Federal Energy Regulatory Commission

Office of Energy Projects
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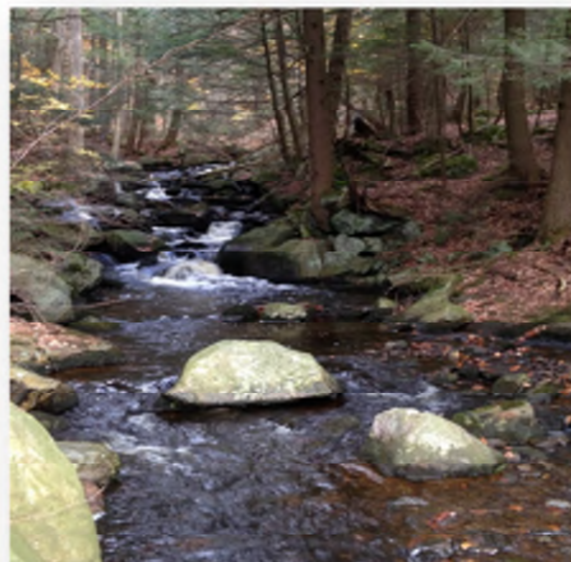
Washington, DC 20426

Environmental Assessment

CONNECTICUT EXPANSION PROJECT

Tennessee Gas Pipeline Company, L.L.C.



Cooperating Agency

October 2015

Docket No.: CP14-529-000

Official Business
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OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 1
Tennessee Gas Pipeline
Company, L.L.C
Docket No. CP14-529-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared this environmental assessment (EA) for the Connecticut Expansion Project (Project) proposed by Tennessee Gas Pipeline Company, L.L.C. (Tennessee) in the above-referenced docket. Tennessee requests authorization to construct and operate certain natural gas pipeline and aboveground facilities along its existing pipeline system in various counties in New York, Massachusetts, and Connecticut to provide an additional 72.1 million cubic feet per day of firm transportation service to three new shippers: Connecticut Natural Gas Corporation, Southern Connecticut Gas Company, and Yankee Gas Services Company.

The EA assesses the potential environmental effects of the construction and operation of the Project in accordance with 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 New York State Department of Agriculture and Markets 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 Project includes the following facilities:

- installing approximately 1.4 miles of new 36-inch-diameter pipeline loop[1] near the Town of Bethlehem, in Albany County, New York (referred to as the New York Loop);

[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.

- installing approximately 3.8 miles of 36-inch-diameter pipeline loop near the Town of Sandisfield, in Berkshire County, Massachusetts (referred to as the Massachusetts Loop);
- installing approximately 8.3 miles of 24-inch-diameter pipeline loop near the Town of Agawam, in Hampden County, Massachusetts and near the Towns of Suffield and East Granby in Hartford County, Connecticut (referred to as the Connecticut Loop);
- modifying the existing Agawam Compressor Station (Compressor Station 261) in Hampden County, Massachusetts;
- installing appurtenant facilities, including a mainline valve, cathodic protection, and pig[2] launchers and receivers along the three pipeline loops; and
- relocating two existing pig receiver facilities.

The EA has been placed in the public files of the FERC and is available for public viewing on the FERC's website at 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 Conference Room
888 First Street NE, Room 2A
Washington, DC 20426
(202) 502-8371

Copies of the EA have been mailed 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; libraries in the Project area; and parties to this proceeding.

Any person wishing to comment on the EA may do so. Your comments should focus on the potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that your comments are properly recorded and considered prior to a Commission decision on the proposal, it is important that the FERC receives your comments in Washington, DC on or before **November 23, 2015**.

For your convenience, there are three methods you can use to submit your comments to the Commission. In all instances, please reference the Project docket number (CP14-529-000) with your submission. The Commission encourages electronic

[2] A "pig" is a device to clean or inspect the pipeline. A pig launcher/receiver is an aboveground facility where pigs are inserted or retrieved from the pipeline.

filing of comments and has dedicated eFiling expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov.

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

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

(3) You may file a paper copy of your comments at the following address:

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

Although your comments will be considered by the Commission, simply filing comments will not serve to make the commentor a party to the proceeding. 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).[3] Only intervenors have the right to seek rehearing of the Commission's decision.

Affected landowners and parties with environmental concerns may be granted intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which would not be adequately represented by any other parties. **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., CP14-529). 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.

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

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

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

TECHNICAL ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACHP	Advisory Council on Historic Preservation
AI	Agricultural Inspector
AIM Project	Algonquin Incremental Market Project
Algonquin	Algonquin Gas Transmission Pipeline
AQCR	Air Quality Control Region
ATWS	additional temporary workspace
BA	Biological Assessment
CAA	Clean Air Act of 1970
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
CH_4	methane
CMR	Code of Massachusetts Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
Commission	Federal Energy Regulatory Commission
CTDEEP	Connecticut Department of Energy and Environmental Protection
CTNDDB	Connecticut Natural Diversity Database
CWA	Clean Water Act
dBA	decibels on the A-weighted scale
EA	Environmental Assessment
EI	Environmental Inspector
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FERC Plan	FERC *Upland Erosion Control, Revegetation, and Maintenance Plan*
FERC Procedures	FERC *Wetland and Waterbody Construction and Mitigation Procedures*
GHG	greenhouse gases
GIS	geographic information system
gpm	gallons per minute
HCA	high consequence areas
HUC	Hydrologic Unit Code
INGAA	Interstate Natural Gas Association of America Foundation, Inc.
L_{dn}	day-night averaged sound level

L_{eq}	24-hour equivalent sound level
MADCR	Massachusetts Department of Conservation and Recreation
MADEP	Massachusetts Department of Environmental Protection
MADFW	Massachusetts Department of Fisheries and Wildlife
MAEEA	Massachusetts Executive Office of Energy and Environmental Affairs
MAOP	maximum allowable operating pressure
MEPA	Massachusetts Environmental Policy Act
MLV	mainline valve
MP	milepost
NAAQS	National Ambient Air Quality Standards
NED Project	Northeast Energy Direct Project
NEPA	Natural Environmental Policy Act of 1969
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NO_x	nitrogen oxides
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive area
NYSDAM	New York State Department of Agriculture and Markets
NYSDEC	New York State Department of Environmental Conservation
O_3	ozone
OEP	Office of Energy Projects
PEM	palustrine emergent wetland
PFO	palustrine forested wetland
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM_{10}	particles with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particles with an aerodynamic diameter less than or equal to 2.5 microns
Project	Connecticut Expansion Project
psig	pounds per square inch gauge
PSS	palustrine scrub-shrub wetland
Secretary	Secretary of the Commission
SHPO	state historic preservation office(r)
SO_2	sulfur dioxide
SPRP	*Spill Prevention and Response Procedures*
Tennessee	Tennessee Gas Pipeline Company, L.L.C.
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture

USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USET	United Southern and Eastern Tribes
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compounds

A. PROPOSED ACTION

1. Introduction

On July 31, 2014, Tennessee Gas Pipeline Company L.L.C. (Tennessee) filed an application with the Federal Energy Regulatory Commission (FERC or Commission) in Docket No. CP14-529-000. Tennessee seeks a Certificate of Public Convenience and Necessity (Certificate) under Section 7(c) of the Natural Gas Act (NGA) to construct, modify, and operate a natural gas transmission pipeline and related facilities along its existing 200 Line system in New York and Massachusetts, and along its existing 300 Line system in Connecticut. Tennessee's proposed system expansion, referred to as the Connecticut Expansion Project (Project), includes construction of three looping[1] segments of new 36-inch-diameter and 24-inch-diameter natural gas pipeline, totaling about 13.5 miles, modifications at an existing compressor station, and certain appurtenant facilities, which are described in detail in section A.4. This Project would provide 72,100 dekatherms per day of firm transportation service to three new shippers with a proposed in-service date of November 1, 2016.

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 regulations for implementing NEPA under Title 40 of the Code of Federal Regulations (CFR) Parts 1500-1508 (40 CFR 1500-1508), and the Commission's implementing regulations under 18 CFR 380.

The FERC is the lead federal agency for the preparation of this EA. The New York Department of Agriculture and Markets (NYSDAM) is a cooperating agency that assisted us in preparing this EA because it has special expertise with respect to environmental impacts associated with Tennessee's proposal.

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

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

The EA will be used by the Commission in its decision-making process to determine whether to authorize Tennessee's proposal. Approval would be granted if, after consideration of both environmental and non-environmental issues, the Commission finds the Project is in the public interest.

2. Purpose and Need

Tennessee states the purpose of the proposed Project is to provide 72,100 dekatherms per day of firm transportation service to three new shippers: Connecticut Natural Gas Corporation, Southern

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

Connecticut Gas Company, and Yankee Gas Services Company. According to Tennessee, average daily volumes delivered onto its system increased by about 32 percent over the past 4 years. With its existing 200 and 300 Line infrastructure reaching capacity, Tennessee states that it is only through the expansion of its existing infrastructure that it would be able to deliver the incremental volumes requested by the Project shippers in binding precedent agreements, while maintaining service to existing shippers and pressure profiles necessary for system operations.

Under Section 7 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 decision on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project.

3. Public Review and Comment

On August 14, 2014, the Commission issued a *Notice of Application* for the Project under Docket No. CP14-529-000. On October 10, 2014, we issued a *Notice of Intent to Prepare an Environmental Assessment for the Proposed Connecticut Expansion Project, Request for Comments on Environmental issues, Notice of Public Scoping Meetings, and Notice of Environmental Site Reviews* (NOI). The NOI was published in the Federal Register and was mailed to 316 interested parties, including federal, state, and local government representatives and agencies; elected officials; affected landowners; environmental and public interest groups; potentially interested Native American tribes; other interested parties; and local libraries and newspapers.

We conducted three public scoping meetings and on-site environmental reviews in the Project area to provide an opportunity for agencies and the general public to learn more about the Project and to identify issues to be addressed in the EA. Scoping meetings were held on October 28, 2014, in East Granby, Connecticut; October 29, 2014, in Sandisfield, Massachusetts; and October 30, 2014, in Delmar, New York. Six individuals spoke at the East Granby meeting, 30 individuals spoke at the Sandisfield meeting, and seven individuals spoke at the Delmar meeting.[3]

Prior to the release of the NOI, the Commission received 139 comments. The Commission received an additional 38 comment letters during the public scoping period (October 10, 2014 through November 10, 2014) in response to the NOI. Written comments were received from one federal agency (United States Fish and Wildlife Service [USFWS]), eight state agencies (the NYSDAM, New York State Department of Environmental Conservation [NYSDEC], Connecticut Department of Energy and Environmental Protection [CTDEEP], the Commonwealth of Massachusetts - Executive Office of Energy and Environmental Affairs [MAEEA], the Commonwealth of Massachusetts Energy Facilities Siting Board, the Massachusetts Department of Conservation and Recreation [MADCR], the Massachusetts Historical Commission, and the Massachusetts Department of Environmental Protection [MADEP]); four local government bodies; two United States Senators; two United States Congressional Representatives from Massachusetts; four groups representing Native American tribes; seven non-governmental organizations; and 144 affected landowners and individuals.

After the end of the scoping period, we received 52 additional comments from individuals, organizations, local agencies, and state agencies. In addition to comments expressing general opposition to the Project, we received comments that: questioned the safety of the Project in relation to construction

[3] The transcripts of the public scoping meetings and all written comments are part of the public record for the Project and are available for viewing on FERC's website, www.ferc.gov, under Docket No. CP14-529-000, using the link called "eLibrary."

accidents; challenged the purpose and need for the Project; expressed concern about improper segmentation; requested a cumulative analysis that includes Marcellus shale production; requested an analysis of system alternatives; expressed concerns about climate change; and challenged the protection of MAEEA Article 97 lands. We also received comments about Lower Spectacle Pond and proposed restrictions on public access to the Pond in the months of July through August during the year of construction. Some commentors expressed general opposition to fracking and the development of infrastructure for fossil fuels. In addition, a landowner requested a minor route variation on their property along the New York Loop.

