaluation is inconclusive, the waterbody bed will be tested for consolidated rock prior to trenching. Blasting will not be done within waterbody channels without prior approval from applicable government authorities having jurisdiction and at least 2-day notice to the authority, or as specified in permits

If the waterbody bottom is consolidated rock, it can be drilled and shot at any time prior to commencing the crossing. However, removal of shot rock, and any additional drilling, shooting and material removal, must be completed within the minimum number of consecutive calendar days practical. The time frame for completing the crossing will immediately commence once a trench of appropriate dimensions is established.

7. Backfilling

Waterbody bottoms will be returned as near as practical to their original contours. Spoil from the trench will be used as backfill. Clean gravel or native cobbles will be used for the final one-foot of fill in the backfilled trench in all coldwater fisheries.

The sediment filter devices removed at the stream will be promptly reinstalled after backfilling.

8. Restoration

The preferred restoration method is to achieve final grade and restore the waterbody, its banks, and 50-foot buffers within 24 hours of backfilling. In the absence of site-specific seeding recommendations, the specifications listed in **Attachment B** will be used. If conditions do not permit the preferred method, the construction work area not in use for access will be promptly rough graded and stabilized in accordance with **Attachment B**.

Stabilize waterbody banks and install permanent sediment barriers/sediment filter devices within 24 hours of completing the crossing. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.

Liquid mulch binders will not be used within 100 feet of waterbodies except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.

For each waterbody crossed, install a permanent interceptor diversion/slope breaker and a trench breaker at the base of slopes near the waterbody. Locate the trench breaker immediately upslope of the interceptor diversion/slope breaker.

All equipment bridges will be removed once access in the area is no longer required.

Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the Environmental Inspector. Install erosion control fabric or a functional equivalent on waterbody banks at the time of final bank recontouring. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices. If the waterbody banks are such that an unstable final soil grade would result and vegetative stabilization is inadequate, the Inspector will require mechanical stabilization of the waterbody banks. Mechanical stabilization includes riprap, gabions, jute netting, etc.

Unless otherwise specified by state permit, limit the use of riprap to areas where flow conditions preclude effective vegetative stabilization techniques, such as seeded erosion control fabric.

Revegetate disturbed riparian areas with native species of conservation grasses, legumes and woody species, similar in density to adjacent undisturbed lands.

~~Application of riprap must comply with the US Army Corps of Engineers, or its delegated agency, permit terms and conditions. In general, riprap will be of field or quarry run stone, which is hard and durable. The riprap will be large enough to prevent normal waterbody current from moving it, typically 6-inch rock for slow moving waterbodies and 12 inch or larger rock for others. The riprap will be placed at least 18 inches thick and generally thicker at the base. The riprap slope will be no steeper than 1:1 and should conform with the remainder of the waterbody bank slopes where they are flatter than 1:1.~~

Install erosion control fabric, **Attachment B**, such as jute thatching or bonded fiber blankets at a minimum, on waterbody banks ~~at the time of final bank re-contouring~~. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat, unless the product is specifically designed to minimize harm to wildlife. Anchor the erosion control fabric with staples or other appropriate devices.

All disturbed areas within 50 feet of top-of-bank shall be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized. A temporary sediment barrier (compost filter sock in high-quality watersheds and silt fence in non high-quality watersheds) shall be installed directly above the erosion control blanketing and maintained until the crossing is stabilized.

Sediment filter devices will be removed once permanent revegetation is successful.

B. Wetland Crossings

1. General

The main objective of any wetland crossing is to construct the pipeline and restore the original contour of the wetland. Wetlands will be clearly marked in the field by a knowledgeable person prior to the start of construction with signs and/or highly visible flagging until construction is complete. The Inspector will maintain these field markings during construction. A maximum 75-foot wide construction work area may be used through wetlands.

Aboveground facilities will not be located in any wetland, except where the location of such facilities outside of wetlands would prohibit compliance with US DOT regulations.

When water levels are temporarily high, the Inspector will direct that starting construction in the wetland will be postponed until after the water levels subside.

Standards relating to spill prevention at wetlands are contained in Section IV, “Spill Prevention”.

2. Crossing Techniques

For wetland crossings without standing water or saturated soils, upland construction techniques can be used provided the top 12 inches of soil taken from the trench is stockpiled separately from the remaining excavated material. The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats), In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction right-of-way.

Wetland crossings in non-saturated soil wetlands will be constructed in a manner that will minimize the amount of time construction activities are occurring in the wetland, such as the length of time the topsoil is segregated and the trench is open. The wetland will not be trenched until the pipeline is assembled and ready to be lowered in.

Wetland crossings with standing water or saturated soils will be constructed as separate construction entities, such that trenching, pipe installation, backfilling, and restoration are completed in the minimum number of consecutive calendar days necessary. Clearing, grading and equipment crossing installations are not included as part of the separate construction entity. The “push-pull” or “float” technique of pipe installation will be utilized whenever water and other site conditions permit. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

If standing water or saturated soils are present or if construction equipment causes ruts or mixing of the topsoil and subsoil, use **low-ground-weight** construction equipment, or operate normal equipment on timber riprap (only 2 layers), prefabricated equipment mats or terra mats. Tree stumps, rock, gravel, soil imported from outside the wetland or brush will not be used to stabilize the construction work area or as equipment pads in wetlands. Remove all equipment mats, and timber riprap during restoration of the wetland.

Staging areas will be located at least 50 feet from the wetland edge except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land and will be limited to the minimum necessary to construct the crossing. If topographic conditions do not permit a 50-foot setback, these areas must be located at least 10 feet from the wetland’s edge with prior approval from the Natural Resources Permitting group.

The only access roads, other than the construction work area, that can be used in wetlands are those existing roads that can be used with no modification or improvement, other than routine repair, and no impact on the wetland.

Limit construction equipment operating in wetland areas to that needed to clear the construction work area, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the ROW. All other construction equipment shall use access roads located in upland areas to the maximum extent practicable. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction work area.

A typical wetland crossing is illustrated in **Attachment B.**

3. Clearing

Tree and brush clearing will be performed as previously described in Section II, “Upland Construction”. Cut vegetation off just above ground level, leaving existing root systems in place, and remove (vegetation) from the wetland for disposal. Woody debris can be burned in wetlands, if approval by the COE and in accordance with state and local regulations, ensuring that all remaining woody debris is removed for disposal.

4. Grading

Grading in wetlands will consist of the minimum necessary for safe and efficient equipment operation. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the construction work area in wetlands unless the Chief Inspector and **Environmental Inspector** determine that safety-related construction constraints require removal of tree stumps from under the working side of the construction work area. Areas where stumps are removed will be noted by the Inspector so, if necessary, those areas can be replanted with woody vegetation as described in wetland restoration.

Where wetlands are adjacent to the construction right-of-way and the right-of-way slopes toward the wetland, install sediment barriers along the edge of the construction work area as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the wetland. Remove these sediment barriers after successful restoration has occurred.

Sediment filter devices will be installed promptly across the construction work area during grading at any wetland edge and maintained until construction work area revegetation is complete. Temporary interceptor diversions will be installed adjacent to wetlands. Locations for these devices are illustrated in **Attachment B**.

5. Trenching

Sediment filter devices can be temporarily removed from the trenchline to allow trenching activities to proceed. Spoil piles will be protected with sediment filter devices, if determined necessary by the Inspector, to prevent the flow of spoil off the construction work area.

Trench plugs shall also be installed on either side of streams and wetlands. Trench plug materials shall consist of foam, clay, bentonite or concrete filled sacks.

6. Blasting

During the pre-planning of crossing wetlands with standing water or saturated soils, an evaluation will be made concerning the need for blasting. If the evaluation is inconclusive, the wetland will be tested for

consolidated rock prior to trenching. If the wetland has consolidated rock, it must be drilled and shot as part of the single construction entity.

7. Backfilling

If trench dewatering is required, the water will be filtered and discharged through a sediment trap (**Attachment B**) and/or filter bag (**Attachment B**) and/or a series of terra tubes, sediment logs or flocculent logs or into a heavily vegetated area outside the wetland (where the water will filter back into the ground), so that no silt-laden water enters directly into a wetland or waterbody. Remove any dewatering structure as soon as practicable after the completion of dewatering activities. Spoil from the trench will be used as backfill. The surface will be recontoured as closely as practical to the original condition so that drainage patters will not be changed. The conserved topsoil layer will be returned to the surface after backfilling.

Sediment filter devices will be promptly installed after backfilling.

Where the pipeline trench may drain a wetland, construct trenchline barriers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology. For each wetland crossed, install a permanent interceptor diversion and trenchline barriers at the base of slopes near the boundary between the wetland and adjacent upland areas. Locate the trenchline barriers immediately upslope of the interceptor diversion. Restore pre-construction wetland contours to maintain the original wetland hydrology.

Concrete coating activities will not take place within 100 feet of any wetland.

8. Restoration

For each wetland crossed, install a ~~trench breaker~~ trench plug at the base of slopes near the boundary between the wetland and adjacent upland areas. Install a permanent ~~slope breaker/interceptor diversion~~ waterbars across the construction right-of-way at the base of a slope greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers/sediment filter devices as shown in **Attachment B**. In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

Consult with the appropriate federal or state agencies to develop a project-specific wetland restoration plan. The restoration plan should include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of invasive species and noxious

weeds (e.g., purple loosestrife and phragmites), and monitoring the success of the revegetation and weed control efforts.

Upon completion of construction in wetland areas with standing water or saturated soils, all access improvements will be promptly removed. In the absence of specific recommendations from conservation authorities, the seed mix and rate specified in Table 2c will be used. Fertilizer, lime or mulch will not be used, unless required in writing by the appropriate federal or state angency.

In accordance with PADEP *Erosion and Sediment Control Pollution Control Program Manual* (March 2012), Lime and Fertilizer are not to be applied to the backfilled trench, Annual Rye grass may be applied at the rate of 40 lb/acre where needed to areas without standing water. Mulch should be used at a rate of 3 tons/acre and without binding agents.

Asphaltic emulsions will not be used to stabilize mulch within 100 feet of wetlands. Liquid mulch binders will not be used within 100 feet of wetlands.

IV. SPILL PREVENTION, CONTAINMENT AND CONTROL

A. General

A project-specific Preparedness Prevention and Contingency (PPC) Plan will be prepared for the pipeline in accordance with Pennsylvania PPC Guidelines, Chapter 78.

Spills of any amount of petroleum products or polluting materials are to be prevented. The following will be followed to help avoid spills and minimize the impact of spills, which accidentally occur:

- Bulk quantities up to 5,000 gallons of diesel fuel and 5,000 gallons of gasoline will be stored in one location (the fuel depot) for the Project. Adequate spill containment measures, such as containment dikes, combined with impervious lining will be installed before fuel storage tanks are filled, and will be maintained throughout the Project. Bulk quantities of hazardous liquids (e.g., solvents and lubricants) will be stored at the fuel depot locations.

- Fuel can be stored at the equipment staging areas and as much equipment as practical will be refueled there. Any equipment that must be refueled in the field will be fueled from tanks carried to the work site. Fuel carriers (greater than 110 gallons capacity) will not be permitted to cross wetlands or ford waterbodies. Equipment refueling will not be performed within 100 feet of any body of water or wetland except by hand-carried cans (5 gallon maximum capacity) when necessary. If construction equipment must be refueled within 100 feet of a waterbody, follow the procedures outlined in the project-specific SPCC Plan. Care will be taken during refueling not to overfill or spill fuel onto the housing of equipment.

- Lesser quantities of fuel (up to 500 gallons) and solvents and lubricants (e.g., motor oils, hydraulic fluid) may be stored along the construction work area as necessary to service equipment used on the Project (quantities vary depending on the size of the construction spread being used), provided that this storage does not conflict with other parts of this plan. Sorbent booms and clean-up kits will be kept at all storage locations and will be readily available at all times.

- All fuel storage areas will be located at least 100 feet from streams, ponds, or wetlands; at least 200 feet from active private water wells, and at least 400 feet from municipal water wells, unless using an operational fuel storage area established on Columbia property. All fuel storage areas will not be located within any designated municipal watershed area (except at locations designated for these purposes by an appropriate governmental authority): Equipment servicing, lubricating and refueling will also be in accordance with these requirements whenever possible (i.e., except when stationary equipment such as drilling rigs is being used). Where these conditions cannot be met, the Environmental Inspector will prepare a supplemental SPCC plan, based on field conditions, to protect these resources.

- Use of hazardous materials for vehicle maintenance will follow the same requirements mentioned above for equipment refueling. Impervious or sorbent materials will be placed under the work area before the work begins. Additional sorbent materials will also be readily available. Waste materials created during maintenance (e.g., used oil) will be collected for proper disposal. The work site and the vehicle will be checked by a Columbia inspector after the maintenance work is complete to ensure that all hazardous materials are properly contained. All waste material, including partially used or empty containers, discarded parts, clean up rags, and used sorbent materials, as well as discarded hazardous materials containers (e.g., oil cans, grease tubes), will be collected for proper disposal.

- All motor fuel, lube oil, chemicals, and other polluting substances will be tightly sealed and clearly labeled during transportation and storage.

- Fuel trucks, pumps, mechanics' vehicles, the contractor's foremen's vehicles and Columbia Inspectors' vehicles will be equipped with appropriate sized spill kits containing absorbent materials approved for petroleum products and have sufficient tools and material to stop leaks.

- Construction equipment will not be washed in any body of water or wetland, nor will runoff resulting from washing operations be permitted to directly enter any body of water or wetland area.

- Construction equipment, vehicles, materials, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products will not be

parked, stored, or serviced within 100 feet of all bodies of water and wetlands.

- All equipment will be checked, by a Columbia inspector, daily for leaks prior to beginning work in bodies of water or wetlands. Steps will be taken to repair leaks or remove the equipment from service, if necessary.

If barge mounted equipment is to be employed, the contractor will develop specific spill-prevention plans to be reviewed and approved by Natural Resource Permitting group.

B. Spill Cleanup

Spills occurring during construction, operation and maintenance are to be reported immediately to the Monitoring Center at 1-800-835-7191 in accordance with Columbia policies, plans and procedures (Plan Number 120.02.01). Columbia's Environmental Health and Safety department will be responsible for contacting the appropriate agencies, except as provided for below.

If the call to the Monitoring Center is not returned within 30 minutes ***and*** the spill has impacted water, the person discovering the spill or release will contact the National Response Center at 1-800-424-8802 and report the release. That person will continue calling the Monitoring Center until a representative is reached.

If a spill should occur, Columbia will ensure immediate action is taken to minimize the impact of the spill, and see that appropriate cleanup action is immediately undertaken.

In the event of a spill into or in the vicinity of bodies of water or wetlands, the following will occur immediately:

- the source will be immediately stopped;
- the spill will be contained by placing sorbing booms or constructing dikes;
- the spill will be collected with sorbing materials, skimmed off water surfaces with booms, and/or the contaminated soil will be excavated;
- the waste materials will be properly stored and disposed in accordance with Columbia policy.

The affected areas will be restored as closely as possible to their previous condition.

If the spill is such that Columbia personnel or the on-site contractor cannot immediately and effectively respond, Columbia's environmental contractor, who specializes in spill cleanup, will be employed.

V. MAINTENANCE

A. General

Maintenance of Columbia's ROWs is an ongoing process, which is governed by Columbia policy, certificate and permit conditions and landowner agreements. Routine vegetation mowing or clearing over the full width of the permanent ROW in uplands shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion/leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in a herbaceous state. In no case shall routine vegetation mowing or clearing accur during the migratory bird nesting season between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency or the U.S. Fish and Wildlife Service.

Maintenance activities will be performed with emphasis on preservation and enhancement of the environment. All applicable certificate and permit conditions will be incorporated into the future maintenance plan of the facility.

Specific procedures when required by regulations will be developed in coordination with the appropriate agency to prevent the introduction or spread of noxious weeds and soil pests resulting from construction and restoration activities.

B. Upland Areas

Plant growth on the ROW will be inspected regularly and maintained for the life of the facility. Follow-up inspections will occur after the first and second growing season.

Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise.

The disturbed areas will not be considered stabilized until a minimum uniform 70% vegetative cover of erosion resistant perennial species has been achieved and final inspection by the Conservation District is completed.

Continue revegetation efforts until revegetation is successful.

Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is successful.

ROW are generally maintained by mowing or other mechanical means, and through the use of herbicides. Use of herbicides will follow Columbia policy. Only those herbicides approved by the EPA will be used. Herbicide use will be in accordance with existing regulations and label instructions.

If revegetation is not successful, the area will be restored as soon as practical.

Problems with drainage and irrigation systems resulting from construction activities will be reported to the local Operations Team Leader. Corrective measures will be performed as needed.