The issues identified in the environmental comments are summarized in table A-1 and addressed, as applicable, in relevant sections of this EA.

Table A-1

Issues Identified During the Public Scoping Process

Issue	EA Section Addressing Issue
General Project Description	
Purpose and need for the Project	A.2
Project requires Environmental Impact Statement	A.3
Project encourages shale gas development and hydraulic fracturing	A.3
Project segmentation	A.3
Minimize construction right-of-way to reduce impacts	A.5
Geology and Soils	
Access to emergency services during construction from geological hazards	B.1.1
Impact on soils and agriculture	B.1.2 / B.5.1
Water Resources, Fisheries, and Wetlands	
Impacts on drinking water	B.2.1
Depletion of Lower Spectacle Pond	B.2.2
Waterway degradation	B.2.2
Impacts on wetlands	B.2.3
Impact on coldwater fisheries	B.3.2
Vegetation	
Impacts on hemlock forest	B.3.1
Introduction of invasive species	B.3.1
Wildlife and Threatened and Endangered Species	
Impacts on wildlife habitat	B.3.3
Concern for dwarf wedgemussel	B.4.1
Cumulative impacts on wildlife and habitat	B.10.3
Land Use, Visual Resources, and Recreation	
Concerns about MADCR Lands and Article 97 (Otis State Forest)	B.5.3
Socioeconomics	
Impacts on local traffic during construction	B.6.2
Concern about property values	B.6.5
Cultural Resources	
Impacts on culturally significant and historic areas	B.7
Air Quality and Noise	
Air quality	B.8.1
Concerns about Project contribution to climate change	B.10.8

Table A-1 **Issues Identified During the Public Scoping Process**	
Issue	**EA Section Addressing Issue**
Reliability and Safety	
Emergency planning and response	B.9
Release of methane	B.9
Safety of high pressure gas pipelines	B.9
Concerns about blasting	B.9.1
Alternatives	
Consider no action and system alternatives	C.1; C.2
Consider compression alternatives	C.2
Consider route variations	C.3
Consider a roadway alternative	C.4
Consider alternatives that do not affect MADCR Lands under Article 97 (Otis State Forest)	C.4

MADCR = Massachusetts Department of Conservation and Recreation

We received comments recommending that an Environmental Impact Statement (EIS), rather than an EA, be prepared to assess the impacts of the Project. An EA is a concise public document that serves to provide sufficient evidence and analysis for determining a finding of no significant impact. Pursuant to 18 CFR 380.6(b) "If the Commission believes that a proposed action…may not be a major federal action significantly affecting the quality of the human environment, an EA, rather than an EIS, will be prepared first. Depending on the outcome of the EA, an EIS may or may not be prepared." In preparing this EA, we are fulfilling our obligation under NEPA to consider and disclose the environmental impacts of the Project. This EA addresses the impacts that could occur on a wide range of resources should the Project be approved and constructed. Based on our analysis and considering that the Project would involve pipeline looping and modifications to an existing compressor station, we conclude that the impacts associated with this Project could be sufficiently mitigated to support a finding of no significant impact and, thus, an EA is warranted.

We also received comments urging the Commission to deny the Project on the grounds that it would transport or further encourage the development of natural gas obtained by hydraulic fracturing ("fracking"). Other commentors recommended that impacts associated with fracking be included in the environmental review of the Project. We note that facilities associated with the production of natural gas within a state are not under FERC jurisdiction. The development of the shale gas reserves is regulated by the states. In New York, the permitting of oil and gas production facilities is administered under the jurisdiction of the NYSDEC Division of Mineral Resources and other agencies, depending on the resources affected, such as the United States Army Corps of Engineers (USACE) or the Delaware River Basin Commission. Natural gas is not produced in Massachusetts or Connecticut. The Council on Environmental Quality's regulations require agencies to consider the indirect impacts of proposed actions. Indirect impacts are "caused by the proposed action" and occur later in time or farther removed in distance than direct project impacts, but are still "reasonably foreseeable."[4] For an agency to include consideration of an impact in its NEPA analysis as an indirect effect, approval of the proposed project and the related secondary effect must be causally related. We find no causal link between natural gas production from shale formations in the northeast region and the proposed Project, which is designed to provide Tennessee's customers with the requested additional natural gas transportation service.

[4] 40 CFR § 1508.8(b) (2014).

Development of natural gas will occur with or without the proposed Project and would find other avenues to serve industrial and energy market needs. Therefore, natural gas production and hydraulic fracturing are not considered in this EA as an indirect effect of the proposed action. In addition, as part of our analysis of cumulative impacts in section B.10 of this EA, we did not identify any natural gas production projects within the region of influence for any resource analyzed.

Commentors also contend that Tennessee has improperly segmented the Northeast Energy Direct (NED) Project from the Connecticut Expansion Project to reduce the level of environmental scrutiny. Actions are "connected" if they: "[a]utomatically trigger other actions which may require environmental impact statements;" "[c]annot or will not proceed unless other actions are taken previously or simultaneously;" or "[a]re interdependent parts of a larger action and depend on the larger action for their justification."[5] Actions are not connected if they display independent utility. The proposed Project would function independently from the NED Project, currently in the Commission's pre-filing process in Docket No. PF14-22-000. In addition, the projects have different purposes, different start and end points, and subscription of 100 percent of the capacity to be created. An applicant's FERC-regulated projects in the same region are subject to environmental review by the Commission. Whereas the scope of this EA is focused on the environmental impacts of the Connecticut Expansion Project as proposed by Tennessee, we consider in section B.10 the cumulative effects that other projects in the region, including other projects under FERC's jurisdiction, may have in conjunction with the Project. As the NED Project would be constructed in proximity to the Connecticut Expansion Project, it is considered in our cumulative effects discussion in section B.10.

4. Proposed Facilities

The Project would consist of the following:

- installation of 1.4 miles of new 36-inch-diameter pipeline loop near the Town of Bethlehem, in Albany County, New York (referred to as the New York Loop);
- installation of 3.8 miles of 36-inch-diameter pipeline loop near the Town of Sandisfield, in Berkshire County, Massachusetts (referred to as the Massachusetts Loop);
- installation of 8.3 miles of 24-inch-diameter pipeline loop near the Town of Agawam, in Hampden County, Massachusetts and near the Towns of Suffield and East Granby in Hartford County, Connecticut (referred to as the Connecticut Loop);
- modifications at the existing Agawam Compressor Station (Compressor Station 261) in Hampden County, Massachusetts;
- installation of appurtenant facilities, including a mainline valve (MLV), cathodic protection, pig[6] launchers and receivers along the three pipeline loops; and
- relocation of two existing pig receiver facilities.

Figure 1 shows the overall Project location. Figure 2, figure 3, and figure 4 depict the New York, Massachusetts, and Connecticut Loops, respectively. Detailed location maps are included in appendix A.

5 40 CFR § 1508.25(a)(1)(i)-(iii) (2014).

6 A "pig" is a device to clean or inspect the pipeline. A pig launcher/receiver is an aboveground facility where pigs are inserted or retrieved from the pipeline.

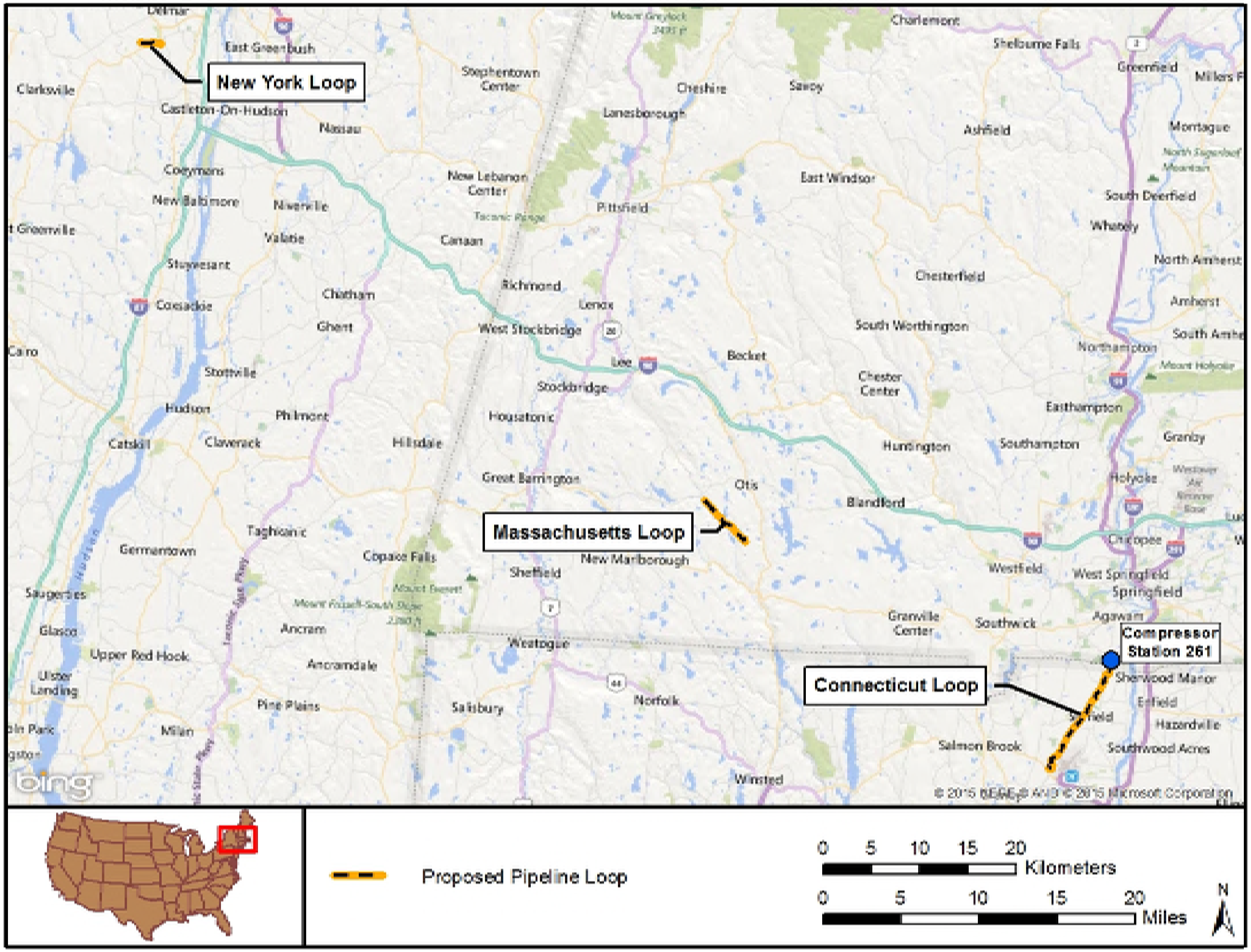


Figure 1: Project Overview

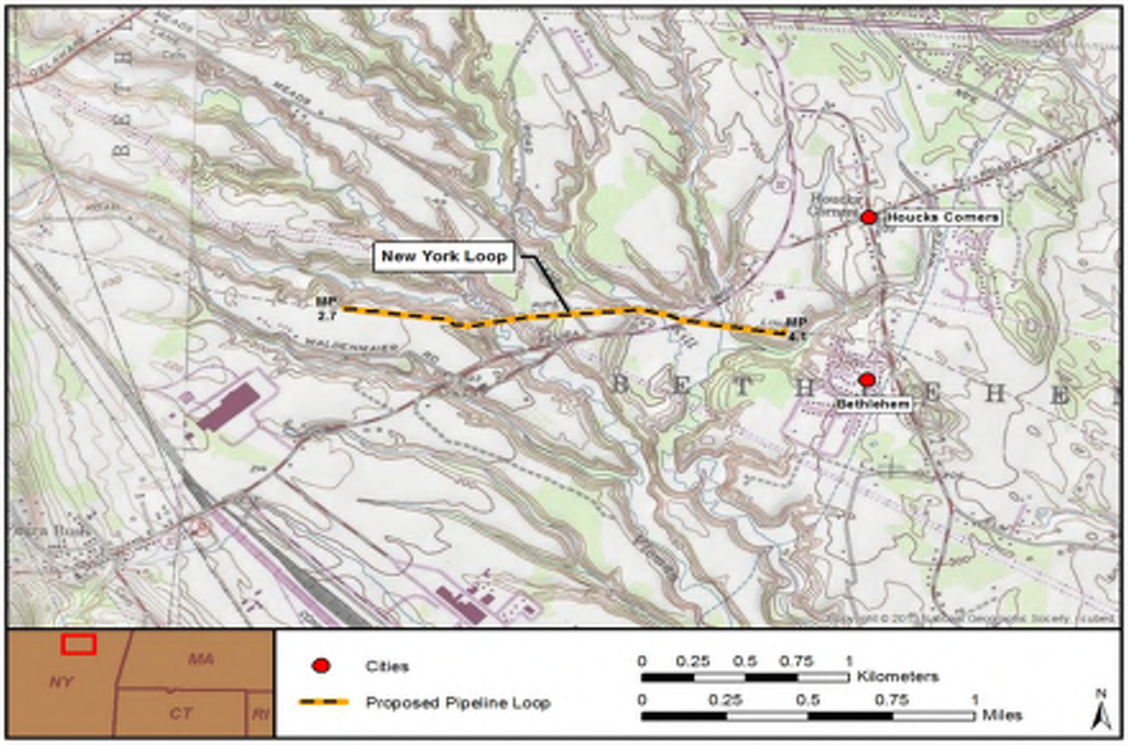


Figure 2: New York Loop

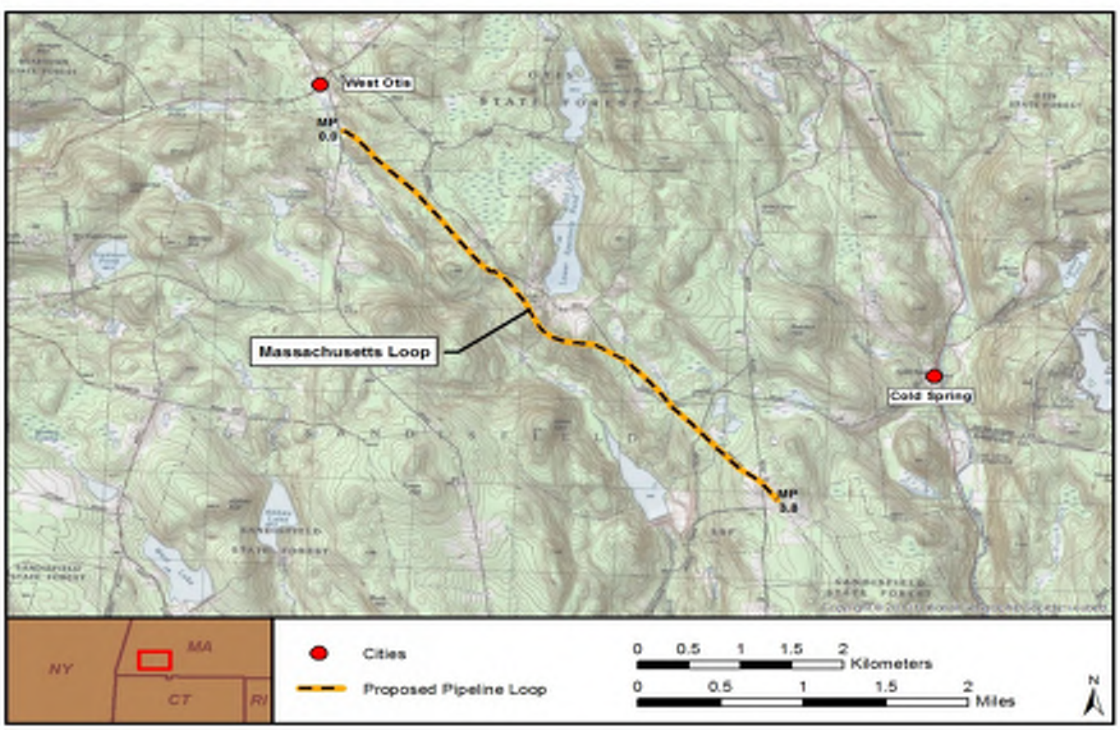


Figure 3: Massachusetts Loop

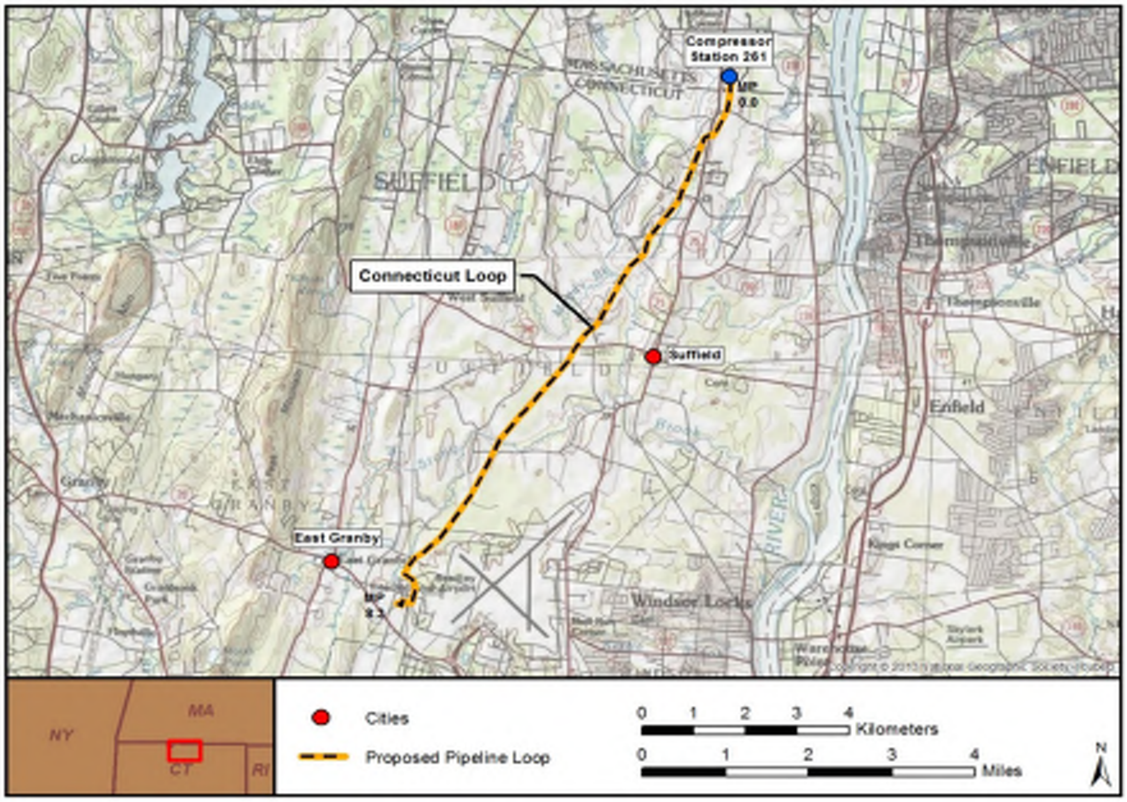


Figure 4: Connecticut Loop

4.1 Pipeline Facilities

The New York Loop would consist of 1.4 miles of new 36-inch-diameter pipeline that would tie into Tennessee's existing 36-inch 200 Line. Tennessee would use a portion of the existing right-of-way for its 24-inch-diameter 200 Line to construct the New York Loop and would obtain new permanent right-of-way for the New York Loop (see figure 1 in appendix A). This loop would begin at Tennessee's existing MLV 251 at milepost (MP) 2.7 on the Tennessee 200 Line and extend eastward 1.4 miles to end at MP 4.1. The pipeline would have a maximum allowable operating pressure (MAOP) of 880 pounds per square inch gauge (psig) and would be constructed of carbon steel.

The Massachusetts Loop would consist of 3.8 miles of new 36-inch-diameter pipeline that would also tie into Tennessee's existing 36-inch-diameter 200 Line. Tennessee would use a portion of the existing rights-of-way for its 24-inch-diameter 200 Line and 30-inch-diameter 200 Line to construct the Massachusetts Loop and would obtain new permanent right-of-way for the Massachusetts Loop (see figures 2-1 and 2-2 in appendix A). This loop would begin at Tennessee's existing MLV 258 at MP 0.0 and extend southeast to MP 3.8. The pipeline would have an MAOP of 880 psig and be constructed of carbon steel.

Tennessee would use a portion of the existing right-of-way for its 16-inch-diameter 300 Line to construct the Connecticut Loop and would obtain new permanent right-of-way for the Connecticut Loop (see figures 3-1 and 3-2 in appendix A). This loop would consist of 8.3 miles of new 24-inch-diameter pipeline that would tie into existing Compressor Station 261 at MP 0.0, cross the Massachusetts/Connecticut state line, and terminate at Tennessee's existing East Granby Meter Station at MP 8.3. The pipeline would have an MAOP of 800 psig and be constructed of carbon steel.

4.2 Aboveground and Appurtenant Facilities

At the beginning of the New York Loop (MP 2.7), an existing pig receiver and associated valve would be relocated to its terminus point (MP 4.1) to allow for tie-in back to the existing 200 Line.

At the beginning of the Massachusetts Loop (MP 0.0), an existing pig receiver would be relocated to its terminus point (MP 3.81) with a new pig receiver to allow for tie-in back to the existing 200 Line.

On the Connecticut Loop and adjacent Compressor Station 261, two new bi-directional pig launcher/receivers would be installed, one within Compressor Station 261 at MP 0.0 of the Connecticut Loop and one at the Loop's terminus (MP 8.3) within the East Granby Meter Station. A new MLV would be installed at MP 4.2 of the Connecticut Loop as well as regulation equipment at existing MLV 354.1 on Tennessee's existing 300 Line. All work at Compressor Station 261 would be within the existing fence line. Compressor Station 261 would be accessed using an existing access road (see figure 3-1 in appendix A). Land requirements for appurtenant facilities are summarized in table A-2.