Erosion problems on the facility ROW and access roads will be reported to the local Operations Team Leader or the Natural Resource Permitting group. Corrective measures will be performed as needed. Erosion control devices that are no longer required must be removed. Removal of the erosion control devices will be at the discretion of the local Operations Team Leader and the Engineering & Construction department. Similarly, additional erosion control devices will be installed as required.

Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies, or roads are stabilized. Remove temporary sediment barriers from an area once that area is successfully restored.

Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary.

C. Waterbodies, Wetlands, and Environmentally Sensitive Areas

Columbia will work cooperatively with appropriate government agencies in an effort to minimize the impacts of ROW maintenance in waterbodies, wetlands, and other environmentally sensitive areas.

Limit routine vegetation mowing or clearing adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to grow. **Attachment B** illustrates ROW maintenance standards near waterbodies.

Do not use herbicides or pesticides in or within 100 feet of a waterbody or wetland except as specified by the appropriate land management or state agency. Mowing and clearing of riparian areas is restricted to April 15-August 1st of any year.

In wetlands, a corridor up to 10 feet wide centered on the pipeline will be cleared at a frequency necessary to maintain in a herbaceous state. In addition, trees that are located within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating may be selectively cut. All felled trees will be removed from the wetland.

Attempts will be made to prevent the invasion or spread of undesirable exotic vegetation (i.e., purple loosestrife and phragmites) within wetland areas disturbed during construction. Typically, these efforts include Columbia's wetland construction techniques and the use of approved herbicides.

Monitor the success of wetland revegetation annually for the first 3 years after construction or until wetland revegetation is successful. Revegetation should be considered successful if the affected wetland satisfies the current federal definition for a wetland (i.e. soils, hydrology, and vegetation) if the vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjancent wetland areas that were not disturbed by construction, if natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and, invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

Within 3 years after construction, file a report identifying the status of the wetland revegetation efforts and documenting success as defined, above. The requirement to file wetland restoration reports does not apply to projects constructed under the automatic authorization, prior notice, or advance notice provisions in the FERC's regulations.

For any wetland where revegetation is not successful at the end of 3 years after construction, develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively revegetate wetlands. Continue revegetation efforts and file a report annually documenting progress in these wetlands until wetland revegetation is successful.

For certain locations through Columbia's system listed threatened, endangered, or special concern species and their habitats have been identified. In addition, eligible cultural resources, wetlands, and other environmentally sensitive areas may also have been identified. In these instances, permits normally include maintenance provisions that must be adhered to for the life of the facility.

VI. ENVIRONMENTAL CONSTRUCTION MANAGEMENT AND INSPECTION

A. General

Columbia is responsible for compliance with the environmental conditions contained in a Projects' EM&CP, which include all permits and other approvals. One or more Environmental Inspectors will be assigned to every Project and will report to the Natural Resources Permitting group. At least one Environmental Inspector is required for each construction spread during active construction or restoration. Environmental Inspectors shall have peer status with all other activity inspectors. Environmental Inspectors shall have the authority to stop activities that violate the environmental conditions of the FERC's Orders, stipulations of other environmental permits or approvals or landowner easement agreements; and to order appropriate corrective action.

B. Environmental Inspector

The Environmental Inspector is responsible for assuring that the construction activity is performed in accordance with the environmental conditions of the

EM&CP and landowner requirements and has the authority to stop work and order appropriate corrective action as outlined in Section VI.E. For construction activities that are found by the Natural Resource Permitting group to have minimal environmental impacts, the Environmental Inspector may also serve to monitor other construction functions.

At a minimum, the Environmental Inspector(s) shall be responsible for:

- inspecting construction activities for compliance with the requirements of this Plan, the Procedures, the environmental conditions of the FERC's Orders, the mitigation measures proposed by the applicant project sponsor (as approved and/or modified by the Order), other environmental permits and approvals, and environmental requirements in landowner easement agreements.

- Identifying, documenting and overseeing corrective actions, as necessary to bring an activity back into compliance.

- verifying that the limits of authorized construction work areas and locations of access roads are visibly marked before clearing and maintained throughout construction;

- verifying the location of drainage and irrigation systems;

- verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;

- identifying erosion/sediment control and stabilization needs in all areas;

- ensuring that the design of slope breakers will not cause erosion or direct water into sensitive environmental resource areas, including cultural resource sites, wetlands, waterbodies, and sensitive species habitats;

- verifying that dewatering activities are properly monitored and do not result in the deposition of sand, silt, and/or sediment into sensitive environmental resource areas, including wetlands, waterbodies, cultural resource sites, and sensitive species habitats; stopping dewatering activities if such deposition is occurring and ensuring the design of the discharge is changed to prevent reoccurrence; and verifying that dewatering structures are removed after completion of dewatering activities;

- ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;

- advising the Chief Construction 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;

- ensuring restoration of contours and topsoil;

- verifying that the soils imported for agricultural or residential use are certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

- ensuring that erosion control devices are properly installed to prevent sediment flow into sensitive environmental resource areas (e.g., wetlands, waterbodies, cultural resource sites, and sensitive species habitats) and onto roads, and determining the need for additional erosion control devices;

- Inspecting and ensuring the maintenance of temporary erosion control measures at least:

    a. on a daily basis in areas of active construction or equipment operation;
    b. on a weekly basis in areas with no construction or equipment operation; and
    c. immediately following a storm event that result in run-off;

- ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification, or as soon as conditions allow if compliance with this time frame would result in greater environmental impacts

- keeping records of compliance with the environmental conditions of the FERC's Orders, and the mitigation measures proposed by the project sponsor in the application submitted to the FERC, and other federal or state environmental permits during active construction and restoration;

- Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase; and

- Verifying that location disposal of excess construction materials for beneficial reuse comply with section III.E.

- establishing a program to monitor the success of restoration. Implementation of this program may be transferred to (Field Services) upon completion of construction and restoration activities;

- looking for evidence of contamination and, if found, cease activities in that area and notify the Environmental Health & Safety department and the Natural Resource Permitting group and wait for further instruction. If the contamination is determined to be hazardous, an experienced hazardous

waste contractor will be mobilized to handle the waste; the hazardous waste contractor will follow a site-specific health and safety plan and standard operating procedures for working in hazardous environments, which is maintained by the Environmental Health & Safety department; and

- verifying the location of signs and visible flagging marking the boundaries of wetlands, waterbodies and other environmental sensitive areas.

C. Environmental Training

The Engineering & Construction Project Manager assigned to the construction activity and/or the Columbia employee in responsible charge, will be responsible for assuring that the Environmental Inspector(s), other inspectors and any contractor's foreman have been trained in all environmental aspects of the activity, and fully understands the environmental conditions contained in the activity's EM&CP.

The Natural Resource Permitting group staff will conduct training for construction personnel when sensitive resources are present or when permit/certificate conditions mandate, or when requested by the Team Leader.

D. Contractor's Environmental Compliance Specialist (Environmental Foreman)

For construction activities that utilize an outside contractor, the contractor will be required to provide at least one environmental compliance specialist. This specialist will become thoroughly familiar with Columbia's EM&CP for the activity. The specialist will be responsible for the contractor's efforts to correctly install and maintain environmental control devices and for construction in environmentally sensitive areas. Contractor's specialist will work in cooperation with Columbia's employees responsible for environmental compliance.

The Contractor's Environmental Foreman must be available at all times during the project and have the appropriate number of available employees to adequately implement the project's EM&CP.

E. Environmental Construction Management

The Environmental Inspector and each functional inspector shall have the authority to stop work on a particular construction function to which they are assigned if it deviates from the environmental conditions of the activity's EM&CP. The deviation shall be reported immediately to the Columbia employee in responsible charge of the activity and the Environmental Inspector. The Columbia employee in responsible charge, the Engineering & Construction Team Leader and the Natural Resource Permitting group department will be responsible for the resolution of the deviation.

Stop work authority for the entire construction activity rests with the Columbia employee in responsible charge or the Engineering & Construction Team Leader.

The Natural Resource Permitting group may, from time to time, perform inspections of construction activities to review the implementation of the EM&CPs. The Natural Resource Permitting group will have stop work authority during these inspections should deviations from the activity's EM&CP occur. Any corrective actions that are required shall be taken as directed by the Natural Resources Permitting group.

F. Environmental Variances

Unapproved variances from an EM&CP and this ECS are not permitted. Any proposed variance from an EM&CP will require approval from the EM&CP preparer, prior to commencing the activity. The approval for a variance will be in writing. In instances where written approval is not practical (i.e., emergencies and weekends), verbal approval may be given provided that written confirmation is provided as soon as possible.

Any proposed variance from this ECS will require approval from the Natural Resource Permitting group prior to commencing the activity.

VII. EMERGENCY CONSTRUCTION

In the event of an emergency, the Company employee in responsible charge will take such action as is necessary to contain the emergency giving due regard to minimizing environmental impact. In conjunction with other Columbia policies, the requirements contained in this ECS will be followed as close as possible.

[1] Will include all environmental and regulatory mandated surveys such as but not limited to, threatened and endangered species surveys, archeology surveys, wetland delineations etc.

[2] Deviations that involve measures different from those contained in this ECS will only' be permitted by written approval from the Natural Resource Permitting group. The Natural Resource Permitting group may be required to obtain written approval from the Director of the Office of Pipeline Regulation (OPR) (Federal Energy Regulatory Commission), or his/her designee, unless specifically required in writing by another Federal, state, or Native American land management agency for the portion of the project on its land. The Natural Resource Permitting group shall coordinate the filing of other agency requirements with the Secretary of the Commission (Secretary). This filing shall be prior to construction.

VIII. DEFINITION OF TERMS*

AGRICULTURAL LANDS: Permanent or rotated croplands, hayfields, and pastures.

COLUMBIA: Columbia Gas Transmission Corporation

COE: U.S. Army Corps of Engineers

CONSTRUCTION WORK AREA: Construction work areas include permanent and temporary ROW, contractor's yards, pipe and materials storage yards, staging areas, and access roads.

ECS: Environmental Construction Standards

ENVIRONMENTAL INSPECTOR: The Inspector responsible for environmental compliance on a construction project.

EPA: Environmental Protection Agency

FWS: U.S. Fish and Wildlife Service

EM&CP: Environmental Management and Construction Plan

EXCEPTIONAL VALUE WATER(S): A stream or waterbody which constitutes an outstanding national, State, regional or local resource, such as waters of national, State or county parks or forests, or waters which are used as a source of unfiltered potable water supply, or waters of wildlife refuges or State game lands, or waters which have been characterized by the Fish Commission as "Wilderness Trout Streams." and other waters of substantial recreational or ecological significance.

FINAL GRADING: Includes returning the construction work area as closely as practical to its original contour, redistributing conserved topsoil, soil compaction testing in agricultural lands, and installing final interceptor diversions.

HIGH QUALITY STREAM: A cold water fishery or significant warm water fishery as designated by a state resource agency.

IMMEDIATE: Without interval of time; "right now".

INSPECTOR: Collectively: the Chief Inspector, Environmental Inspector, Utility Inspector, or any other inspector assigned to do an environmental task.

INTERMITTENT WATERBODY: A waterbody channel which generally carries water in the spring or immediately after a rain event; designated on topographic maps and environmental construction drawings with a broken line.

INTERMEDIATE WATERBODY: A waterbody greater than 10 feet wide at the water's edge at the time of construction but less than or equal to 100 feet wide.

LOW-GROUND-WEIGHT: Construction equipment that is designed "specifically for" or "frequently used in" areas where compaction and sinking is to be minimized. This equipment can be less than 5 lbs/in^2 or contain wider tracks than the standard minimum size width tracks for the model equipment to be used.

MAJOR WATERBODY: A waterbody greater than 100 feet wide at the water's edge at the time of construction.

MINOR WATERBODY: A waterbody less than or equal to 10 feet wide at the water's edge at the time of construction.

MSDS: Material Safety Data Sheet

NRCS: Natural Resource Conservation Service

NOISE SENSITIVE AREA: Includes residences, schools, churches, cemeteries, hospitals, farms, camping facilities and outdoor amphitheaters and playgrounds.

ORV: Off-road vehicle.

PERENNIAL WATERBODY: A waterbody which generally flows all year in years of normal rainfall; waterbody level is generally lowest in the fall, highest in the spring; designated with a solid line on topographic maps and environmental construction drawings.

PROMPTLY: By the end of the work day.

RESTORATION: Includes fertilizing, liming, disking, seeding and mulching, and crimping mulch.

RIVER: A waterbody which is 100 feet wide or more.

ROW: Right-of-way.

SCARIFY: To make shallow cuts into the soil surface. This should be accomplished with a disk, rake, tracked equipment (grousers) or other suitable means.

SEDIMENT FILTER DEVICE: Properly embedded silt fence, erosion control logs, terra tubes, staked bales or other approved device.

SPCC: Spill Prevention Control and Countermeasure Plan

STEEP SLOPE: Slope of approximately 33% or greater.

TEMPORARY STABILIZATION: Includes installing temporary interceptor diversions and sediment filter devices, mulching critical areas and at times, seeding to hold soil in place until final grading and restoration can be accomplished.

UPLAND CONSTRUCTION: All areas which are not waterbodies, rivers, streams, or wetlands.

WATERBODY: Includes any natural or artificial waterbody, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes.

WETLAND: An area of special concern with soils prone to holding water for long periods of time, generally also characterized by distinctive plants such as rushes, sedges, cattails, or certain trees. Includes any area that satisfies the requirements of the current Federal methodology for identifying and delineating wetlands.

*Includes all grammatical variations of each term.

ATTACHMENT A

FERC's Plan and Procedures are available at http://www.ferc.gov/industries/gas/enviro/guidelines.asp.

ATTACHMENT B

PROJECT-SPECIFIC CONSTRUCTION TYPICALS

Drawings can be found in Columbia's application to the FERC in Resource Report 1, Appendix 1E.1. Search for Docket No. CP14-17-000, and accession number 20131101-5125.

Appendix C
Agricultural Impact Minimization Plan

Columbia Gas Transmission℠
A NiSource Company

COLUMBIA GAS TRANSMISSION, LLC

EASTSIDE EXPANSION PROJECT

Docket No.
CP14-17-000
PF13-7-000

AGRICULTURAL IMPACT MINIMIZATION PLAN

December 2013

AGRICULTURAL IMPACT MINIMIZATION PLAN
EASTSIDE EXPANSION PROJECT

Introduction

On November 1, 2013, Columbia Gas Transmission, LLC ("Columbia") filed an application for a certificate of public convenience and necessity with the Federal Energy Regulatory Commission ("Commission" or "FERC") for the East Side Expansion Project (the "ESE Project" or "Project") in Pennsylvania, New Jersey, New York, and Maryland. The proposed Project will include construction of two natural gas looping pipelines and related facilities. The Line 1278 Loop will consist of approximately 9.5 miles of 26-inch-diameter pipeline in Chester County, Pennsylvania, and the Line 10345 Loop will consist of approximately 9.5 miles of 20-inch-diameter pipeline in Gloucester County, New Jersey. To the extent practicable, Columbia proposes to co-locate the pipeline loops parallel to the existing pipelines or other existing rights-of-way ("ROW"). Additionally, as part of the Project, Columbia proposes to construct modifications and upgrades at four compressor stations in Pennsylvania and Maryland and at three measurement and regulation ("M&R" or "meter") stations in Pennsylvania and New York. Columbia proposes to begin construction of the Project pipeline facilities in November 2014 and to place the facilities in-service by September 2015.

This Agricultural Impact Minimization Plan outlines the protective measures that Columbia and its contractor would implement to minimize impacts to agricultural lands (*e.g.*, active cropland, orchards, vineyards, or hay fields) crossed during construction and operation of the Project.

Construction Documents

This document has been created to outline protective measures specific to active agricultural lands, and is designed to summarize and supplement the measures outlined in the following documents:

- 18 Code of Federal Regulations ("CFR") Part 380 – Regulations Implementing the National Environmental Policy Act;
- 49 CFR Part 192 – Transportation of Natural Gas and Other Pipeline Minimum Federal Safety Standards;
- FERC's 2013 *Upland Erosion Control, Revegetation, and Maintenance Plan* (the "Plan");
- FERC's 2013 *Wetland and Waterbody Construction and Mitigation Procedures* (the "Procedures");
- Columbia's Environmental Construction Standards ("ECS") document, provided in Appendix 1E of Resource Report 1;
- Columbia's Spill Prevention Control and Countermeasures ("SPCC") Plan, provided in Appendix 1E of Resource Report 1;
- The FERC Certificate, if issued, under FERC Docket No. CP14-17-000; and
- Applicable state, county, and local permits.

Notifications

Columbia has consulted and coordinated with landowners and tenant farmers during its route selection process and has developed its route to accommodate their requests to the extent practicable and to

minimize impacts on agricultural lands. Prior to construction, Columbia will provide landowners and tenant farmers of active agricultural lands with as much advance notice as possible, but not less than 24 hours prior to entry.