Table A-2

Appurtenant Facilities Proposed for the Project

Facility	Milepost	Acres	Town	County	State
New York Loop					
Relocate existing pig receiver	4.1	0.1	Bethlehem	Albany	NY
Massachusetts Loop					
Relocate existing pig receiver and install new pig receiver	3.8	0.2	Sandisfield	Berkshire	MA
Connecticut Loop					
Bi-directional pig launcher/receiver	8.3	0.1	East Granby	Hartford	CT
New MLV #1	4.2	0.0	Suffield	Hartford	CT
Compressor Station 261					
Bi-directional pig launcher/receiver	0.0	0.1	Agawam	Hampden	MA
Project Total	**—**	**0.5**	**—**	**—**	**—**

MLV = mainline valve

The appurtenant aboveground facilities would be installed within the respective operational right-of-way. Pig launchers, receivers, and MLVs would have associated blowdown valves within the facility. Each facility would include gravel bases, site access, chain-link fence enclosures for security purposes, and identification and emergency signage. These facility locations are shown on the pipeline location maps (appendix A). The pig launchers and receivers would be designed in accordance with 49 CFR Part 192 (United States Department of Transportation [USDOT] regulations), Tennessee's company specifications and standards, and other applicable safety and environmental regulations.

5. Land Requirements

Construction of the Project would affect 216.2 acres of land, including pipeline facilities, additional temporary workspace (ATWS), contractor/pipeyards, access roads, and aboveground facilities.

Appurtenant facilities described in section A.4.2 would be constructed within the operational right-of-way and would not have additional land requirements. Following construction, 163.4 acres would revert to pre-construction conditions and uses. The remaining 52.8 acres, including the permanent pipeline right-of-way and permanent aboveground facility sites, would be retained for operation of the Project. Land requirements for the Project are summarized in table A-3.

Table A-3

Summary of Land Requirements for the Project

Facility [a]	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline [b]		
New York Loop	27.5	3.6
Massachusetts Loop	52.0	12.5
Connecticut Loop [c]	84.1	35.0
Pipeline Subtotal	**163.6**	**51.1**
Access Roads	8.7	1.6
Contractor/Pipe Yards	42.2	0.0
Compressor Station 261 [d]	1.7	0.1
Project Total	**216.2**	**52.8**

[a] Launchers/receivers and mainline valves would be within the operational right-of-way of the pipeline.
[b] Includes additional temporary workspace.
[c] Excludes about 30 feet of pipeline within the Compressor Station 261 fence line.
[d] Although all work would be within the Compressor Station 261 fence line, a portion of the area within the fence line would need to be cleared to allow for construction and operation of the pipeline. This acreage is accounted for in the Land Affected During Operation total.

5.1 Pipeline Facilities

Pipeline construction would require a construction right-of-way width of up to 100 feet for the 24-inch-diameter pipeline and 125 feet for the 36-inch-diameter pipeline. The construction right-of-way would generally consist of 25 feet of existing, permanently maintained right-of-way associated with Tennessee's existing 200 and 300 Lines, 25 feet to 35 feet of new permanent right-of-way, and 50 to 75 feet of temporary construction workspace. As discussed further in section B.2.3, the construction right-of-way width at wetland crossings would generally be 75 feet. Locations and justification for construction right-of-way greater than 75 feet within wetland areas are listed in table B-7 and discussed in section B.2.3.

The New York and Massachusetts Loops would generally require 25 feet of new permanent rights-of-way adjacent to Tennessee's existing easements. The Connecticut Loop would generally require an additional 35 feet of new permanent right-of-way adjacent to Tennessee's existing easements with the exception of about 0.7 mile of the non-collocated portion of the loop, discussed below, that would require a new 50-foot-wide permanent right-of-way. The new permanent rights-of-way would be maintained for pipeline operations; the remainder of the construction rights-of-way would be revegetated and allowed to revert to pre-existing conditions and previous land uses. Figure 5 shows the typical construction right-of-way for the Connecticut Loop (24-inch-diameter pipeline) and figure 6 shows the typical construction right-of-way for the New York and Massachusetts Loops (36-inch-diameter pipeline). Figure 7 shows the typical construction right-of-way for the non-collocated pipeline at the end of the Connecticut Loop.

Tennessee would collocate most of the three loops within or adjacent to its existing pipeline rights-of-way, but would acquire additional permanent rights-of-way as discussed above. In its July 31, 2014 Certificate application Tennessee proposed to use the horizontal directional drill construction method on a portion of the Connecticut Loop in East Granby Township to avoid Degrayes Brook and its associated wetland. However, upon conclusion of its geotechnical analysis, Tennessee determined the horizontal directional drill method would not be feasible at this location. To avoid the stream/wetland, Tennessee adjusted the route away from its 300 Line from MP 7.6 to MP 8.3; thus about 0.7 mile of the Connecticut Loop is not collocated with its existing right-of-way. Table A-4 summarizes areas of new pipeline collocation with existing rights-of-way.

Table A-4

Summary of Pipeline Collocation with Existing Tennessee Rights-of-Way

Facility	Start Milepost	End Milepost	Portion Collocated
New York Loop	2.7	4.1	1.4 of 1.4 miles
Massachusetts Loop	0.0	3.8	3.8 miles of 3.8 miles
Connecticut Loop	0.0	7.6	7.6 miles of 8.3 miles

ATWS would also be required for construction at areas of steep slopes, unstable terrain, areas with soil limitations, road and waterbody crossings, areas with shallow bedrock, for safety concerns, and for other potential site-specific constraints. Although Tennessee has identified areas where ATWS would be required, additional or alternative areas could be identified in the future due to changes in site-specific construction requirements, and Tennessee would be required to file information on each of those areas for Commission review and approval prior to use. ATWS within 50 feet of wetlands or waterbodies (also denoted in appendix B) require site-specific justification per the FERC *Wetland and Waterbody Construction and Mitigation Procedures* (FERC Procedures) and are further addressed in section B.2.3. See table A-6 for a summary of Tennessee's requested exceptions from the FERC Procedures for the proposed Project. ATWS would be returned to pre-construction conditions and land uses following construction.

Vegetation within the permanent right-of-way would be maintained in an herbaceous state, except in wetlands and adjacent to waterbodies. During operations at waterbodies, Tennessee would not clear within a 25-foot-wide riparian strip for the full width of the permanent right-of-way and would limit annual maintenance to immediately over a 10-foot-wide-strip centered over the pipeline. In wetlands, Tennessee would not clear the entire full width of the permanent right-of-way and would limit annual maintenance over a 10-foot-wide corridor centered over the pipeline. However, in forested wetlands trees with roots than may compromise the pipe or its coating within a 30-foot-wide corridor centered over the pipeline would be selectively removed. Crop production would be allowed to continue within the permanent right-of-way in agricultural areas.

5.2 Aboveground Facilities

Modifications at the existing Compressor Station 261 would occur within the existing facility fence line, and would affect 1.7 acres during construction and about 0.1 acre for operations. These modifications are limited to the installation of a new bi-directional pig launcher/receiver, miscellaneous station piping, valves, fittings, and insertion meter to interconnect the new Connecticut Loop with the existing Compressor Station 261 facility.

Appurtenant facilities including new pig launchers, receivers, and MLVs would be constructed within the pipeline rights-of-way and are accounted for in the land requirements for pipeline facilities.

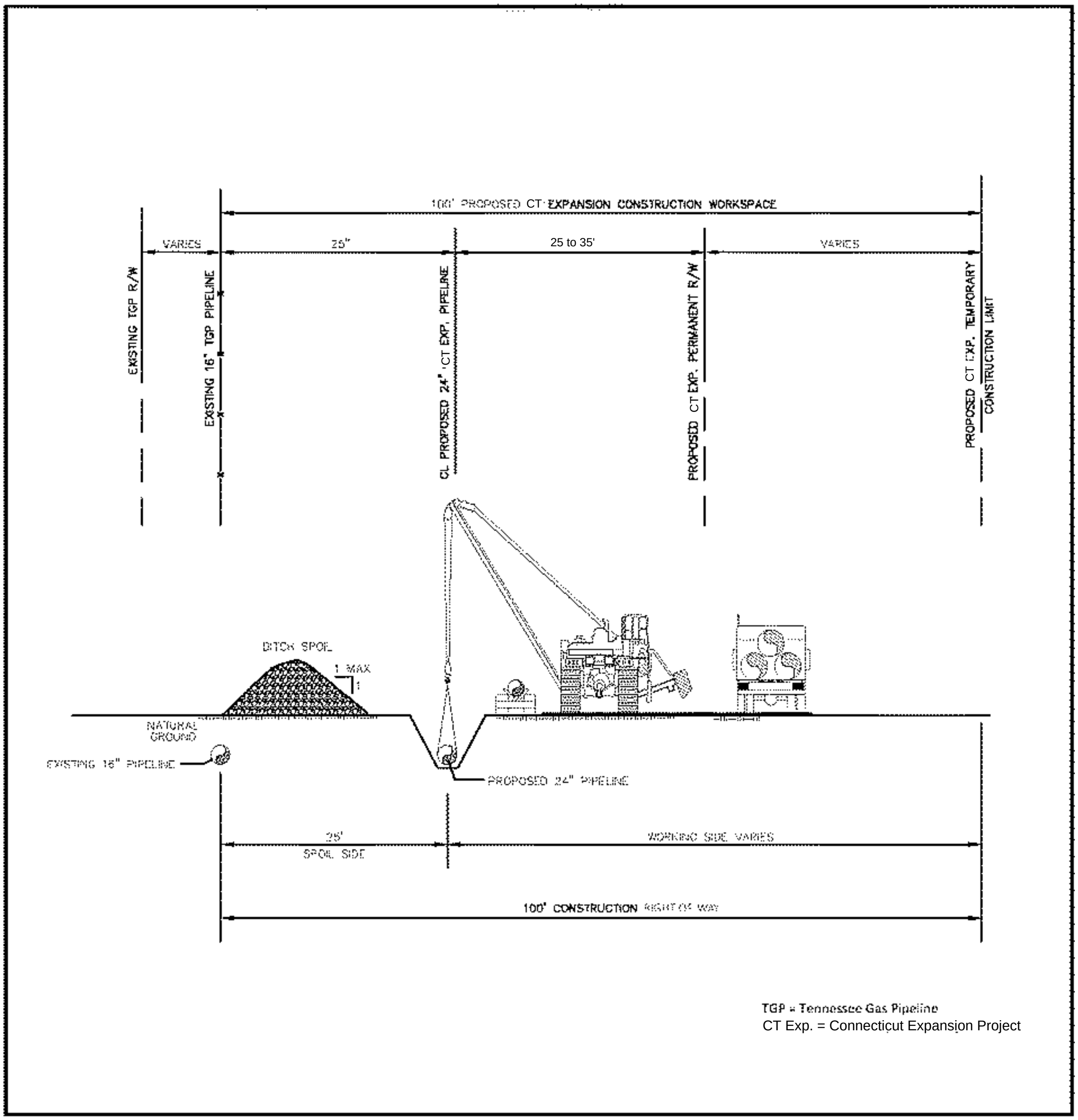


Figure 5: Typical Construction Right-of-Way for 24-inch-diameter Pipeline

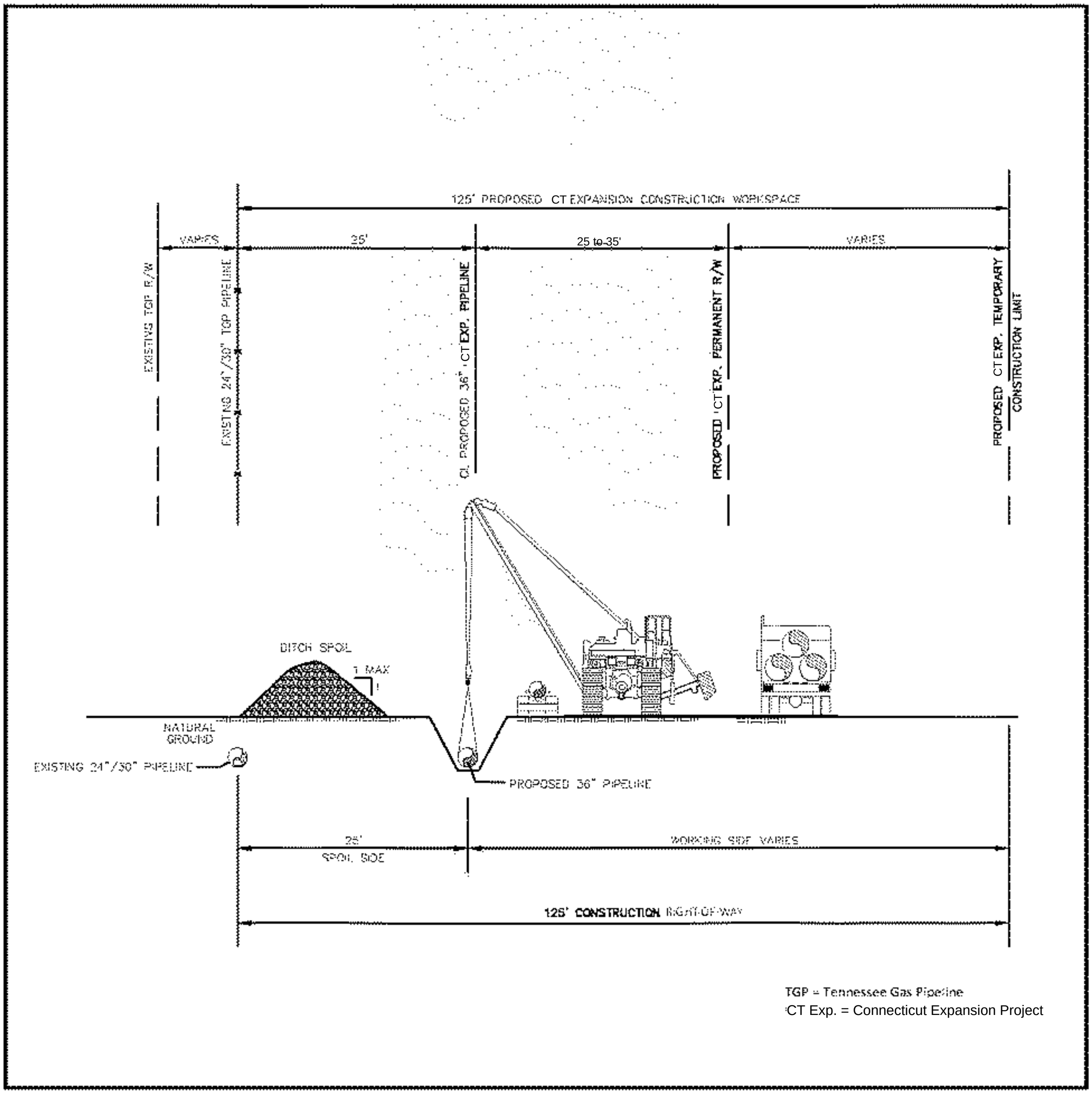


Figure 6: Typical Construction Right-of-Way for 36-inch-diameter Pipeline

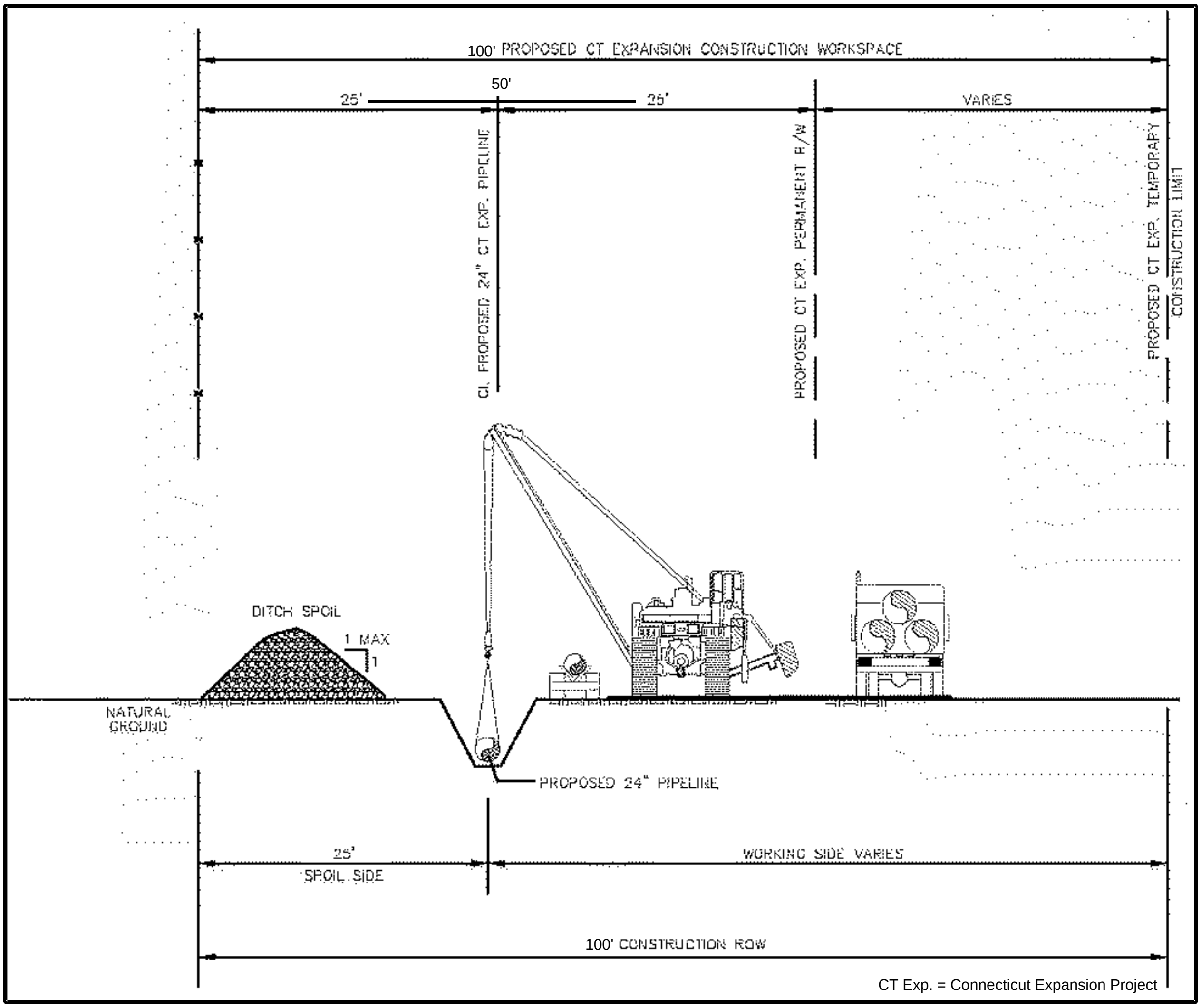


Figure 7: Typical Construction Right-of-Way for Non-collocated 24-inch-diameter Pipeline

5.3 Contractor/Pipe Yards

Tennessee identified seven contractor/pipeyards in the vicinity of the Project that would be used for equipment, pipe and materials storage, as well as temporary field offices and pipe assembly areas. The contractor/pipeyards are identified on maps of the pipeline loops (appendix A) and are included in table A-5. The total land requirements for these facilities would be about 42.2 acres. All yards would be leased from the landowners, and returned to pre-construction condition and former usage following Project construction. If additional pipe storage, contractor yards, or contractor offices are identified as being necessary, Tennessee would be required to file information on each new facility for Commission review and approval prior to use.

Table A-5				
Contractor/Pipeyards Proposed for the Project				
Name	**Town, State**	**Approximate Location from Project Facilities**	**Existing Land Use Classification**	**Acres**
New York Loop				
Creble Road	Selkirk, NY	2.6 miles south of MP 4.0	Commercial/ Industrial	6.9
New York Subtotal				**6.9**
Massachusetts Loop				
Tyringham	Tyringham, MA	4.4 miles northeast of MP 0.0	Agricultural/Forest/ Open Land	3.5
Town Hill Road	Sandisfield, MA	1.7 miles southwest of MP 3.0	Agricultural	2.3
South Beech Plain Road	Sandisfield, MA	0.1 mile southwest of MP 3.7	Agricultural	4.6
Cold Spring Road	Sandisfield, MA	0.2 mile northeast of MP 2.0	Agricultural	7.5
Massachusetts Subtotal				**17.9**
Connecticut Loop				
Hickory Street	Suffield, CT	250 feet east of Loop from MPs 0.1 to 0.4	Agricultural/Forest	11.3
East Granby	East Granby, CT	Crosses Loop between MPs 7.1 and 7.3	Open Land/Forest	6.1
Connecticut Subtotal				**17.4**
Project Total				**42.2**

MP = milepost

5.4 Access Roads

Tennessee has identified a total of 18 access roads that would be needed for the Project. Five roads would be permanent and used for operation of the facilities while the remaining13 would be temporary during construction and restored as applicable to permit requirements and landowner agreements. Of the 18 access roads, two would be new roads and 16 are existing roads. One of the two new access roads would be temporary while the other would be permanent. The use of 11 of the existing roads would require modifications or improvements, such as widening and adding gravel. A list of access roads is provided in appendix C. Tennessee would negotiate with landowners for the use of private roads. The construction and use of access roads along the pipeline route would affect about 8.7 acres of land. Five access roads would be permanently retained for access to MLV or pig receiver sites during operation. The construction and use of the one new permanent access road to a relocated pig receiver near MP 3.9 of the New York Loop would affect 0.6 acre of land. If any of the existing access roads are damaged by the Project, Tennessee has committed to restore temporary access roads to their existing condition or better.

6. Construction Schedule and Workforce

Tennessee anticipates that construction would commence in the fourth quarter of 2015, subject to receiving the necessary permits and approvals. Tennessee anticipates an in-service date of November 1, 2016.

Tennessee estimates that one construction spread would be required for each of the three loop segments, for a total of three construction spreads. Tennessee states that construction of the New York

Loop would require about 100 workers from May through mid-June 2016, with a residual workforce of about 20 workers performing restoration and revegetation from mid-June through August 2016. Construction of the Massachusetts and Connecticut Loops would require about 250 workers each from May through October 2016. A crew of about 30 to 40 workers would perform restoration and revegetation of the rights-of-way through the end of November 2016. Tennessee proposes to conduct tree clearing for all forested areas of the proposed Project between November 2015 and March 2016 to avoid peak migration or nesting periods of migratory birds and roosting of bat species.

Tennessee does not anticipate the need for additional permanent staff for operation of the new Project facilities, and no new operations offices or district offices would be required for operation of the facilities.

7. Construction, Operations, and Maintenance Procedures

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

Generally, installation of the pipeline loops would be conducted using conventional overland construction techniques, where each of the construction spreads (crews) would proceed along the pipeline right-of-way in one continuous operation, with the entire process coordinated to minimize the total amount of time a tract of land is disturbed. Unless authorized through a variance granted by the Commission, Tennessee would comply with the FERC *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC Plan) and FERC Procedures. The FERC Plan and Procedures provide a set of construction and mitigation measures developed to minimize the potential environmental impacts of the construction of pipeline projects in general. Tennessee has not requested any alternative measures to the FERC Plan, but has requested alternative measures to the FERC Procedures. These are described in table A-6.