Construction Monitoring

Columbia will assign at least one environmental inspector ("EI") per construction spread. The role of the EI will be to ensure compliance with the mitigation and construction procedures identified in the FERC application/certificate, including this Agricultural Impact Minimization Plan, as well as those identified in the federal, state, and county permits. Columbia will maintain sufficient oversight via EIs of the construction and will bring in additional inspectors as necessary for specific areas or situations.

In addition, Columbia will require the successful Project contract bidder to provide at least one environmental foreman (compliance specialist). The environmental foreman will be responsible for the contractor's efforts to correctly install and maintain environmental control devices and for construction in environmentally sensitive areas, including agricultural lands. The environmental foreman will be available at all times during the construction and restoration of the Project and will have a sufficient number of employees to implement the Project's compliance standards.

Pipe Depth

Within active agricultural lands, the pipe will be buried with a minimum of 4 feet of cover.

Topsoil Segregation

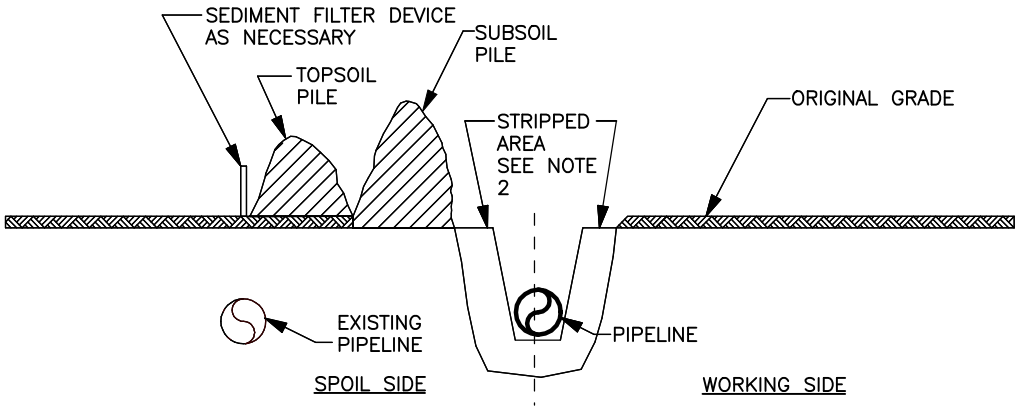
The topsoil will be removed separately to a depth of at least twelve (12) inches or the actual topsoil depth, whichever is less, either from the full work area or from the trench and subsoil storage area (ditch plus spoil side method). All subsoil material that is removed from the trench will be placed in a second stockpile that is separate from the topsoil stockpile. Subsoil will not be stored directly on unstripped topsoil without a barrier. Typical topsoil segregation is depicted in Drawing TA-6711-8608. In backfilling the trench, the stockpiled subsoil material will be placed back into the trench first.

Agricultural Drain Tiles

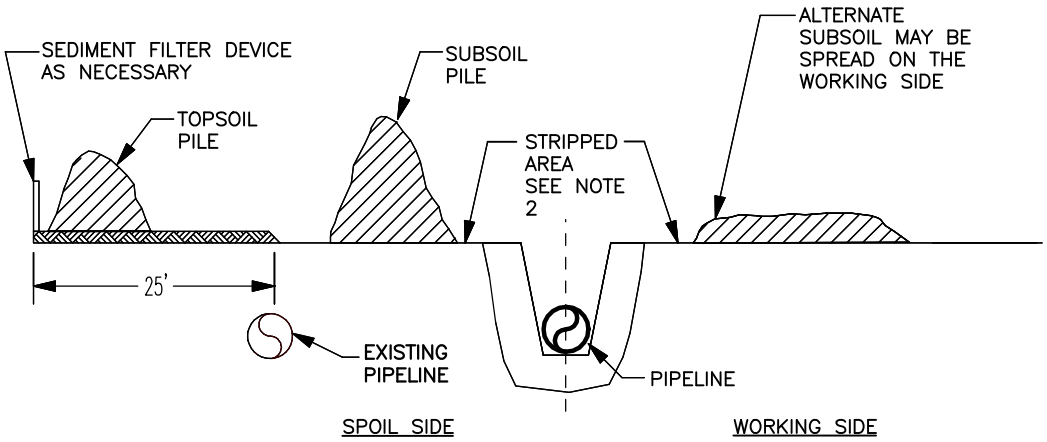
If underground drainage tile is damaged by the pipeline installation, it will be repaired in a manner that assures the tile line's pre-construction operation at the point of repair. Typical drain tile repair procedures are depicted in Drawing TA-6711-8643-NJ. The following standards and policies will apply to the drainage tile repairs:

- Columbia will attempt to locate all identified tile lines prior to construction by contacting landowners or tenants.

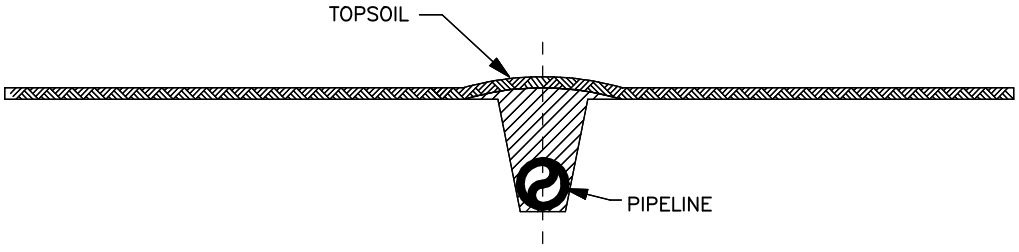
- For drainage tiles cut during ditching, temporary repairs will be made immediately to allow damaged tiles to continue to flow freely, without obstructions, blockages or breaks. The ends of the existing tile will not be plugged and continuous flow will be maintained in the tile system during construction activity, unless otherwise authorized by the landowner.



A. STRIPPED AREA–TRENCHLINE AND SPOIL SIDE



B. STRIPPED AREA–CONSTRUCTION ROW WIDTH



C. REPLACED

NOTES:

1.) OTHER CONFIGURATIONS OF TOPSOIL AND SUBSOIL ARE ACCEPTABLE PROVIDED THEY ARE KEPT SEPARATE.

2.) UP TO 12 INCHES OF TOPSOIL REMOVED.

3.) TOPSOIL AND SUBSOIL PILES WILL BE ADEQUATELY PROTECTED TO PREVENT EROSION AND SEDIMENTATION OFF–SITE BY USE OF SEDIMENT FILTER DEVICES AND/OR MULCH.

CERTIFICATE

TO THE BEST OF MY KNOWLEDGE, ALL COMPONENTS OF THIS DRAWING ARE DESIGNED IN ACCORDANCE WITH APPLICABLE NGT&S GUIDELINES AND SPECIFICATIONS.

DESIGN ENGINEER DATE

ANY CHANGES TO THE DESIGN SHOWN ON THIS DRAWING MUST BE APPROVED BY THE DESIGN ENGINEER

NO.	REVISION	APP'D	DATE
A	ISSUED FOR FERC	JHE	10/18/13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

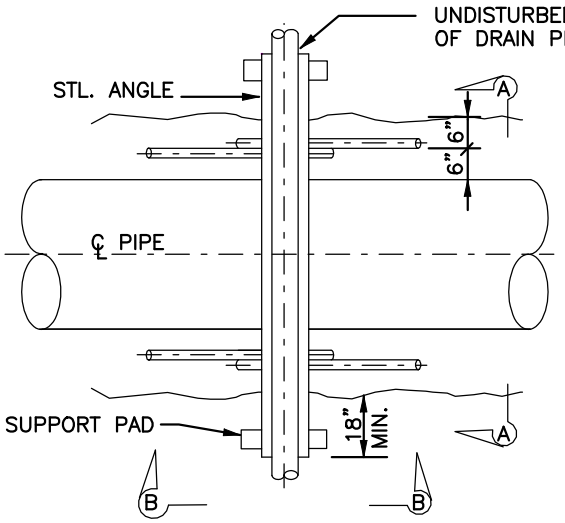
EAST SIDE EXPANSION

TYPICAL TOPSOIL CONSERVATION

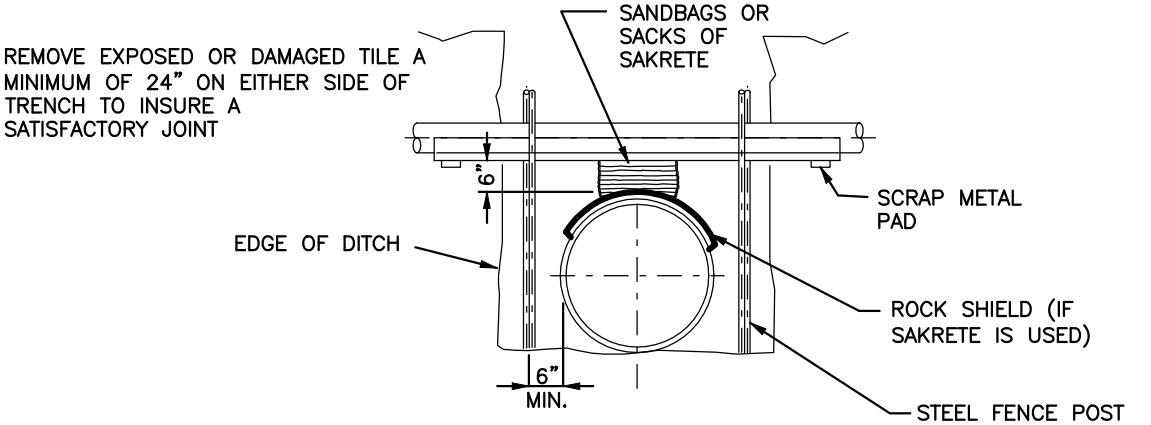
SCALE: N.T.S.

DRAWING NUMBER: TA–6711–8608

ISSUE: A

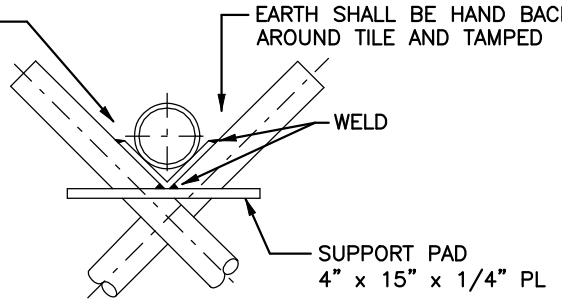


PLAN VIEW
N.T.S.



SECTION "A–A
N.T.S.

TO SUPPORT 4" & 6" TILE USE 4" x 1/4" ANGLE
TO SUPPORT 8" & 10" TILE USE 6" x 7/16" ANGLE
TO SUPPORT 12 & 16" TILE USE 8" x 1/2" ANGLE



SECTION "B–B"
N.T.S.

NOTE:

USE OF SAKRETE SHALL REQUIRE PRIOR COMPANY APPROVAL.

CERTIFICATE
TO THE BEST OF MY KNOWLEDGE, ALL COMPONENTS OF THIS DRAWING ARE DESIGNED IN ACCORDANCE WITH APPLICABLE NGT&S GUIDELINES AND SPECIFICATIONS.

DESIGN ENGINEER DATE

ANY CHANGES TO THE DESIGN SHOWN ON THIS DRAWING MUST BE APPROVED BY THE DESIGN ENGINEER

NO.	REVISION	APP'D	DATE
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Columbia Gas Transmission℠
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EAST SIDE EXPANSION

DRAIN TILE REPAIR PROCEDURE
FIGURE #24

SCALE: N.T.S.

DRAWING NUMBER	ISSUE
TA–6711–8643–NJ	A

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- Permanent tile repairs will be made at the time of backfill. Columbia will repair or replace the tile with tile of comparable quality. The landowner will be given the opportunity to inspect the repaired drainage tile prior to backfilling.

- The excavated pipeline trench will provide a minimum of twelve (12) inches clearance between the pipe and drainage tile on the ROW. Columbia will install its pipe to accommodate drainage tile installations planned within three years of the construction of the pipeline where the location has been identified by qualified tiling personnel and provided in writing to Columbia. At locations along the ROW where future underground tile is proposed, the pipeline trench will be excavated to the required depth to provide the specified clearance.

- Following the completion of the pipeline, Columbia will be responsible for correcting all drainage tile repairs made by Columbia that fail.

Interference with Irrigation Systems

If the pipeline and/or temporary work areas intersect an operational (or soon to be operational) spray irrigation system, Columbia will establish with the landowner or tenant farmer an acceptable amount of time the irrigation system may be out of service. If an irrigation system interruption is caused by the pipeline construction activities and results in crop damages, either on the ROW or off the ROW, the landowner or tenant farmer will be compensated for such crop damages. If it is feasible and mutually acceptable to Columbia and the landowner/tenant farmer, temporary measures will be implemented to allow an irrigation system to continue to operate across land on which the pipeline is also being constructed.

Rock Removal

The pipeline trench, bore pits, or other excavations above the pipeline may be backfilled with soil containing rocks consistent in concentration and size with that existing prior to the pipeline's construction. In areas of consolidated rock formations, suitable precautions will be taken to minimize the potential for excavated rock to become interspersed with the soil material to be backfilled into the trench.

Rocks and/or surplus soil containing rocks that will not be used to backfill the pipeline trench, bore pits, or other excavations will be removed from the property or, subject to permit conditions and relevant laws, disposed of on the property at a location that is mutually acceptable to Columbia and the landowner.

Removal of Construction Debris

All surplus material, equipment skids, trash, litter, and miscellaneous debris from the construction activity will be removed and properly disposed of during final cleanup and restoration.

Compaction and Rutting

Columbia will chisel, disc or till with other appropriate equipment agricultural land traversed by construction equipment to a depth of 12 inches or actual topsoil depth, whichever is less. At least two (2) passes will be made over lands to be chiseled, disked or tilled as described above. In areas where topsoil has been segregated over the work area and traversed by construction equipment passage, the subsoil will be decompacted before replacing the segregated topsoil.

Agricultural land rutted during pipeline construction will be restored to pre-construction contours as near as practicable.

Land Leveling

Following construction of the pipeline, Columbia will restore the Project ROW to its pre-construction elevation and contour as near as practicable. Columbia will provide the Landowners with a telephone number and address that may be used to alert Columbia of the need to perform additional land leveling should uneven settling occur or surface drainage problems develop due to inaccurate leveling during restoration. Columbia will provide such land leveling services within 45 days of receipt by Columbia of the landowner's written notice, weather and property access permitting.

Revegetation

Columbia will negotiate revegetation of impacted agricultural land with the individual landowners. This may include seeding with a seed mix specified by the local county soil conservation authority or as requested by the landowner, or it may include compensation for farmers (whether they are landowners or tenant farmers) up-front for the value of their crops when the easement is executed. The compensation is for 100% of the value of the crop in the easement (temporary or permanent) area for the first year, 50% for the following year, and 25% for the year after that. The determination will be made on a per-acre calculation based on the fair market value of that particular crop. This is paid regardless of any actual damage to the crops that occur during construction. For specialty crops that take longer to recover (*i.e.,* those that would be impacted beyond the construction season), Columbia will negotiate an appropriate compensation plan with the individual landowners or tenant farmers during the easement negotiation process that is based on the duration of potential damage to the crop roots and harvest, and would adjust the payment plan accordingly on a sliding scale.

Affected cropland will be allowed to revert to its previous agricultural use after construction, including those on the permanent ROW, provided they do not interfere with the safe operation and maintenance of the pipeline.

State and County Agricultural Programs

The Project crosses agricultural lands that are enrolled in various state and county agricultural programs, including the Green Acres Program in New Jersey; the Farmland Preservation Program ("FPP"), which is administered by the New Jersey State Agriculture Development Committee ("SADC") in coordination with County Agricultural Development Boards ("CADB"); the Transfer of Development Rights Program ("TDR") in New Jersey; and the General Development Plans ("GDP") in New Jersey. Because the permanent and construction ROW will be allowed to revert to previous agricultural uses after construction, Columbia does not believe that the proposed pipeline will impact the land's ability to continue to participate in these agricultural programs. Columbia will restore the ROW so that farming may continue over the pipeline, and will reimburse the landowner for crop losses expected to be incurred due to construction-related impacts to the crops. Columbia will work with the appropriate states, counties and municipalities to continue to identify farmlands crossed by the Project that participate in government agricultural programs and to provide appropriate best management practices and mitigation, as necessary, for these lands.