Table A-6

Tennessee's Requested Alternative Measures to the FERC Procedures

Section of Our Procedures	Alternative Measure	Explanation
V.B.2.a: Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.	Tennessee would use ATWS within 50 feet of specified wetlands or waterbodies.	Tennessee provided explanations of the conditions for ATWS within 50 feet of a wetland or waterbody (see appendix B). We agree that these ATWS are necessary. See sections B.2.2 and B.2.3 for further evaluation.
V.B.6: Unless approved otherwise by the appropriate federal or state agency, install the pipeline using one of the dry-ditch methods outlined below for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally designated as critical habitat.	In accordance with consultations from state agencies, Tennessee would cross all streams with discernible flow at the time of construction via flume or dam-and-pump, regardless of fisheries or critical habitat designation.	By crossing all streams with discernable flow using dry-ditch methods regardless of fisheries or critical habitat designation, Tennessee would comply with state agency requirements and provide a level of protection equal to or greater than the FERC Procedures.

Table A-6

Tennessee's Requested Alternative Measures to the FERC Procedures

Section of Our Procedures	Alternative Measure	Explanation
VI.A.3: Limit the width of the construction right-of-way to 75 feet or less within wetlands. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet.	Tennessee's construction right-of-way would be greater than 75 feet wide at some locations within wetlands.	Tennessee provided explanations of the conditions that would require a construction right-of-way greater than 75 feet wide within wetlands (see table B-8). We agree that the extra workspace is justified at these locations. See section B.2.3 for further evaluation.
VI.C.3: Install a permanent slope breaker across the 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 wetland, or as needed to prevent sediment transport into a wetland.	At the discretion of the Environmental Inspector (EI), Lead EI, and Tennessee's contractor, in areas where permanent slope breakers may alter the permanent overland flow characteristics and consequently alter the wetland's characteristics, Tennessee proposes to use hay/straw bales as temporary slope breakers at wetland boundaries until restoration is complete to ensure the wetland characteristics would remain intact.	We agree that installing temporary slope breakers at wetland boundaries until restoration is complete would be appropriate in situations where flow and wetland characteristics would be altered with permanent slope breakers.

We have reviewed Tennessee's requested alternative measures to the FERC Procedures and find them acceptable, while others would require additional justification and possible modification. Sections B.2 and B.3 provide additional discussion of ATWS proposed within 50 feet of wetland or waterbody areas. Section B.2 also provides information where the construction right-of-way would be greater than 75 feet wide within wetlands. In these sections, we have recommended additional justifications or modifications for specific ATWS.

Tennessee would also implement additional construction, restoration, and mitigation plans prepared for the Project. These plans include the following: *Blasting Plan, Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*, *Invasive Species Management Plan, Site-specific Residential Plans, Spill Prevention and Response Procedures (SPRP), Hazardous Materials Discovery Plan, Waste Management Plan, and Massachusetts Traffic and Transportation Management Plan.* We have reviewed Tennessee's general construction and mitigation plans and find them acceptable. Plans not attached to this EA are available for viewing on our website (eLibrary under Docket No. CP14-529-000).

7.1 General Pipeline Construction Procedures

Figure 8 is a depiction of the typical pipeline construction sequence. Prior to construction, Tennessee's survey contractor would stake the pipeline centerline and the limits of the construction right-of-way, ATWS, road crossings, and access roads. Wetland boundaries and other environmentally sensitive areas would also be marked at this time.

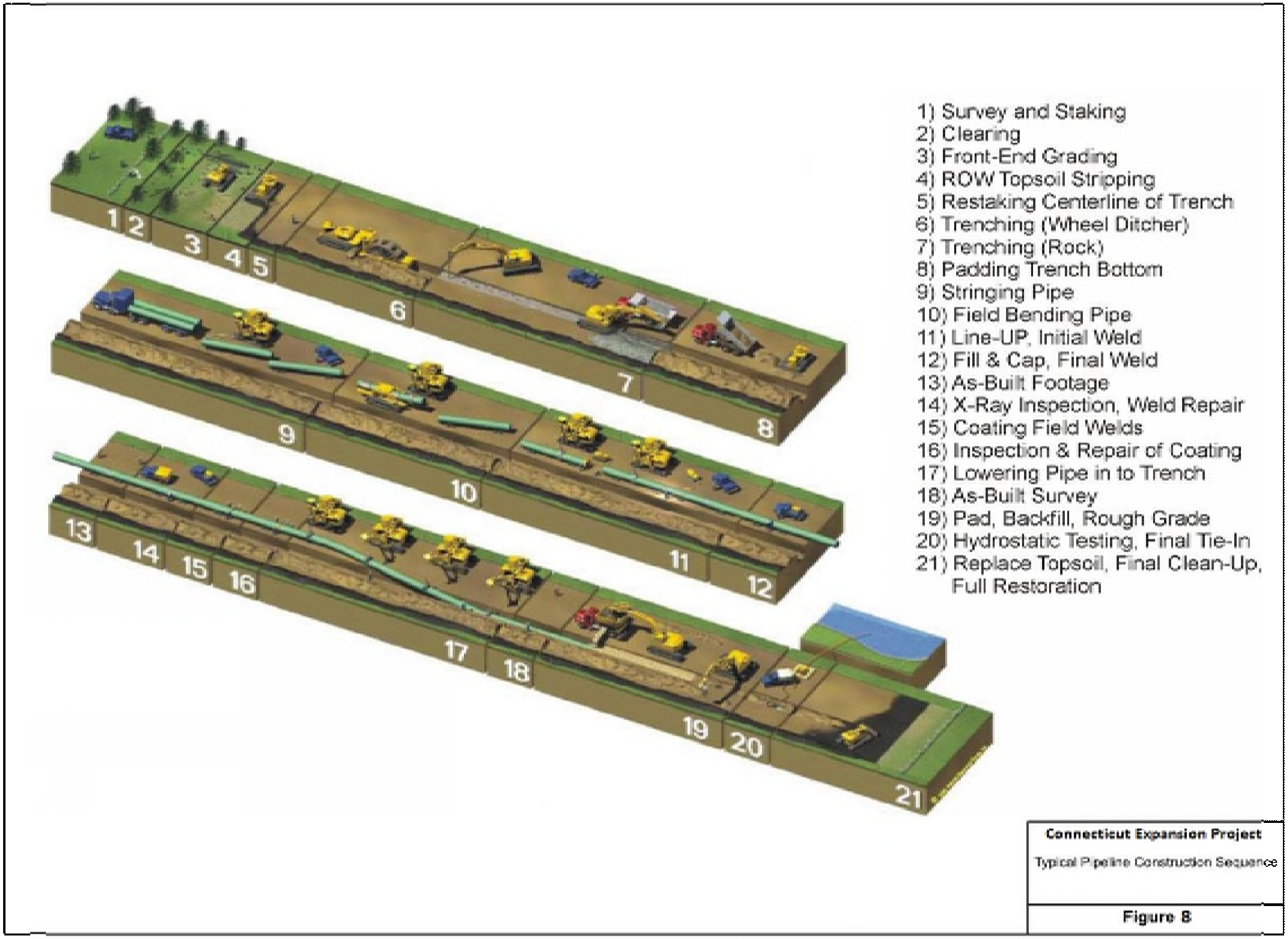


Figure 8: Typical Pipeline Construction Sequence

Prior to ground-disturbing activities, Tennessee's construction contractor would call the "Dig-Safe" call system for the states of New York, Massachusetts, and Connecticut, as well as the national "811" call system to identify underground utilities and foreign pipelines so their locations could be marked. In agricultural areas, any drain tile locations would be identified. Temporary soil erosion and sedimentation control devices would be installed as needed in accordance with the FERC Plan and Procedures. These erosion and sediment controls would be inspected and maintained throughout construction and restoration of the Project.

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

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

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

Prior to lowering-in the pipe, Tennessee would inspect the trench to ensure it is free of rocks and other debris that could damage the pipe or its protective coating. The pipe would then be lifted from the temporary supports and lowered into the trench using side-boom tractors. As necessary, trench breakers (stacked sand bags or foam) would be installed in the trench around the pipe in steeply sloped areas to control movement of subsurface water along the pipeline. After lowering-in, final welds would be made in the trench by the tie-in crew. Once the tie-ins are complete, the trench would be backfilled with previously excavated materials. If excavated materials are not suitable (e.g., they are rocky), the pipeline would be covered with more suitable fill or protected with a rock shield. "Padding material" would either be imported or obtained by removing rock from the excavated spoil to backfill the area immediately around and 8 inches above the pipe in the trench. Topsoil would not be used to pad the pipe. Previously graded areas would be returned to original contours as near as practicable with a slight crowning at the top of the trench to allow for settling.

After backfilling, the pipeline would be hydrostatically tested in sections to ensure the system is free from leaks and provide the required safety at operating pressures. Tennessee would obtain the test water from municipal hydrants for the New York and Connecticut Loops and Lower Spectacle Pond for the Massachusetts Loop. Tennessee has coordinated with the Town of Sandisfield and MADEP for the use of water from Lower Spectacle Pond and would seek coverage under Title 33 Water Withdrawal Permit, and Massachusetts Water Resources Management Program (310 Code of Massachusetts Regulations [CMR] 36.00). A suction pipe would be attached to a pump with a dissipation device (screen) attached to the end to avoid or minimize the entrainment of fish and other aquatic species. The screen would be attached to a buoy and also anchored to the bottom to ensure the intake is elevated off the bottom to avoid the intake of sediment. No chemicals would be added to the test water prior to use. Upon completion of hydrostatic testing, Tennessee would discharge the test water in accordance with the FERC Plan and Procedures and the requirements of the applicable federal and state discharge permits.

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

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

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

7.2 Special Pipeline Construction Procedures

Waterbody Crossings

Tennessee would cross typical waterbodies using conventional trenching, dam-and-pump, or flume crossing methods. In addition, Tennessee would use construction bridges at all waterbodies with discernible flow at the time of crossing. Tennessee would adhere to the measures specified in the FERC Plan and Procedures, as well as any additional requirements specified in federal or state waterbody crossing permits. Additional information on waterbody crossings is provided in section B.2.2.

ATWS would be at least 50 feet from the edge of the waterbody except in five specific cases where this is not feasible (e.g., in areas of steep slopes and near road crossings). In these cases, Tennessee has requested alternatives to the FERC Procedures that would allow a setback less than 50 feet from the waterbody. Appendix B identifies the location and rationale for changes in setback distances at waterbody crossings. We have reviewed these locations and Tennessee's justification for the setback distances and find the majority of them acceptable. See section B.2.2 for our recommendation regarding an alternative requested.

Conventional Trenching Method (Open-Cut)

Tennessee would cross waterbodies that are dry or have no discernible flow at the time of construction using a conventional open-cut trenching method. An open-cut waterbody crossing is typically conducted with backhoe-type excavators operating from the banks of the waterbody that would open a trench while flow is maintained across the trench. Spoil excavated from the trench would be placed on the bank above the high water mark for use as backfill. A prefabricated segment of pipe would then be placed into the trench using side-boom tractors. Concrete coating or set-on weights would be used, as necessary, to provide negative buoyancy for the pipeline. Once the trench is backfilled, the banks would be restored as near as practicable to pre-construction contours and stabilized. Stabilization measures would include seeding, installation of erosion control blankets, or installation of riprap materials, as appropriate. Excavated material not required for backfill would be removed and disposed of at upland disposal sites. If conditions change during construction such that there is perceptible flow or likely to be perceptible flow, Tennessee would implement the dam-and-pump or flume method as described below.

Dam-and-Pump Crossing Method

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

Flume Crossing Method

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

Wetlands

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

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

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

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

Most ATWS would be at least 50 feet from the edge of the wetland except in cases where this is not feasible (e.g., in areas of steep slopes and near road crossings). In these cases, Tennessee has requested alternatives to the FERC Procedures that would allow a setback less than 50 feet from the wetland. In areas where the wetland is adjacent to an upland that consists of actively cultivated or rotated cropland or other disturbed land, exceptions would not be required. Table A-5B identifies the location and rationale for changes in setback distances at wetland crossings. We have reviewed these locations and Tennessee's justification for the setback distances and find the majority of them acceptable. See section B.2.3 for recommendations regarding a subset of the alternatives requested.