Appendix D
Site-Specific Construction Drawings

Columbia Gas Transmission℠
A NiSource Company

RESIDENTIAL CONSTRUCTION DRAWINGS

EAST SIDE EXPANSION PROJECT
26" LOOP 1278 CHESTER COUNTY, PA
20" LOOP 10345 GLOUCESTER COUNTY, NJ

Drawing Number	Drawing Title
Appendix 8C	**Residential Construction Drawings**
	Residential Construction Drawing - Pennsylvania
TB-6711-8800	26" LOOP 1278 PROPERTY OF OSCAR & FRIEDA SENN TRUST
TB-6711-8801	26" LOOP 1278 PROPERTY OF JAY P. LOUCKS & ELEANOR S. NARUM
TB-6711-8802	26" LOOP 1278 PROPERTY OF JEFFERY S. NICHOLAS & TERESA NICHOLAS
TB-6711-8803	26" LOOP 1278 PROPERTY OF HELMUTH G. & EDELGARD A. VAISHVILLE
TB-6711-8804	26" LOOP 1278 PROPERTY OF EDWARD A. DAY
TB-6711-8805	26" LOOP 1278 PROPERTY OF SUDHIR K. & ASHA BHATNAGAR
TB-6711-8806	26" LOOP 1278 PROPERTY OF JOHN & DANI BEST
TB-6711-8807	26" LOOP 1278 PROPERTY OF FRED V. DIERS
TB-6711-8808	26" LOOP 1278 PROPERTY OF GREGORY J. MAURER & TAMARA G. DAVIS
TB-6711-8809	26" LOOP 1278 PROPERTY OF MATTHEW SNYDER & AMY AUKER
TB-6711-8810	26" LOOP 1278 PROPERTY OF JOSEPH A. & JEAN CIVIS
TB-6711-8811	26" LOOP 1278 PROPERTY OF MARY M. PLANK
TB-6711-8812	26" LOOP 1278 PROPERTY OF JOHN ALEXANDER CHURCHMAN
TB-6711-8813	26" LOOP 1278 PROPERTY OF JAY PAR & PAR ANBIL
TB-6711-8814	26" LOOP 1278 PROPERTY OF TREVOR D. & CATHRYN C. WEISS
TB-6711-8815	26" LOOP 1278 PROPERTY OF MARK W. DALTON & HELENE M. FULTON
TB-6711-8816	26" LOOP 1278 PROPERTY OF ROBERT & JOAN MCGLINN
TB-6711-8817	26" LOOP 1278 PROPERTY OF ROBERT L. LUEBBERS & LAURIE O'DONNELL LUEBBERS
TB-6711-8818	26" LOOP 1278 PROPERTY OF MATTHEW B. & DANIELLE P. ELLIS
TB-6711-8819	26" LOOP 1278 PROPERTY OF SCOTT R. & KERSTIN R. MARCUM
TB-6711-8820	26" LOOP 1278 PROPERTY OF JOANNE CRAMPHORN, KEVIN R. MOORE, SR. & DIANE M. MOORE
TB-6711-8821	26" LOOP 1278 PROPERTY OF MICHAEL A. LANE & MELISSA B. LANE
TB-6711-8822	26" LOOP 1278 PROPERTY OF ANGELA E. MONTGOMERY-BUDD & TIMOTHY F. BUDD
TB-6711-8823	26" LOOP 1278 PROPERTY OF HENRY H. GRABB & KAREN L. DANNESSA
TB-6711-8824	26" LOOP 1278 PROPERTY OF WILLIAM J. & MARGARET A. REIDY
TB-6711-8825	26" LOOP 1278 PROPERTY OF BRIAN T. HURLEY & KRISTINA M. SOKSO
TB-6711-8826	26" LOOP 1278 PROPERTY OF JAY & KATHERINE DECHANT
TB-6711-8827	26" LOOP 1278 PROPERTY OF SHARON HARDIN-WARFIELD
	Residential Construction Drawing - New Jersey
TB-6711-8828	20" LOOP 10345 PROPERTY OF SAMUEL SUSNICK, III
TB-6711-8829	20" LOOP 10345 PROPERTY OF SUSNICK, JOHN
TB-6711-8830	20" LOOP 10345 PROPERTY OF BACON, ROBERT J. JR. & GRETCHEN L.
TB-6711-8831	20" LOOP 10345 PROPERTY OF BROSOVICH, CARL & DIANE
TB-6711-8832	20" LOOP 10345 PROPERTY OF RIZZI, FRANCESCO A. & JOSEPH H. JR. CO
TB-6711-8833	20" LOOP 10345 PROPERTY OF SEELHORST, ROBERT G. JR. & AMANDA

NO.	REVISION	APPR.	DATE
A	ISSUED FOR FERC	JHE	10/18/13

NO.	REVISION	APPR.	DATE

DRAWING	REFERENCE

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

EAST SIDE EXPANSION PROJECT
RESIDENTIAL CONSTRUCTION DRAWINGS
LOOP 1278 & LOOP 10345

DRAWN BY	DCG	DATE	09/25/13	DRAWING NUMBER	ISSUE
DRAFTING CHECK	TLJ		09/25/13	TB-6711-8800-COV	A
ENGINEERS REVIEW	JHE		09/25/13		

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TRACT PA-CH-006.001
OSCAR & FRIEDA SENN TRUST
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFETY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
- METER
- WV WATER VALVE
- GV GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE

NOTES:

1. PROPERTY OUTLINES ARE BASED ON TAX MAPS AND CIVIL SURVEY.
2. STRUCTURES AND FEATURES ARE BASED ON 2012 & 2013 CIVIL SURVEY.
3. CONTRACTOR SHALL ERECT A TEMPORARY SAFETY FENCE BETWEEN THE WORK AREA AND ADJACENT STRUCTURES BEFORE EQUIPMENT IS USED IN ANY PART OF THE RIGHT-OF-WAY. FENCING SHALL REMAIN THROUGHOUT ALL OPEN-TRENCH PHASES OF CONSTRUCTION. SAFETY FENCE SHOULD EXTEND 100' ON EITHER SIDE OF STRUCTURE.
4. CONTRACTOR SHALL MAINTAIN AGREED UPON ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
5. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
6. UNLESS OTHERWISE NEGOTIATED WITH THE LANDOWNER, THE CONSTRUCTION WORKSPACE WILL BE CLEARED. CLEARING INCLUDES VEGETATION, LANDSCAPING, TREES, FENCES AND OTHER OBJECTS WITHIN THE WORK AREA.
7. CONTRACTOR SHALL LIMIT WORK IN THIS AREA TO DAYLIGHT HOURS, UNLESS OTHERWISE AGREED UPON.
8. MAINLINE CONSTRUCTION FROM START TO END WILL BE 4 TO 6 MONTHS. ACCESS AND OBSERVATION OF THE CONSTRUCTION AREA WILL CONTINUE THROUGHOUT THE 4 TO 6 MONTH PROJECT.
9. TOPSOIL AND SUBSOIL STORAGE PILES WILL BE ON THE SPOIL SIDE OF THE PROPOSED PIPELINE.
10. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 72 HOURS PRIOR TO CONSTRUCTION.

PRELIMINARY NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE	NO	REVISIONS	BY	DATE
		A	ISSUED FOR FERC	CJT	10-18-13
				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
OSCAR & FRIEDA SENN TRUST

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8800	A

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TRACT PA-CH-040.001
JAY P. LOUCKS & ELEANOR S. NARUM
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFETY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
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- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE

NOTES:

1. PROPERTY OUTLINES ARE BASED ON TAX MAPS AND CIVIL SURVEY.
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4. CONTRACTOR SHALL MAINTAIN AGREED UPON ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
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10. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 72 HOURS PRIOR TO CONSTRUCTION.

PRELIMINARY NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE	NO	REVISIONS	BY	DATE
		A	ISSUED FOR FERC	CJT	10-18-13
				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

26" LOOP 1278
PROPERTY OF
JAY P. LOUCKS & ELEANOR S. NARUM

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8801	A

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TRACT PA-CH-043.000
JEFFERY S. NICHOLAS & TERESA NICHOLAS
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFETY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
- METER
- WV WATER VALVE
- GV GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE

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A NiSource Company

26" LOOP 1278
PROPERTY OF
JEFFERY S. NICHOLAS & TERESA NICHOLAS

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8802	A

TRACT PA-CH-044.000
HELMUTH G. & EDELGARD A. VAISHVILLE
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
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- OVERHEAD POWER
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- ℄ STREAM
- EXISTING FENCE
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- EDGE OF WOODS
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- ℄ ROAD
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SCALE: 0 50FT

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1442 21-OCT-2013 ctwest

TRACT PA-CH-044.001
EDWARD A. DAY
CHESTER COUNTY, PENNSYLVANIA

LEGEND

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- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
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Columbia Gas Transmission
A NiSource Company

26" LOOP 1278
PROPERTY OF
EDWARD A. DAY

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8804	A

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14:42 21-OCT-2013 clwest

TRACT PA-CH-045.000
SUDHIR K. & ASHA BHATNAGAR
CHESTER COUNTY, PENNSYLVANIA

LEGEND

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ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
SUDHIR K. & ASHA BHATNAGAR

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8805	A

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1442 21-OCT-2013 clwest

TRACT PA-CH-047.000
JOHN & DANI BEST
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
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Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
JOHN & DANI BEST

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8806	A

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1:422 21-OCT-2013 cltwet

TRACT PA-CH-048.000
FRED V. DIERS
CHESTER COUNTY, PENNSYLVANIA

LEGEND

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- ℄ EXISTING NISOURCE PIPELINES
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26" LOOP 1278
PROPERTY OF
FRED V. DIERS

SCALE: 0 50FT

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21-OCT-2013 11:42 clrwest

TRACT PA-CH-051.000
GREGORY J. MAURER & TAMARA G. DAVIS
CHESTER COUNTY, PENNSYLVANIA

LEGEND

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- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
- METER
- WV WATER VALVE
- GV GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE

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10. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 72 HOURS PRIOR TO CONSTRUCTION.

PRELIMINARY NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE	NO	REVISIONS	BY	DATE
		A	ISSUED FOR FERC	CJT	10-18-13
				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
GREGORY J. MAURER & TAMARA G. DAVIS

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8808	A

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TRACT PA-CH-052.000
MATTHEW SNYDER & AMY AUKER
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFETY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
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A NiSource Company

26" LOOP 1278
PROPERTY OF
MATTHEW SNYDER & AMY AUKER

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8809	A

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1445 21-OCT-2013 clfwet

TRACT PA-CH-053.000
JOSEPH A. & JEAN CIVIS
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
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Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
JOSEPH A. & JEAN CIVIS

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8810	A

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1443 21-OCT-2013 cjlwest

TRACT PA-CH-054.000
MARY M. PLANK
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
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1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
MARY M. PLANK

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8811	A

TRACT PA-CH-055.000
JOHN ALEXANDER CHURCHMAN
CHESTER COUNTY, PENNSYLVANIA

LEGEND

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- ℄ EXISTING NISOURCE PIPELINES
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ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

26" LOOP 1278
PROPERTY OF
JOHN ALEXANDER CHURCHMAN

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8812	A

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TRACT PA-CH-056.000
JAY & ANBIL PAR
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
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A NiSource Company

26" LOOP 1278
PROPERTY OF
JAY & ANBIL PAR

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8813	A

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1443 21-OCT-2013 cjlwest

TRACT PA-CH-079.000
TREVOR D. & CATHRYN C. WEISS
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- PROPOSED ROUTE
- EXISTING NISOURCE PIPELINES
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A NiSource Company

26" LOOP 1278
PROPERTY OF
TREVOR D. & CATHRYN C. WEISS

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8814	A

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TRACT PA-CH-092.020
MARK W. DALTON & HELENE M. FULTON
CHESTER COUNTY, PENNSYLVANIA

LEGEND

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- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
- METER
- WV WATER VALVE
- GV GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE

NOTES:

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2. STRUCTURES AND FEATURES ARE BASED ON 2012 & 2013 CIVIL SURVEY.
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5. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
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9. TOPSOIL AND SUBSOIL STORAGE PILES WILL BE ON THE SPOIL SIDE OF THE PROPOSED PIPELINE.
10. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 72 HOURS PRIOR TO CONSTRUCTION.

PRELIMINARY NOT FOR CONSTRUCTION

SIGNATURE _____ DATE _____

DWG. NO.	REFERENCE	NO	REVISIONS	BY	DATE
		A	ISSUED FOR FERC	CJT	10-18-13
				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
MARK W. DALTON & HELENE M. FULTON

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8815	A

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21-OCT-2013 14:43 clwest

TRACT PA-CH-108.002
ROBERT & JOAN MC GLINN
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFETY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
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- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
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1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
ROBERT & JOAN MC GLINN

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8816	A

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1443 21-OCT-2013 cjtwest

TRACT ALT1-PA-CH-033.000
ROBERT L. LUEBBERS & LAURIE O'DONNELL LUEBBERS
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
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- EXISTING FENCE
- TEMPORARY SAFETY FENCE
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			TLJ	10-18-13

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ENGINEERING SERVICES
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1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
ROBERT L. LUEBBERS & LAURIE O'DONNELL LUEBBERS

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8817	A

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1443 21-OCT-2013 cltwet

TRACT ALT1-PA-CH-034.000
MATTHEW B. & DANIELLE P. ELLIS
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
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				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
MATTHEW B. & DANIELLE P. ELLIS

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8818	A

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1443 21-OCT-2013 cfriwet

TRACT ALT1-PA-CH-035.000
SCOTT R. & KERSTIN R. MARCUM
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
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N

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ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
SCOTT R. & KERSTIN R. MARCUM

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8819	A

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1444 21-OCT-2013 cltwet

TRACT PA-CH-119.002
JOANNE CRAMPHORN, KEVIN R. MOORE, SR. & DIANE M. MOORE
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
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A NiSource Company

26" LOOP 1278
PROPERTY OF
JOANNE CRAMPHORN, KEVIN R. MOORE, SR. & DIANE M. MOORE

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8820	A

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1444 21-OCT-2013 clwest

TRACT PA-CH-120.000
MICHAEL A. LANE & MELISSA B. LANE
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
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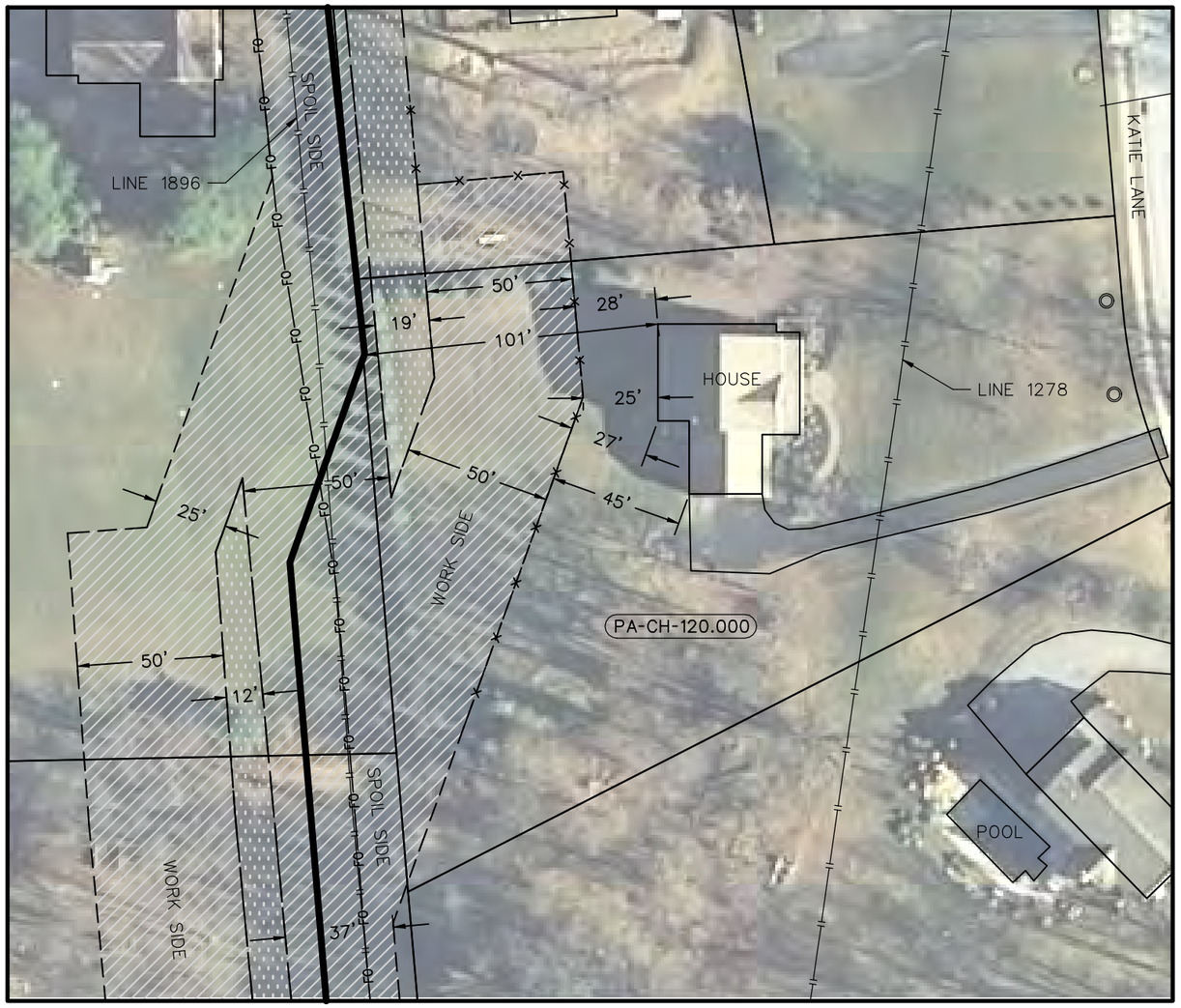

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				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
MICHAEL A. LANE & MELISSA B. LANE

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8821	A

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TRACT ALT1-PA-CH-038.000
ANGELA E. MONTGOMERY-BUDD & TIMOTHY F. BUDD
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFETY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
- METER
- WV WATER VALVE
- GV GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE

NOTES:

1. PROPERTY OUTLINES ARE BASED ON TAX MAPS AND CIVIL SURVEY.
2. STRUCTURES AND FEATURES ARE BASED ON 2012 & 2013 CIVIL SURVEY.
3. CONTRACTOR SHALL ERECT A TEMPORARY SAFETY FENCE BETWEEN THE WORK AREA AND ADJACENT STRUCTURES BEFORE EQUIPMENT IS USED IN ANY PART OF THE RIGHT-OF-WAY. FENCING SHALL REMAIN THROUGHOUT ALL OPEN-TRENCH PHASES OF CONSTRUCTION. SAFETY FENCE SHOULD EXTEND 100' ON EITHER SIDE OF STRUCTURE.
4. CONTRACTOR SHALL MAINTAIN AGREED UPON ACCESS TO THE IMPACTED AREA DURING THE CONSTRUCTION PHASE.
5. CONTRACTOR SHALL PROVIDE FUGITIVE DUST ABATEMENT MEASURES.
6. UNLESS OTHERWISE NEGOTIATED WITH THE LANDOWNER, THE CONSTRUCTION WORKSPACE WILL BE CLEARED. CLEARING INCLUDES VEGETATION, LANDSCAPING, TREES, FENCES AND OTHER OBJECTS WITHIN THE WORK AREA.
7. CONTRACTOR SHALL LIMIT WORK IN THIS AREA TO DAYLIGHT HOURS, UNLESS OTHERWISE AGREED UPON.
8. MAINLINE CONSTRUCTION FROM START TO END WILL BE 4 TO 6 MONTHS. ACCESS AND OBSERVATION OF THE CONSTRUCTION AREA WILL CONTINUE THROUGHOUT THE 4 TO 6 MONTH PROJECT.
9. TOPSOIL AND SUBSOIL STORAGE PILES WILL BE ON THE SPOIL SIDE OF THE PROPOSED PIPELINE.
10. EQUIPMENT TRAVEL LANES WILL BE ON THE WORKING SIDE OF THE PROPOSED PIPELINE.
11. TRENCH WILL NOT BE EXCAVATED UNTIL THE PIPE IS READY TO BE INSTALLED AND WILL BE BACKFILLED AS SOON AS POSSIBLE AFTER PIPE INSTALLATION.
12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 72 HOURS PRIOR TO CONSTRUCTION.

PRELIMINARY NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE	NO	REVISIONS	BY	DATE
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Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
ANGELA E. MONTGOMERY-BUDD & TIMOTHY F. BUDD

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8822	A

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TRACT PA-CH-121.001
HENRY H. GRABB & KAREN L. DANNESSA
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
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- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
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- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
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- TELEPHONE HAND HOLE
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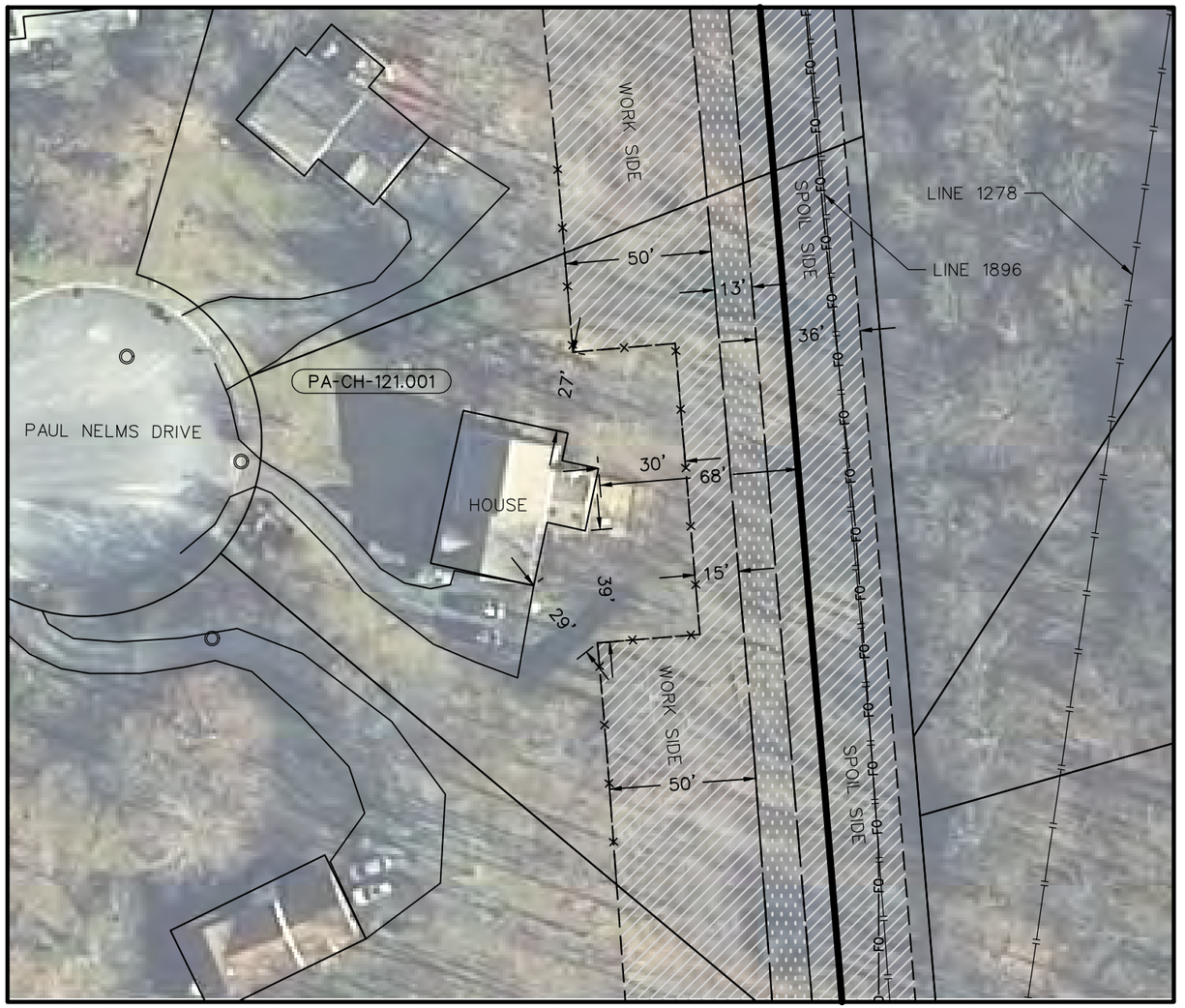
- WATER VALVE
- GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE



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				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

26" LOOP 1278
PROPERTY OF
HENRY H. GRABB & KAREN L. DANNESSA

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8823	A

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1444 21-OCT-2013 clfwet

TRACT PA-CH-127.000
WILLIAM J. & MARGARET A. REIDY
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFETY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
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Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
WILLIAM J. & MARGARET A. REIDY

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8824	A

TRACT PA-CH-128.000
BRIAN T. HURLEY & KRISTINA M. SOKSO
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
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FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

26" LOOP 1278
PROPERTY OF
BRIAN T. HURLEY & KRISTINA M. SOKSO

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8825	A

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1444 21-OCT-2013 clinet

TRACT PA-CH-132.000
JAY & KATHERINE DECHANT
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
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1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

26" LOOP 1278
PROPERTY OF
JAY & KATHERINE DECHANT

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8826	A

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1444 21-OCT-2013 clinwet

TRACT PA-CH-133.000
SHARON HARDIN-WARFIELD
CHESTER COUNTY, PENNSYLVANIA

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
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Columbia Gas Transmission
A NiSource Company

26" LOOP 1278
PROPERTY OF
SHARON HARDIN-WARFIELD

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8827	A

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1444 21-OCT-2013 oliwet

TRACT NJ-GL-012.000
SAMUEL SUSNICK III
GLOUCESTER COUNTY, NEW JERSEY

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
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12. NO REFUELING OR STORAGE OF HAZARDOUS MATERIALS WILL OCCUR WITHIN 200 FEET OF A PRIVATE WELL.
13. LANDOWNERS SHALL BE NOTIFIED AT LEAST 72 HOURS PRIOR TO CONSTRUCTION.

PRELIMINARY NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE	NO	REVISIONS	BY	DATE
		A	ISSUED FOR FERC	CJT	10-18-13
				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

20" LOOP 10345
PROPERTY OF
SAMUEL SUSNICK III

SCALE: 0 50FT

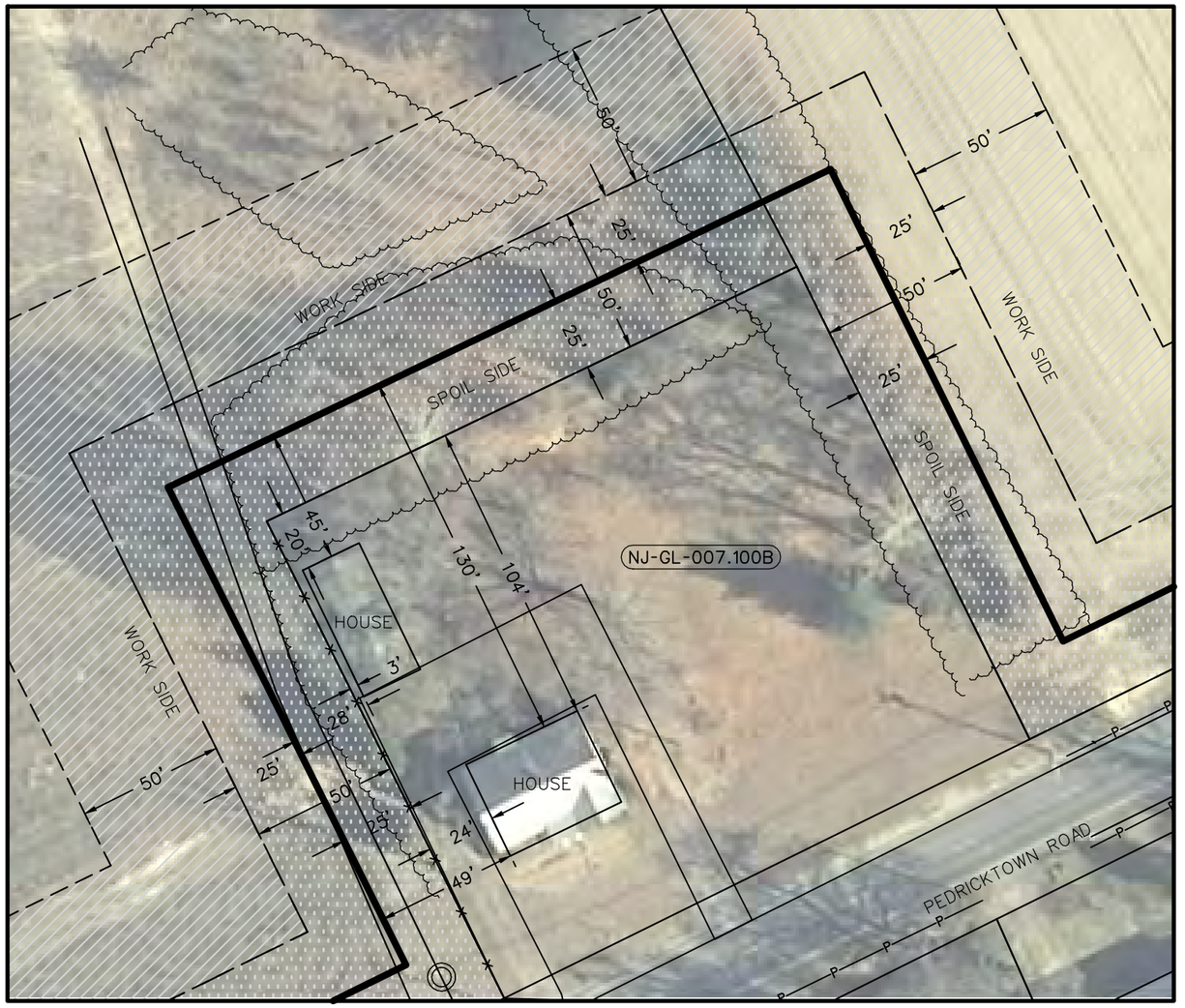
DRAWING NUMBER	ISSUE
TB-6711-8828	A

P:\Projects\52156 - Nisource East Side Exp\CA - CADD\Pipeline\Drawings\ResidentialConstruction Drawings\TB-6711-8828_P1.dgn
1444 21-OCT-2013 ctiwet

TRACT NJ-GL-007.100B
SUSNICK, JOHN
GLOUCESTER COUNTY, NEW JERSEY

LEGEND

- ℄ PROPOSED ROUTE
- ℄℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFTEY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
- METER
- WV WATER VALVE
- GV GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE



NOTES:

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2. STRUCTURES AND FEATURES ARE BASED ON 2012 & 2013 CIVIL SURVEY.
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PRELIMINARY NOT FOR CONSTRUCTION

SIGNATURE _____ DATE _____

DWG. NO.	REFERENCE	NO	REVISIONS	BY	DATE
		A	ISSUED FOR FERC	CJT	10-18-13
				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

20" LOOP 10345
PROPERTY OF
SUSNICK, JOHN

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8829	A

P:\Projects\52156 - Nisource East Side Exp\CA - CADD\Pipeline\Drawings\Residential Construction Drawings\TB-6711-8829_P1.dgn
1444 21-OCT-2013 clinwet

TRACT NJ-GL-018.107B
BACON, ROBERT J. JR. & GRETCHEN L.
GLOUCESTER COUNTY, NEW JERSEY

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
- EXISTING FENCE
- TEMPORARY SAFTEY FENCE
- EDGE OF WOODS
- EDGE OF VEGETATION
- ℄ ROAD
- GUARD RAIL
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- CATCH BASIN
- IRON ROD/PIN
- SINGLE POLE/POWER POLE
- GUY WIRE AND ANCHOR
- UTILITY MARKER
- MISC. SIGN
- MANHOLE
- WATER WELL
- FIRE HYDRANT
- ELECTRIC HAND HOLE
- TELEPHONE HAND HOLE
- METER
- WV WATER VALVE
- GV GAS VALVE
- MISC. VALVE
- VENT
- SEPTIC TANK
- TREE

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		A	ISSUED FOR FERC	CJT JDG TLJ	10-18-13 10-18-13 10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

20" LOOP 10345
PROPERTY OF
BACON, ROBERT J. JR. & GRETCHEN L.