Road Crossings

Tennessee would conduct construction across public and private roadways and highways using a conventional open-cut or bored crossing, depending on permit conditions. Prior to construction, Tennessee would locate existing underground utilities and make provisions for traffic management in work areas as necessary. During construction, Tennessee would incorporate measures to ensure that construction activities would not prevent the passage of fire and emergency vehicles. This could include the creation of temporary travel lanes during construction or the placement of steel plate bridges to allow continued traffic flow during open trenching. Traffic lanes and residential access would be maintained except for the temporary periods essential for pipeline installation.

Tennessee's open-cut technique requires the rerouting of traffic around the open trench during installation. Traffic may be redirected by constructing temporary bypass roadways, by diverting traffic to another lane (on multi-lane roads), or by creating a detour around the workspace using alternate, nearby roadways. Crossing paved roads using this method requires the cutting, removal, and appropriate disposal of the portion of the pavement over the proposed trench. The trench would then be excavated, the pipe would be installed, and the trench would be backfilled. Most open-cut road or driveway crossings would be completed and the surfaces restored in a few days.

Bored crossings consist of excavating a pit on each side of the road, placing boring equipment within the pits, boring a hole under the roadbed, and pulling a section of pipe through the hole. For long crossings, pipe sections would be welded into a pipe string before being pulled through the borehole. All crossings would be conducted in accordance with the local department of public works or the appropriate state department of transportation permit requirements.

Agricultural Areas

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

Existing drainage and irrigation systems would be located prior to construction and would be monitored throughout construction and restoration to ensure no Project-related damage has occurred. Should Project activities affect these systems (including those beyond the trench line), Tennessee would repair them to their pre-construction level of functioning, and a crop monitoring program would be implemented to ensure that crop productivity is restored to pre-construction conditions.

Residential Areas

One residence would be within 25 feet of a construction workspace. Tennessee has prepared site-specific construction plans for residences that would be within 50 feet of the construction right-of-way (see appendix D). The plans depict measures Tennessee would implement to minimize potential impacts on these homes and reduce construction workspace to the extent practicable. With the publication of this EA, we are specifically requesting comments on the residential site-specific plans. See section B.5 for further information on construction methods to minimize impacts on residential areas.

Foreign Utility Crossing

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

Steep Slope and Side Slope Construction

Certain areas along each of the proposed loops would cross areas of steep slopes between 15 and 30 percent and a portion of the Massachusetts Loop would cross an area of steep slopes greater than 30 percent. In these areas, permanent trench breakers would be used to prevent erosion of the trench and transport of sediment down gradient. Along the steep slope greater than 30 percent on the Massachusetts Loop, the specialized construction method of winching the equipment would be used to allow the equipment to move along the right-of-way. Winching is conducted by anchoring a tractor at the top of the slope and using a winch to move the equipment up and down slope.

Portions of the pipeline would also cross areas of steep side slope or rolling terrain that may require the use of cut-and-fill grading to provide for safe working conditions. In these areas, grading activities would cut down the upslope side of the construction right-of-way. Material from the cutting would be used to fill the downslope side of the construction right-of-way to create a safe and level surface for travel lanes and equipment operation. ATWS would be required downslope to accommodate the additional spoil and topsoil. Following pipeline installation and backfilling, Tennessee would place excavated materials back in the area of the cut, compact the soil to restore the surface of the right-of-way to original contours (as practicable), and stabilize the surface in accordance with the FERC Plan and Procedures.

In areas of rugged topography, Tennessee would begin restoration within 10 days of final pipeline installation to minimize potential erosion and sedimentation. Permanent erosion control devices would be installed following site grading, as determined to be necessary, and polyvinyl chloride pipes or French drains would be installed to transport seeps or springs downslope.

Shallow Bedrock and Blasting

If shallow bedrock is encountered during trenching, Tennessee would use one of a number of excavation methods, depending on the rock's relative hardness, fracture susceptibility, expected volume, and location. These methods include:

- conventional excavation with a backhoe;
- ripping with a bulldozer followed by backhoe excavation;
- hammering with a pointed backhoe attachment or a pneumatic rock hammer, followed by backhoe excavation;
- blasting followed by backhoe excavation; or
- blasting surface rock prior to excavation.

Tennessee would conduct blasting in accordance with its *Blasting Plan* to prevent damage to above and below ground structures, impacts on water resources and wetlands, and the scattering of loose rock. The *Blasting Plan* includes guidelines designed to control energy release, and safeguards to protect personnel and property in the area. Tennessee would adhere to all local, state, and federal regulations applicable to controlled blasting and blast vibration limits with regard to structures and underground utilities while performing these activities.

7.3 Aboveground Facility Construction Procedures

Tennessee would carry out construction at Compressor Station 261 and the appurtenant facilities in accordance with industry standards and the FERC Plan and Procedures. The aboveground facilities would be included within either the construction workspace for the pipeline or the existing Compressor Station 261 fence line, and the timing of the work would coincide with construction of the pipeline. Aboveground facility sites would be cleared and graded as necessary in preparation for construction. High pressure piping would be coated for protection against corrosion, and Tennessee would install a cathodic protection system to protect buried piping. Modifications at Compressor Station 261 and the appurtenant facilities would be pressure tested prior to being put in-service. Final grading and landscaping of disturbed areas would be consistent with the FERC Plan for restoration of uplands.

7.4 Environmental Compliance Inspection and Monitoring

Prior to construction, Tennessee would conduct environmental training for the company and contractor supervisory personnel. The training program would focus on the requirements of the FERC Plan and Procedures, Certificate conditions, other Project-specific permit conditions, and Project-specific mitigation plans.

Tennessee would use at least one Environmental Inspector (EI) per proposed loop (spread) during construction and restoration and one Agricultural Inspector (AI) on the New York Loop. The EIs and AI would report directly to Tennessee's Lead EI who would oversee the EI/AI staff. The EIs' responsibilities would include: (1) monitoring the contractor's compliance with environmental measures required by the Certificate, other environmental permits or approvals, and all other construction, restoration, and mitigation plans; (2) taking corrective actions, including issuing stop-activity orders to the contractor; (3) documenting compliance with environmental requirements; and (4) preparing status reports for submittal to the Commission's environmental staff.

Tennessee would conduct post-construction monitoring to document restoration and revegetation of the right-of-way and other disturbed areas, and to address any landowner concerns in accordance with the FERC Plan and Procedures. Tennessee would monitor wetlands for a period of 3 years or until revegetation is successful. Tennessee would monitor upland areas, as necessary, to determine the success of revegetation; at a minimum, inspections would occur after the first and second growing seasons following restoration and would continue until revegetation is successful. Tennessee would also submit quarterly activity reports to FERC to document the status of revegetation in disturbed areas. These reports would describe the results of post-construction inspections, any problem areas, and corrective actions taken. Tennessee would also file with FERC a wetland revegetation status report 3 years after the completion of construction and on an annual basis thereafter until revegetation efforts are considered successful. In addition, FERC staff would inspect the Project throughout construction to independently verify compliance with the Commission's orders. FERC staff would continue to monitor and inspect the vegetation along the Project route until restoration and revegetation are deemed successful.

7.5 Operations and Maintenance

Tennessee would operate and maintain the new pipeline, aboveground facilities, and modified facilities in accordance with all applicable federal and state requirements, including the USDOT's safety standards in 49 CFR 192.

Tennessee would periodically inspect the pipeline from the air and on foot to identify potential concerns that may affect the safety and operation of the pipeline. If pipeline patrols or vegetation maintenance crews identify areas on the right-of-way where erosion is occurring, Tennessee would repair existing erosion control devices or install additional devices as necessary to stabilize the area and prevent future erosion, throughout the life of the Project.

To maintain accessibility to the right-of-way and accommodate pipeline integrity surveys, vegetation along the permanent pipeline right-of-way would be cleared periodically using mechanical mowing or cutting where necessary. As required by the FERC Plan, routine vegetation maintenance would be conducted not more than once every 3 years to maintain the permanent right-of-way in an herbaceous to low scrub-shrub cover state. However, Tennessee may maintain a 10-foot-wide strip centered on the pipeline more frequently to allow for periodic corrosion and leak surveys. In accordance with the FERC Plan and Procedures, in no case would routine vegetation maintenance clearing occur between April 15 and August 1 of any year. This restriction is designed to minimize potential impacts on migratory birds during operation of the pipeline facilities.

Active cropland would be allowed to revert to pre-construction use for the full width of the right-of-way. In wetlands, Tennessee would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and selectively cut and remove trees with roots that may compromise the pipeline integrity within a 30-foot-wide corridor centered over the pipeline.

Tennessee personnel also would perform regular operation and maintenance activities on equipment at Compressor Station 261 and appurtenant facilities. These activities would include calibration, inspection, and scheduled routine maintenance. Tennessee would test safety equipment to ensure proper functioning and correct identified problems.

8. Non-jurisdictional Facilities

Occasionally, projects have associated facilities that are constructed in support of the project, but do not come under the jurisdiction of the FERC. Such non-jurisdictional facilities are often constructed upstream or downstream of the jurisdictional facilities for the purpose of delivering, receiving, or using the proposed gas volumes or may include utilities necessary for aboveground facility operation. Tennessee has not identified any non-jurisdictional facilities as part of the Project.

9. Permits and Approvals

Table A-7 lists federal and state permits related to construction and operation of the Project. Tennessee would provide all relevant permits and approvals, including those listed in table A-7 below, to its construction contractor who would be required to be familiar with applicable requirements.

Table A-7

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

Agency	Permit/Approval/Consultation	Status
Federal		
FERC	Certificate of Public Convenience and Necessity, NEPA Compliance	Application submitted July 2014
USACE New England District USACE New York District	CWA Section 404 Permit	Consultation began in December 2013; Applications submitted July 2014; Consultation ongoing
USFWS New York Field Office USFWS New England Field Office	Consultation for Rare, Threatened and Endangered Species; Migratory Bird Treaty Act; Bald and Golden Eagle Protection Act	Consultations initiated September 2013 and are ongoing
USEPA	Hydrostatic Pressure Test and Discharge	Application anticipated to be submitted third quarter 2015
State		
New York		
NYSDEC Division of Environmental Permits	Joint Permit including • Article 15 Protection of Waters (Stream Disturbance, Excavation and Fill in Navigable Waters), • Article 24 Freshwater Wetlands, Article 15, Title 33 Water Withdrawal (Hydrostatic Test Water Withdrawal) and • 401 Water Quality Certificate	Application submitted July 2014
NYSDEC Division of Water Bureau of Water Permits	State Pollution Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity	Application anticipated to be submitted October 2015
NYSDEC Division of Fish, Wildlife, and Marine Resources Bureau of Wildlife's Endangered Species Program	Consultation (Rare Species)	Consultation initiated September 2013 and is ongoing
NY State Office of Parks, Recreation & Historic Preservation SHPO	Section 106, National Historic Preservation Act Consultation	Consultation initiated September 2013; Application submitted July 2014
NYSDAM	Consultation (Agricultural Lands)	Consultation initiated February 2014 and is ongoing
NY State Department of Transportation	Highway Occupancy Permit	Application submittal pending
Massachusetts		
MADEP Division of Environmental Permits (314 CMR 9.00)	CWA 401 Water Quality Certification	Application submitted June 2015
Massachusetts State Legislature and Governor	Article 97 for Easements on State Lands	Legislation submitted July 2015