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8830	A

P:\Projects\52156 - Nisource East Side Exp\CA - CADD\Pipeline\Drawings\Residential Construction Drawings\TB-6711-8830_P1.dgn
1445 21-OCT-2013 clinwet

TRACT NJ-GL-018.108B
BROSOVICH, CARL & DIANE
GLOUCESTER COUNTY, NEW JERSEY

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
- BURIED T.V. LINE
- BURIED FIBER OPTIC CABLE
- ℄ STREAM
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				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

20" LOOP 10345
PROPERTY OF
BROSOVICH, CARL & DIANE

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8831	A

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11:45 21-OCT-2013 cltwet

TRACT NJ-GL-026.300B
RIZZI, FRANCESCO A. & JOSEPH H. JR. CO
GLOUCESTER COUNTY, NEW JERSEY

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
- OVERHEAD POWER
- BURIED WATER LINE
- BURIED POWER LINE
- BURIED TELEPHONE LINE
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FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

20" LOOP 10345
PROPERTY OF
RIZZI, FRANCESCO A. & JOSEPH H. JR. CO

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8832	A

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1445 21-OCT-2013 cltwet

TRACT NJ-GL-042.000B
SEELHORST, ROBERT G, JR. & AMANDA
GLOUCESTER COUNTY, NEW JERSEY

LEGEND

- ℄ PROPOSED ROUTE
- ℄ EXISTING NISOURCE PIPELINES
- ℄ FOREIGN PIPELINE
- PROPERTY LINE
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				JDG	10-18-13
				TLJ	10-18-13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission℠
A NiSource Company

20" LOOP 10345
PROPERTY OF
SEELHORST, ROBERT G, JR. & AMANDA

SCALE: 0 50FT

DRAWING NUMBER	ISSUE
TB-6711-8833	A

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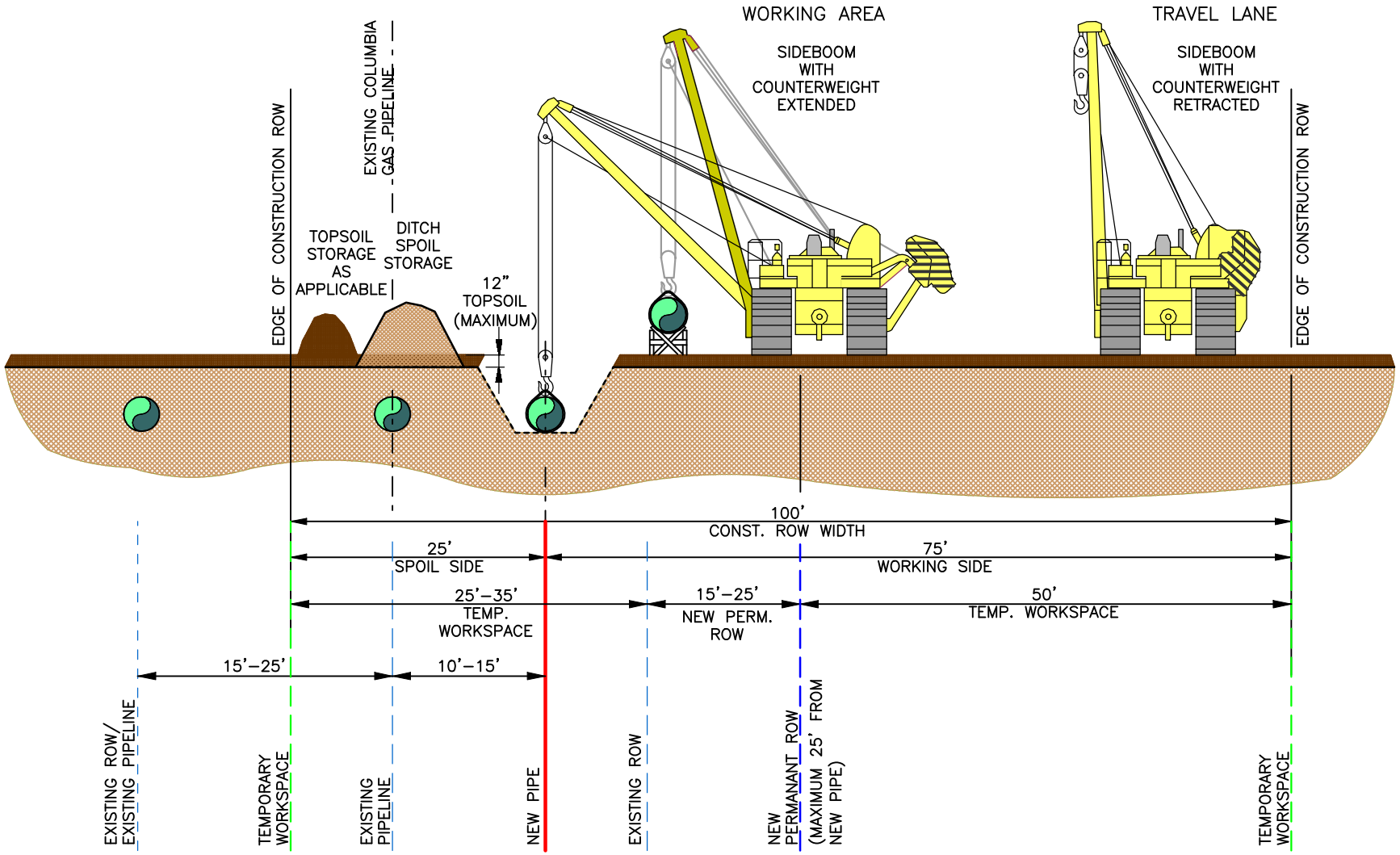
1445 21-OCT-2013 clinwet

Appendix E
Project-Specific Construction Typicals



CERTIFICATE

TO THE BEST OF MY KNOWLEDGE, ALL COMPONENTS OF THIS DRAWING ARE DESIGNED IN ACCORDANCE WITH APPLICABLE NGT&S GUIDELINES AND SPECIFICATIONS.

DESIGN ENGINEER _____ DATE _____

ANY CHANGES TO THE DESIGN SHOWN ON THIS DRAWING MUST BE APPROVED BY THE DESIGN ENGINEER

NO.	REVISION	APP'D	DATE
△			
B	ISSUED FOR FERC	JHE	10/18/13
A	ISSUED FOR FERC PRE–FILING	JHE	03/20/13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission
A NiSource Company

EAST SIDE EXPANSION

TYPICAL ROW CONFIGURATION OVERLAP / ABUT EXISTING CGT PIPELINES

SCALE: NONE

DRAWING NUMBER	ISSUE
TA–6711–8601	B

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14-OCT-2013 09:31
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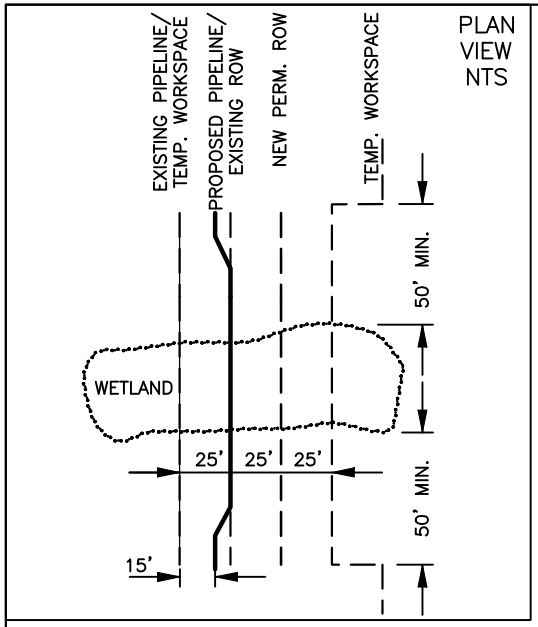

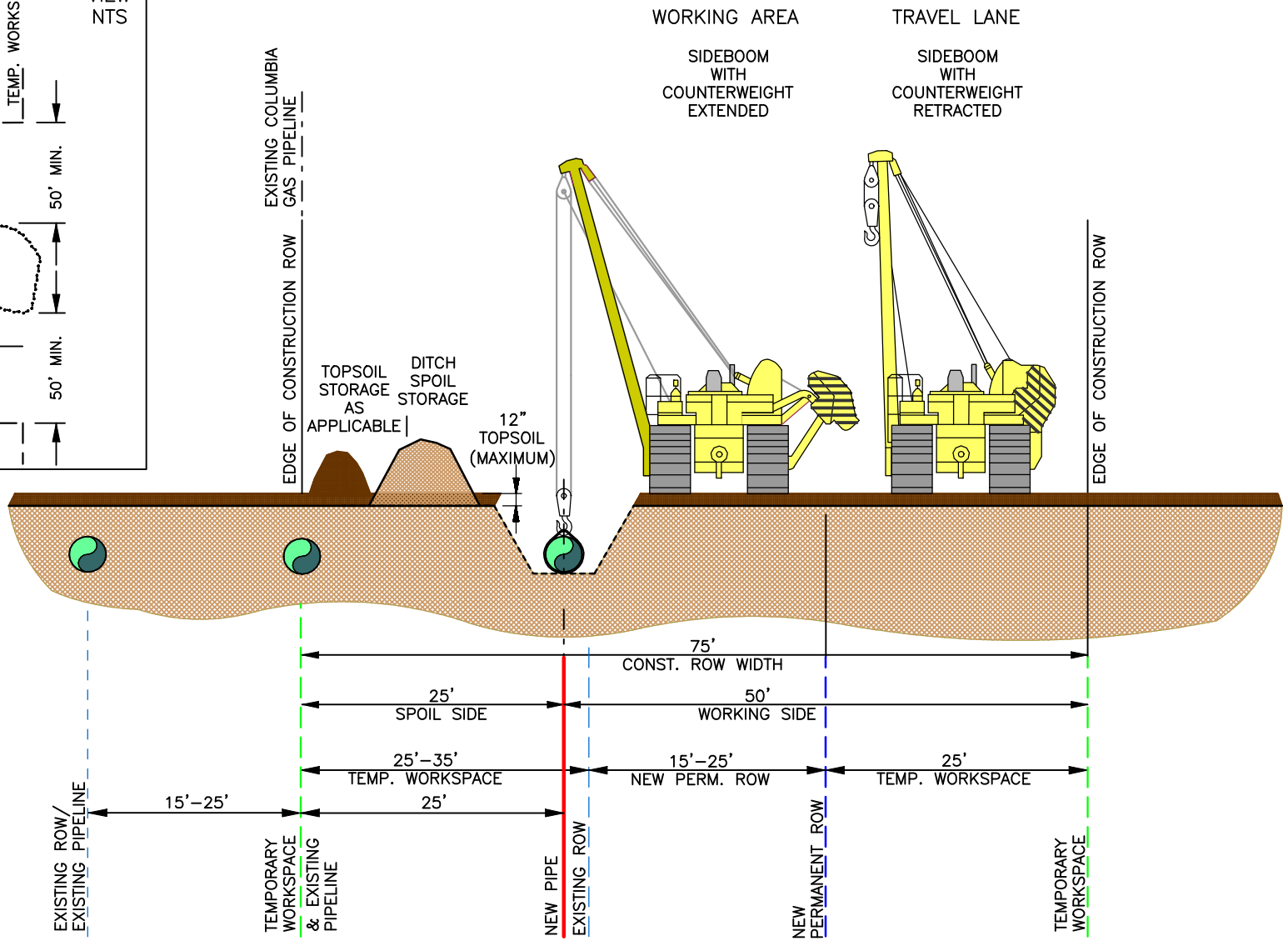

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DESIGN ENGINEER _____ DATE _____

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A	ISSUED FOR FERC PRE-FILING	JHE	03/20/13

FIELD SERVICES
ENGINEERING SERVICES
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

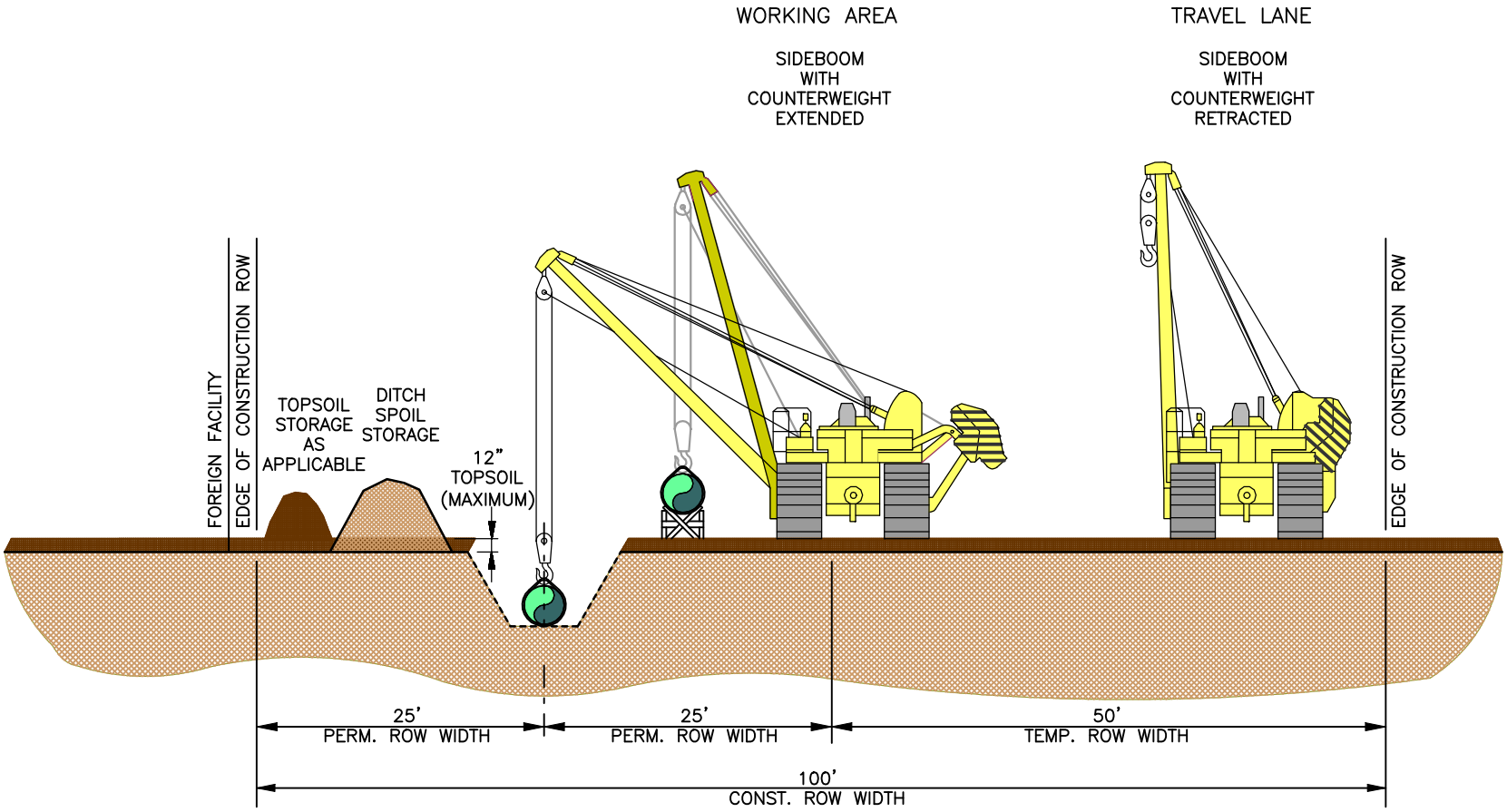
Columbia Gas Transmission
A NiSource Company

EAST SIDE EXPANSION

TYPICAL WETLAND/STREAM ROW CONFIGURATION OVERLAP/ABUT EXISTING CGT PIPELINES

SCALE: NONE

DRAWING NUMBER	ISSUE
TA-6711-8602	B



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DESIGN ENGINEER _____ DATE _____

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FIELD SERVICES ENGINEERING SERVICES
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A NiSource Company

EAST SIDE EXPANSION

TYPICAL ROW CONFIGURATION GREENFIELD/FOREIGN FACILITIES

SCALE: NONE

DRAWING NUMBER	ISSUE
TA-6711-8603	B

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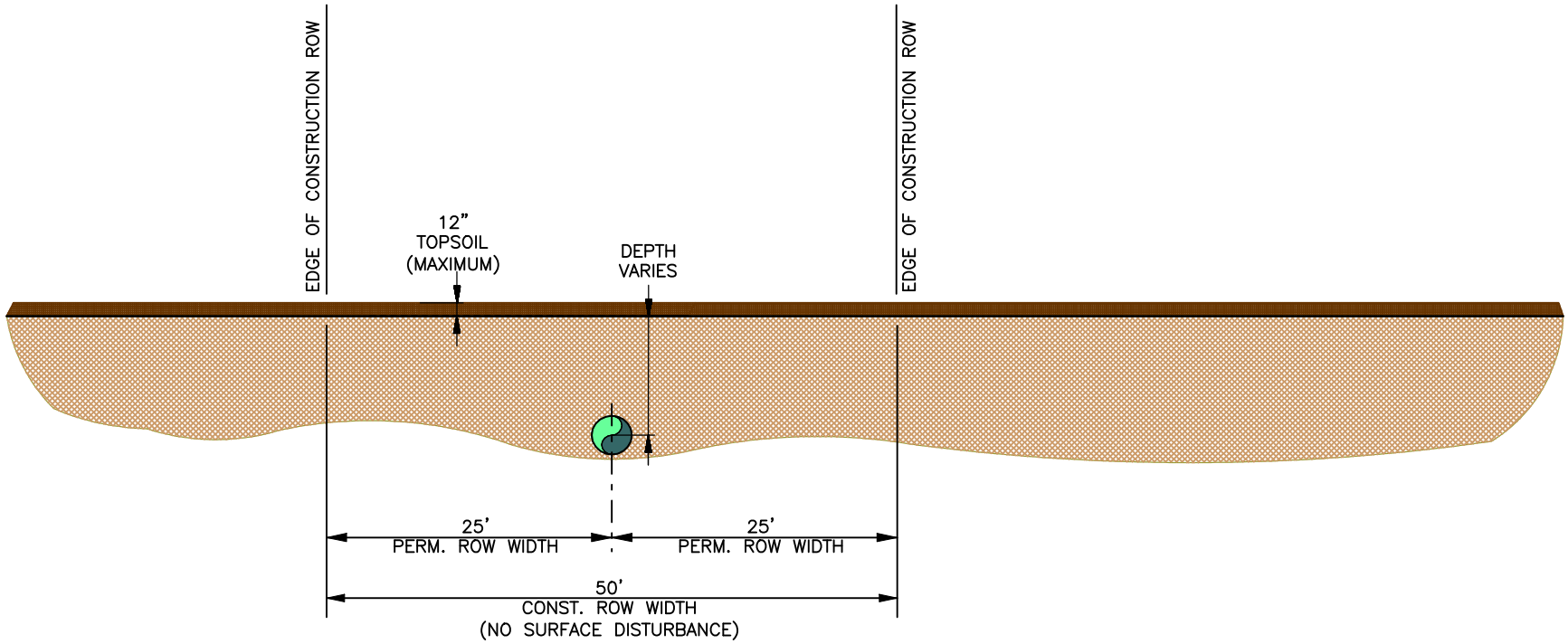

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EAST SIDE EXPANSION

TYPICAL ROW CONFIGURATION HDD CROSSINGS

SCALE: NONE

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PERMANENT CONSTRUCTION R.O.W.

TEMPORARY CONSTRUCTION R.O.W.

ADDITIONAL TEMPORARY WORKSPACE (ATWS)

ACCESS ROAD

PROPOSED PIPELINE

STREAMS

WETLANDS

FENCE

EXISTING NISOURCE PIPELINES

ESCGP BOUNDARY

OVERHEAD POWERLINE

WATERLINE

LIMITS OF DISTURBANCE

EXISTING FOREIGN PIPELINE

EXISTING MAJOR CONTOURS

EXISTING MINOR CONTOURS

COMPOST FILTER SOCK (CFS)

SILT FENCE (SF)

SUPER SILT FENCE (SSF)

PERMANENT WATERBAR

TEMPORARY WATERBAR

TRENCH PLUG

ROCK CONSTRUCTION ENTRANCE

BORE PIT

GENERAL NOTES:

1.) THE TEMPORARY CONSTRUCTION R.O.W. WILL BE 100' WIDE IN OPEN AREAS AND IN WOODED AREAS.
2.) THE PERMANENT MAINTAINED R.O.W. WILL BE 50' WIDE.
3.) NO WORK WILL BEGIN UNTIL THE REVIEW AGENCY HAS BEEN NOTIFIED AND ACKNOWLEDGEMENT RECEIVED.
4.) SOIL STOCKPILES WILL BE LOCATED AT LEAST 10' FROM TOP OF STREAM BANK AND / OR WETLAND BOUNDARY AND OUT OF 100 YEAR FLOODPLAINS.
6.) PIPELINE DEPTH FOR EXCAVATING IN ROCK IS A MINIMUM OF 2'.
7.) TYPICAL PIPELINE DEPTH OF CROSSING AT STREAMS IS A MINIMUM OF 4'.

WETLAND NOTES:

1.) ALL EQUIPMENT CROSSINGS WLL BE LOCATED AT THE NARROWEST DISTANCE OF THE WETLAND TO THE EXTENT FEASIBLE.
2.) TIMBER MATS WILL BE MOVED ACROSS THE WETLAND IN FRONT OF THE EQUIPMENT TO MINIMIZE THE IMPACTS TO THE WETLAND DURING CONSTRUCTION ACTIVITIES.
3.) ON WETLAND CROSSINGS WHICH OCCUR WITHIN THE SPOIL SIDE ONLY, THOSE FEATURES WILL HAVE SILT FENCE INSTALLED AROUND ITS PERIMETER AT A 10 FOOT OFFSET TO AVOID DISTURBANCE.

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EAST SIDE EXPANSION

TYPICAL LEGEND SHEET

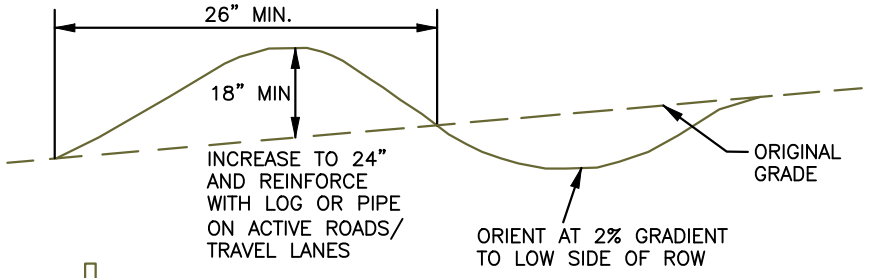
SCALE: N.T.S.

DRAWING NUMBER: TA-6711-8605

ISSUE: A

WATERBAR SPACING
(MINIMUM REQUIRED)

SLOPE	SPACING
< 5%	250 FT.
5–15%	150 FT.
15–30%	100 FT.
>30%	50 FT.



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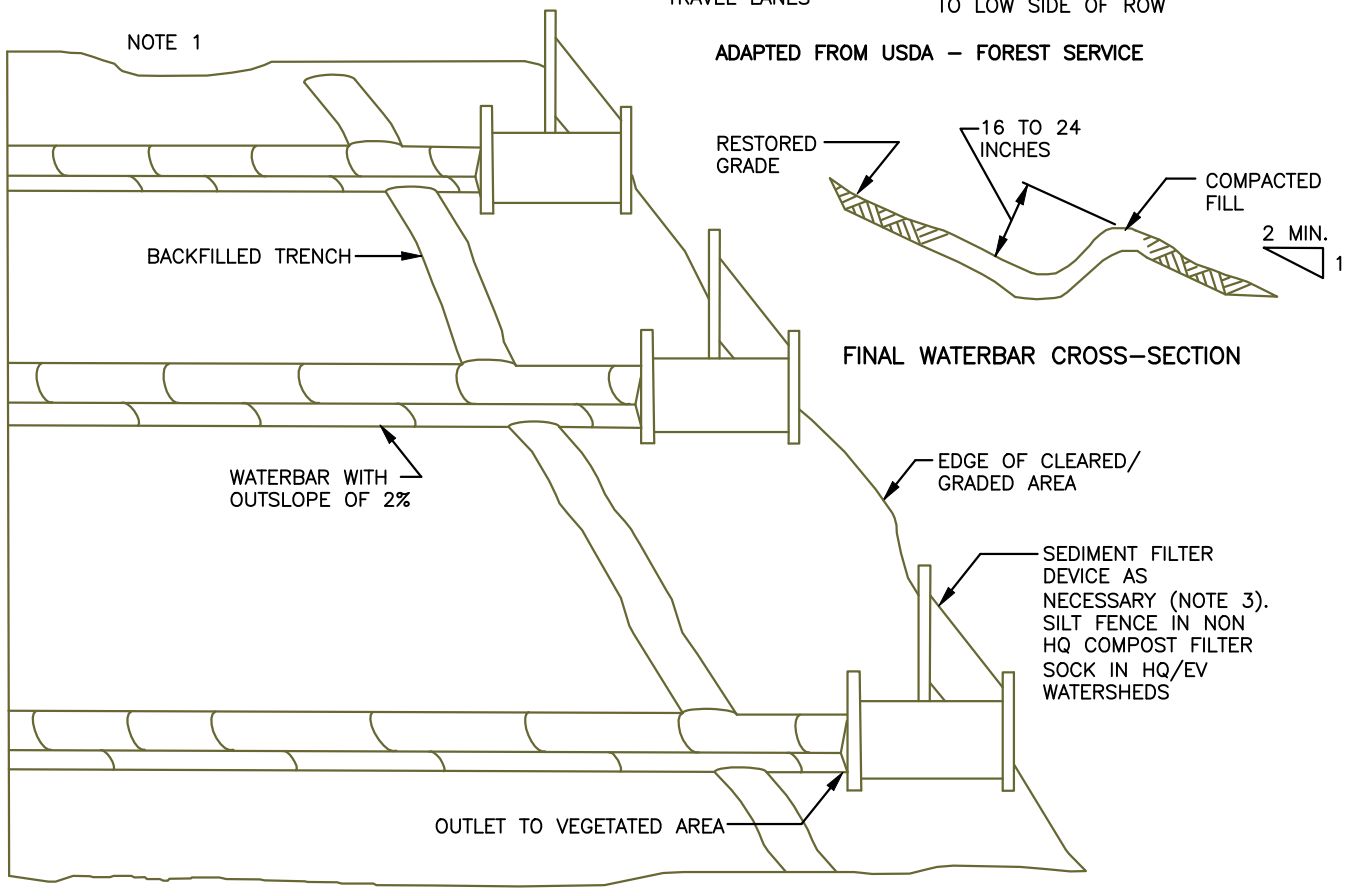

FINAL WATERBAR CROSS–SECTION

NOTES:

1.) SPACING USED FOR BOTH TEMPORARY AND PERMANENT WATERBARS.
2.) LEFT BLANK.
3.) IF EXISTING GROUND IS SPARSE, SECURE SEDIMENT FILTER DEVICE IN OUTLET.
4.) THE DIVERSION MAY BE EXTENDED UP TO 5 FT. OFF THE ROW, IF NECESSARY, TO PROVIDE AN ADEQUATE OUTLET.
5.) WATERBAR OUTLETS WILL ALTERNATE FROM SIDE TO SIDE WHENEVER POSSIBLE.
6.) WATERBARS SHALL DISCHARGE TO A STABLE AREA.
7.) WATERBARS SHALL BE INSPECTED (DAILY ON ACTIVE ROADS AND WEEKLY ON INACTIVE ROADS) AND AFTER EACH RUNOFF EVENT. DAMAGED OR ERODED WATERBARS SHALL BE RESTORED TO ORIGINAL DIMENSIONS WITHIN 24 HOURS OF INSPECTION.
8.) MAINTENANCE OF WATERBARS SHALL BE PROVIDED UNTIL ROADWAY, SKIDTRAIL, OR RIGHT–OF–WAY HAS ACHIEVED PERMANENT STABILIZATION.
9.) WATERBARS ON RETIRED ROADWAYS, SKIDTRAILS AND RIGHT–OF–WAYS SHALL BE LEFT IN PLACE AFTER PERMANENT STABILIZATION HAS BEEN ACHIEVED.

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EAST SIDE EXPANSION

FIGURE 6A STANDARD
CONSTRUCTION WATERBAR DETAIL

SCALE: N.T.S.

DRAWING NUMBER	ISSUE
TA–6711–8609	A

WATERBARS ARE THE MOST COMMON AND EFFECTIVE DEVICE USED FOR EROSION CONTROL ON CONSTRUCTION ROW. DURING CONSTRUCTION, TEMPORARY DIVERSIONS ARE INSTALLED TO CONTROL WATER ON THE GRADED ROW. DURING RESTORATION, FINAL DIVERSIONS ARE INSTALLED TO PROTECT THE ROW FROM EROSION UNTIL THE VEGETATION REESTABLISHES ON THE DISTURBED AREAS.

TEMPORARY DIVERSIONS ARE GENERALLY MADE BY BUILDING A CURB 18 TO 24 INCHES HIGH ACROSS THE ROW. THE CURBS ARE SHAPED TO ALLOW PASSAGE OF CONSTRUCTION EQUIPMENT AND INSPECTOR VEHICLES. THE DIVERSION SHOULD HAVE A GRADIENT OF 2%, AND MUST DRAIN AWAY FROM THE TRENCH AND OFF THE ROW. WHERE WATER IS DIRECTED OFF THE ROW, THE OUTLET WILL BE PROTECTED BY A SEDIMENT FILTER DEVICE OR HEAVY VEGETATION. TEMPORARY DIVERSIONS MAY BE BROKEN DOWN BY CONSTRUCTION EQUIPMENT DURING THE WORKDAY, BUT WILL BE RESTORED BY THE END OF EACH DAY. TEMPORARY DIVERSIONS WILL BE SPACED ALONG THE ROW IN ACCORDANCE WITH FIGURE 6A, SEE DWG TA-6711-8609. THE ACTUAL NUMBER OF TEMPORARY DIVERSIONS MAY VARY FROM THAT OF FINAL DIVERSIONS BECAUSE THE CONSTRUCTION ROW'S ARTIFICAL GRADE MAY REDUCE THE SLOPE. TEMPORARY DIVERSIONS MAY BE CONSTRUCTED OUT OF SILT FENCE, STAKED HAY OR STRAW BALES, OR SAND BAGS WITH THE ENVIRONMENTAL INSPECTORS APPROVAL. POSITION THE OUTFALL OF EACH TEMPORARY SLOPE BREAKER TO PREVENT SEDIMENT DISCHARGE INTO WETLAND, WATERBODIES, OR OTHER SENSITIVE AREAS.

FINAL DIVERSIONS TYPICALLY CONSIST OF A CURB 16 TO 24 INCHES HIGH BELOW A SHALLOW SWALE. THE CURB IS CONSTRUCTED OF COMPACTED EARTH FILL WITH SIDE SLOPES OF 2:1 OR FLATTER TO ALLOW PASSAGE OF MAINTENANCE EQUIPMENT. THE DIVERSIONS SHOULD EXTEND ACROSS THE ENTIRE ROW AND DRAIN WATER WITH A 2% TO 12% GRADIENT. THE OUTLETS OF FINAL DIVERSIONS ARE STABILIZED WITH SEDIMENT FILTER DEVICES, ROCK, BRUSH, OR HEAVY VEGETATION. FINAL DIVERSIONS WILL BE SPACED ALONG THE ROW IN ACCORDANCE WITH FIGURE 6A, SEE DWG TA-6711-8609, (OR AS SHOWN ON THE ENVIRONMENTAL CONSTRUCTION DRAWINGS), AND WILL TIE INTO EXISTING DIVERSIONS WHERE PRESENT. IN PLACES WHERE FINAL GRADE CREATES SIDE SLOPES OR SLOPES WHICH BREAK IN MORE THAN ONE DIRECTION, WATERBAR INSTALLATION MAY NEED TO VARY TO CREATE AN OUTSLOPE OF 0% TO 2% WHICH WILL CARRY WATER OFF THE ROW.

ALTERNATIVE DIVERSION CONSTRUCTION MAY BE USED IN AREAS WHERE AN EARTHEN DIVERSION IS IMPRACTICAL. IN THESE INSTANCES, TEMPORARY DIVERSIONS MAY BE CONSTRUCTED WITH SEDIMENT FILTER DEVICES AS NOTED ABOVE.

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EAST SIDE EXPANSION

INTERCEPTER DIVERSIONS
FIGURE 6B

SCALE: N.T.S.

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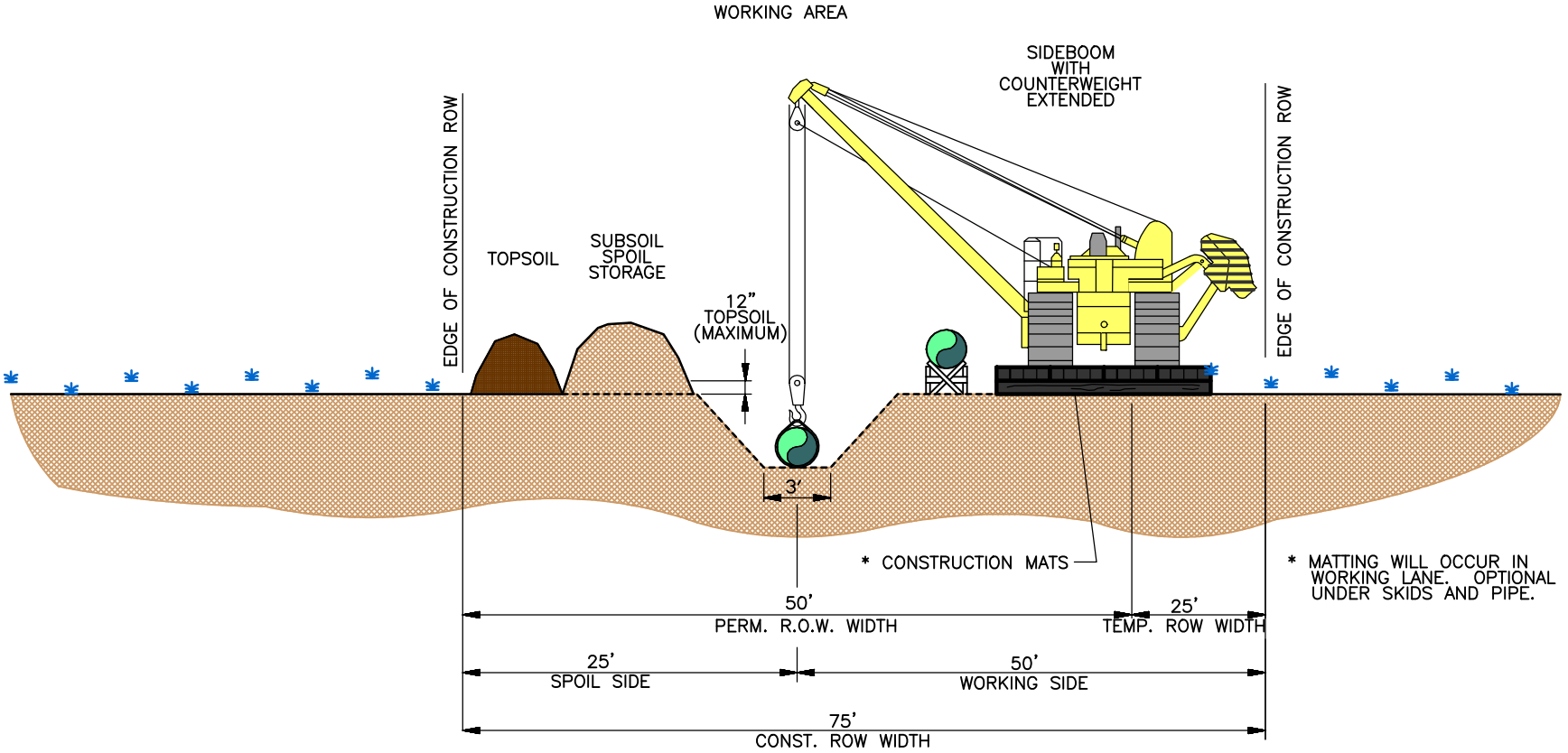

NOTE:

EXTRA DEPTH MAY BE REQUIRED FOR CONCRETE COATED PIPE OR WEIGHTS

SILT SOCK MAY BE PLACED IN WETLAND ALONG TOPSOIL STOCKPILE SIDE, AS AUTHORIZED, IF SLOUGHY OR MUCKY SOILS ARE PRESENT.

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EAST SIDE EXPANSION

MAINLINE CONSTRUCTION
STANDARD WETLAND RIGHT-OF-WAY

SCALE: N.T.S.

DRAWING NUMBER	ISSUE
TA-6711-8627	A

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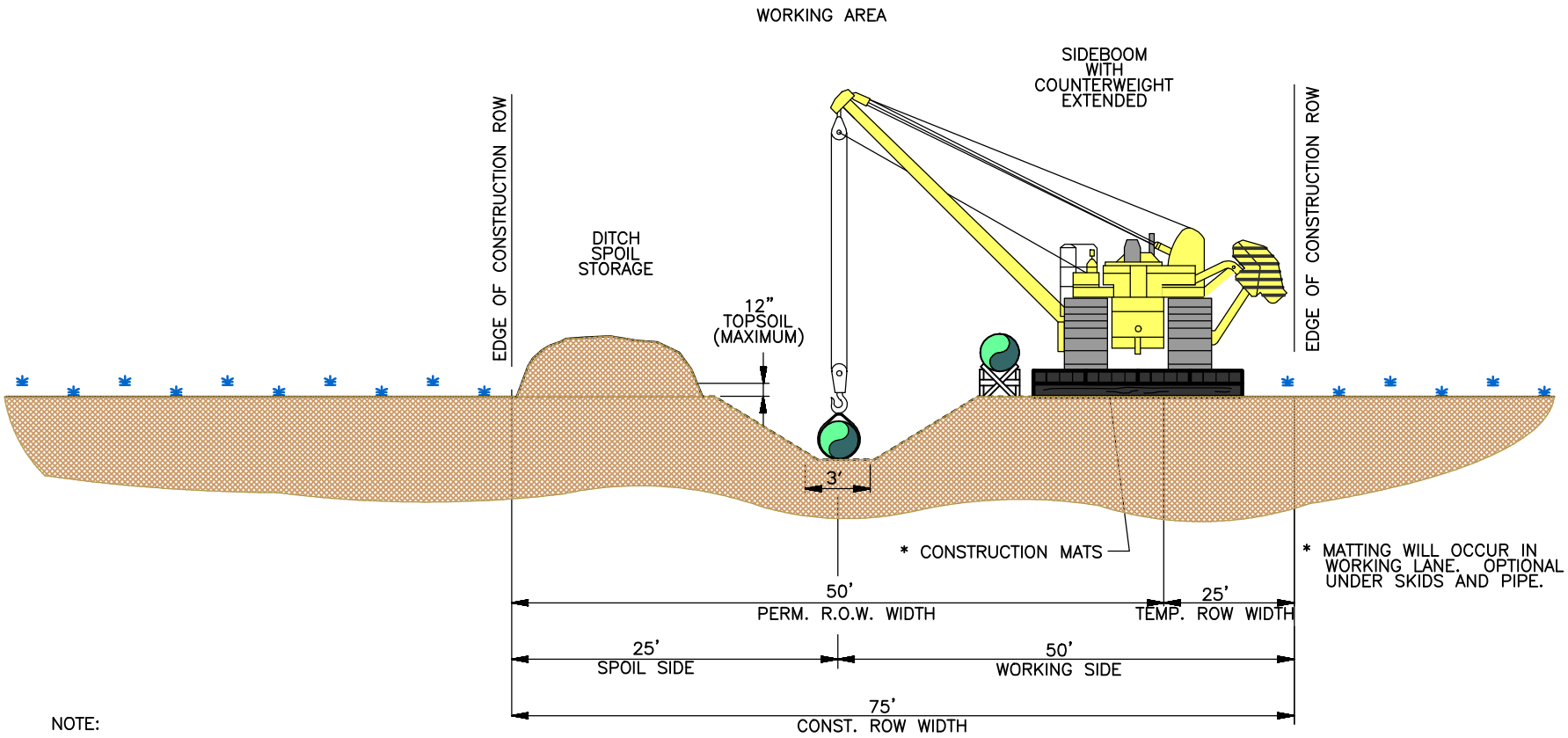

NOTE:

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SILT SOCK MAY BE PLACED IN WETLAND ALONG DITCH SPOIL PILE, AS AUTHORIZED, IF SLOUGHY OR MUCKY SOILS ARE PRESENT.

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EAST SIDE EXPANSION

MAINLINE CONSTRUCTION
SATURATED WETLAND RIGHT-OF-WAY

SCALE: N.T.S.

DRAWING NUMBER	ISSUE
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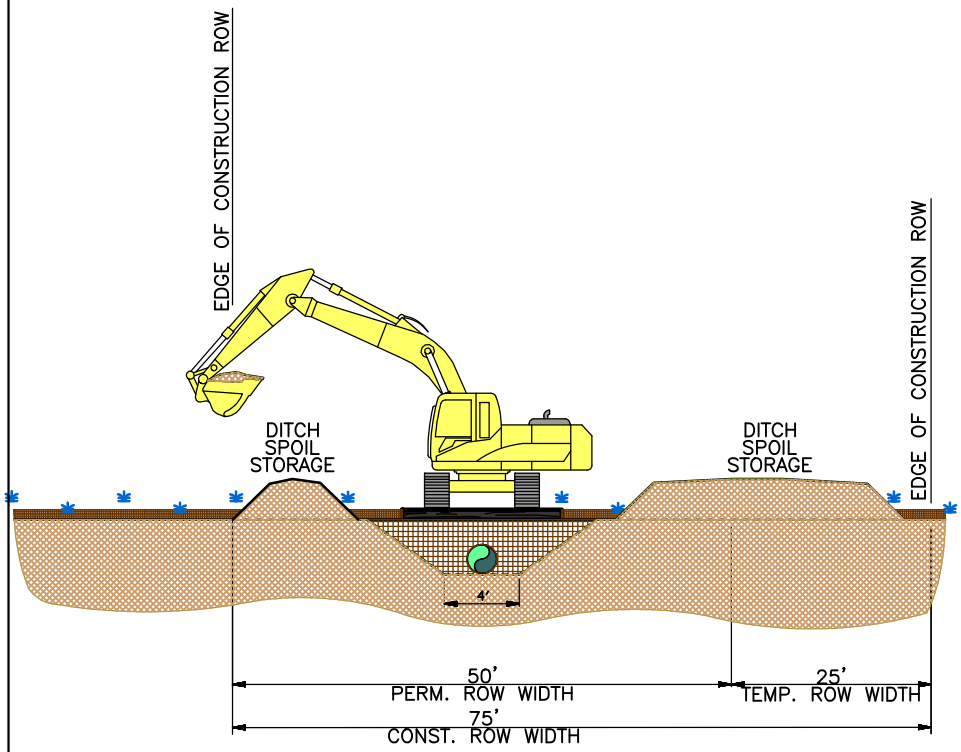

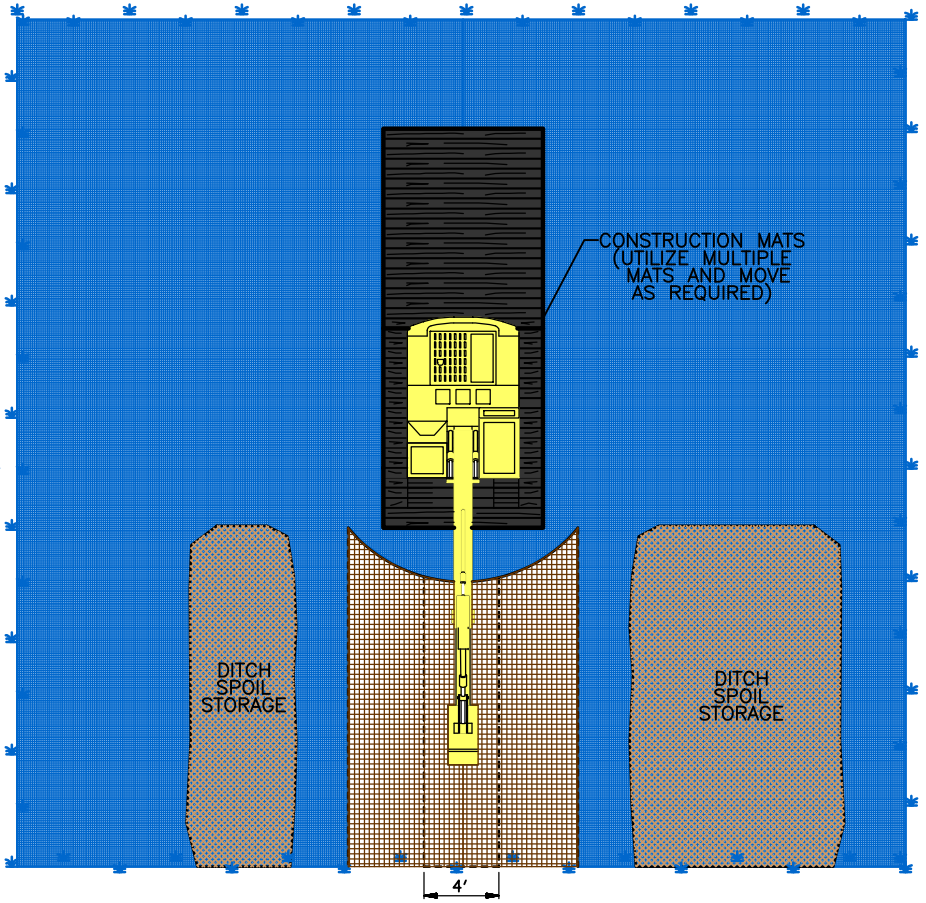

GENERAL NOTES:

1.) EXTRA DEPTH MAY BE REQUIRED FOR CONCRETE COATED PIPE OR WEIGHTS.

2.) PIPE STRING MADE UP OUTSIDE OF WETLAND.

3.) CONSTRUCTION METHOD TO INSTALL CAN BE CONVENTIONAL OR PUSH / PULL METHODOLOGY.

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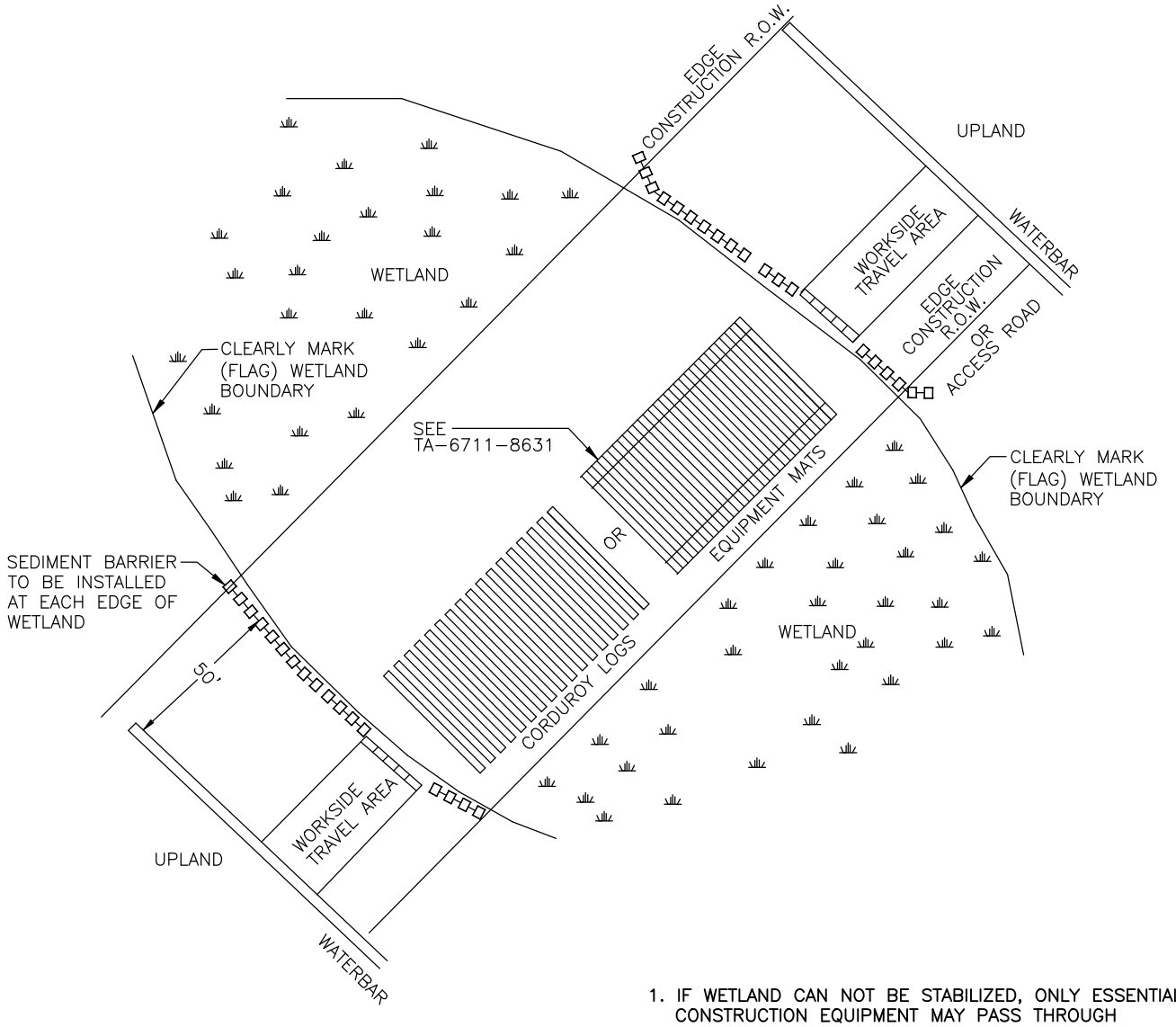
EAST SIDE EXPANSION

MAINLINE CONSTRUCTION
SUBMERGED WETLAND RIGHT-OF-WAY

SCALE: N.T.S.

DRAWING NUMBER	ISSUE
TA-6711-8629	A



NOTES:

1.) INSTALL TRENCH PLUGS ON BOTH SIDES OF THE WETLAND. TEMPORARY WATERBARS SHALL BE INSTALLED ON SLOPES GREATER THAN 5 PERCENT WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WETLAND. REFER TO STANDARD CONSTRUCTION WATERBAR AND TRENCH PLUG DETAILS.

2.) PIPELINE SHOULD BE A MINIMUM OF 5' BELOW THE LOWEST POINT IN THE WETLAND.

1. IF WETLAND CAN NOT BE STABILIZED, ONLY ESSENTIAL CONSTRUCTION EQUIPMENT MAY PASS THROUGH ONE TIME.
2. POST SIGNS, NO FUELING OR HAZARDOUS POLLUTANT MATERIAL STORAGE, WITHIN 100' OF THE WETLAND BOUNDARY
3. ALL CONTROLS WILL BE INSTALLED AFTER INITIAL GROUND DISTURBANCE AND MAINTAINED UNTIL ADJACENT UPLANDS ARE STABILIZED.
4. RESEED USING AN ANNUAL RYE GRASS.
5. USE ONLY STRAW MULCH IN WETLANDS WITH NO SOIL AMENDMENTS.
6. RESTORE TOPSOIL AND GRADE TO ORIGINAL CONTOUR AND DRAINAGE.

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EAST SIDE EXPANSION

TYPICAL WETLAND CROSSING RIGHT-OF-WAY ONLY

SCALE: N.T.S.

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