Table A-7

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

Agency	Permit/Approval/Consultation	Status
Massachusetts Executive Office of Environmental Affairs	MEPA Certificate (301 CMR 11.00) ENF	ENF submitted May 13, 2014; Final EIR submitted on February 27, 2014; MEPA Certificate confirming Final EIR adequately and properly complies with MEPA requirements issued on April 17, 2015
MA Natural Heritage and Endangered Species Program MA Endangered Species Act (321 CMR 10.00)	Consultation (Rare Species)	Consultations initiated September 2013 and are ongoing
MA Conservation Commissions MA Wetland Protection Act (310 CMR 10.00)	Notice of Intent Order of Conditions Towns of Agawam/Sandisfield/Tyringham	Notices of Intent submitted second and third quarter 2015
MA SHPO	Section 106, National Historic Preservation Act Consultation	Consultation initiated September 2013; Application submitted July 2014
Connecticut		
CTDEEP Bureau of Water Protection	CWA 401 Water Quality Certificate	Application anticipated to be submitted concurrently with MA CWA 401 Water Quality Certificate Application (after completion of the MEPA process, which occurred on April 17, 2015)
CTDEEP Bureau of Water Protection	Hydrostatic Pressure Test (DEP-PERD-GP-011)	Application anticipated to be submitted concurrently with MA CWA 401 Water Quality Certificate Application (after completion of the MEPA process, which occurred on April 17, 2015)
CTNDDB CT Endangered Species Act (CT General Statutes 26-303)	Consultation (Rare Species)	Consultation initiated September 2013 and is ongoing
CTDEEP	State Pollution Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity	Application anticipated to be submitted October 2015
CT SHPO	Section 106, National Historic Preservation Act Consultation	Consultation initiated September 2013; Application submitted July 2014
Local		
Towns of Suffield and East Granby	Freshwater Wetland Permits for inland wetlands and watercourses	Application submittals pending

Table A-7 **Permits, Approvals, and Consultations for the Project** [a]		
Agency	**Permit/Approval/Consultation**	**Status**

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

CMR = Code of Massachusetts Regulations
CTDEEP = Connecticut Department of Energy and Environmental Protection
CTNDDB = Connecticut Natural Diversity Database
CWA = Clean Water Act
EIR = Environmental Impact Report
ENF = Environmental Notification Form
FERC = Federal Energy Regulatory Commission
MADEP = Massachusetts Department of Environmental Protection
MEPA = Massachusetts Environmental Policy Act
NEPA = National Environmental Policy Act
NYSDAM = New York State Department of Agriculture and Markets
NYSDEC = New York State Department of Environmental Conservation
SHPO = State Historic Preservation Office
USACE = United States Army Corps of Engineers
USEPA = United States Environmental Protection Agency
USFWS = United States Fish and Wildlife Service

B. ENVIRONMENTAL ANALYSIS

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

1. Geology and Soils

1.1 Geology

Geologic Setting

The proposed Project would be within the Hudson Valley Section of the Valley and Ridge Physiographic Province in New York, and the New England Upland Section of the New England Province in Massachusetts and Connecticut (Fenneman, 1938; USGS, 2003).

The Hudson Valley Section, which would be crossed by the New York Loop, is comprised of rolling plains and hills and long, narrow stream bottomlands and wetlands. The section also contains a portion of the Hudson River riparian corridor. The underlying carbonate bedrock, such as shale, sandstone, and limestone, has been continuously eroded by groundwater and surface water, forming the valleys in the section (Fenneman, 1938). The southern end of the Hudson Valley Section is the lowest, with elevations near sea level; elevations within the remainder of the section generally range to 200 feet, with some areas reaching almost 500 feet (Fenneman, 1938; USDA, 1992).

The surficial geology in the Project area of the New York Loop is primarily a result of glacial deposition from the last glaciation, known as the Late Wisconsinan, about 20,000 years ago. The area contains mostly glacial lacustrine deposits of silt, clay, and sand (Cadwell, 1991). Underlying the Hudson Valley Section and the New York Loop are the Schenectady Formation and the Normanskill Shale bedrock formation. Bedrock in these formations consists of greywacke sandstone, siltstone, and shale (Fenneman, 1938; USDA, 1992).

The New England Upland Section, which would be crossed by both the Massachusetts and Connecticut Loops and is occupied by Compressor Station 261, has been greatly affected by glaciation and is comprised of severely eroded plateaus with narrow valleys. This section is large, extending from Canada south through New England, and the glaciation has resulted in erosion of the underlying bedrock and creation of rock basin lakes. Although hills and mountains are present within this section, the remainder of the topography is fairly level. Elevations in the section range from about 2,200 feet inland to about 400 to 500 feet along the coastal portions, down to sea level at the coast (Fenneman, 1938).

The surficial geology of the Project area for the Massachusetts Loop consists mainly of till 10 to 50 feet thick; however, the northern portion of the Project area contains till overlain by sand and gravel (Mabee, 2014a). As indicated by the surficial geology, the topography in this area was greatly affected by erosion from the Housatonic and Hoosic River systems, as well as glaciation that occurred up to about 10,000 years ago (USDA, 1983). The underlying bedrock in the Project area in Massachusetts is Proterozoic basement, which consists of schist, granofels, and gneiss (Mabee, 2014a, 2014b).

The Connecticut Loop and Compressor Station 261 would be within the Central Valley of the New England Upland Section, which is a broad, flat valley running north-south between the western and eastern portions of the section (Fenneman, 1938). The topography in this area is generally a result of glaciation, which created floodplains along the Connecticut and Farmington Rivers, nearly level to sloping terraces, low glacial upland hills, and narrow steep-sided ridges of basalt. Elevations in the valley range from 10 feet at the Connecticut River to 500 feet on the highest basalt ridges (USDA, 2008).

The Connecticut Loop would span two states, Connecticut and Massachusetts, which each have different surficial geologies. In Massachusetts, the Connecticut Loop and Compressor Station 261 at the north end of the loop would be located near the shoreline of a glacial lake. An island of glacial till would be to the west of the loop and fine-grained glacial lake sediments would lie to the east and north of the loop (Mabee, 2014a). In Connecticut, the loop would traverse a drumlin at Glover Hill, glacial Lake Hitchcock bottom deposits consisting of fine sand and silt, and glacial Lake Hitchcock delta deposits consisting of coarse-grained sediment overlying fine-grained deposits. In addition, the loop would cross areas of floodplain alluvium fine sand and silt where streams are present. Underlying the Connecticut Loop and Compressor Station 261 would be the Jurassic Portland Formation, which, in the proposed Project area, consists of micaceous arkose and siltstone, interspersed with red to black fissile silty shale (Mabee, 2014a; Riese, 2014).

Mineral Resources

Extraction of mineral resources within the Project area is limited to non-fuel resources, such as sand and gravel. In the State of New York, mineral resources extracted include crushed stone, salt, sand, gravel, common clay, masonry cement, crude gypsum, peat, zinc, and wallastonite. However, no active, inactive, closed, or permitted mineral resource mining operations were identified in proximity of the proposed New York Loop. Based on Tennessee's consultations with the NYSDEC Division of Mineral Resources – Region 4 and the New York State Geological Survey, no known sites of ongoing geologic resource extraction were identified within 0.25 mile of the proposed Project (Kozlowski, 2014).

In Massachusetts, mineral resources consist mainly of sand and gravel, and the most productive areas are generally associated with glacial moraines (USGS, 2014a). Outwash terraces and deposits along major river valleys are also an important source, including the Clam River valley which runs parallel to the northernmost 0.9 mile of the Massachusetts Loop and is about 500 feet from the Project area. In addition, an abandoned gravel pit southwest of Lower Spectacle Pond could serve as a potential source of sand and gravel (Mabee, 2014a). The abandoned gravel pit is greater than 1 mile from the Project area.

Stone and gravel are the most common mineral resources found in Connecticut (USGS, 2014a). Several inactive stone quarries and clay pits are located in the area; however, they are greater than 1 mile from the Project area. Based on Tennessee's consultations with CTDEEP – Geological and Natural History Survey, no active or planned mining operations are near the proposed Project area. CTDEEP – Geological and Natural History Survey also stated that no mineral resources are known to exist within the Project alignment (Riese, 2014).

Due to the locations of the mineral resources in New York, Massachusetts, and Connecticut, construction of the Project would not result in short-term or long-term impacts on current or future production, or result in any restrictions on current or future activities related to mining of mineral resources.

Paleontology

Paleontological resources have been documented within the geologic formations that would underlie the Connecticut Loop, but have not been documented in bedrock that would underlie the New York Loop or Massachusetts Loop. Tennessee contacted the New York State Geological Survey and the

Massachusetts State Geologist for paleontological information in the proposed Project area. The Massachusetts State Geologist indicated the bedrock underlying the proposed Massachusetts Loop would not contain paleontological resources (Mabee, 2014a). The bedrock underlying the New York Loop contains at least one fossiliferous layer, known as the Manlius Formation. The Manlius Formation is comprised of marine-sedimentary rocks laid down during the Devonian Period during which time most of the region was comprised of a shallow sea and river delta. Fossils contained within the Manlius Formation consist of numerous fishes, cephalopods and trilobites as well as some of the earliest forests. The Malinus Formation is of unknown depth within the Project area; however it does become shallower north and west, with several outcroppings, most notably within John Boyd Thatcher State Park approximately 9 miles to the northwest (NYSDEC, 2015a; Paleontology Portal, 2015). Within Connecticut and underlying the portion of the Connecticut Loop in Massachusetts, bedrock formations contain paleontological resources, such as dinosaur tracks, fish, conchostracans and plants (Riese, 2014). These resources are generally found in the sandstones and shales in the Connecticut River Valley and can be traced to the Triassic and Jurassic periods of the Mesozoic era (Farrand, 1990). While sedimentary rock contains the majority of fossils in this area, metamorphic rock formations may also contain paleontogical resources, but are less common. Impacts on bedrock in the Project area would be minimal and localized to specific areas where shallow bedrock removal is required to allow for sufficient cover of pipeline facilities. United States Department of Agriculture (USDA) soil survey data do not indicate that shallow bedrock (less than 5 feet from the surface) is present along the Connecticut Loop (USDA-NRCS, 2015a).

Given that paleontological resources are not likely to underlie the Massachusetts Loop, shallow depth to bedrock that could contain fossils is not present under the New York Loop or Connecticut Loop, and no federal land would be affected by the proposed Project, we believe there would be no short-term or long-term impacts on regional paleontological resources.

Geologic Hazards and Impact Mitigation

Geologic hazards are natural physical conditions that can result in damage to land or structures, and injury to the public. Potential geologic hazards may include seismic hazards, such as earthquakes or surface faulting, soil liquefaction, landslides, flash flooding, volcanism, and dissolution of soluble bedrock, such as limestone or gypsum, resulting in collapse or subsidence of the ground surface.

Seismicity

Seismic activity is a sudden movement of the earth's crust caused by the release of stress accumulated along geologic faults or by volcanic activity. Tennessee's consultations with the New York State Geological Survey did not identify any active or currently dormant faults, or areas susceptible to volcanism within 0.25 mile of the New York Loop (Kozlowski, 2014). Areas that would be crossed by the Massachusetts Loop have negligible earthquake hazard (Mabee, 2014a, 2014b). Seismic activity in the State of Connecticut has not been directly related to mapped geologic faults, but earthquake hazards are considered a moderate concern through the state. Earthquakes have occurred in Connecticut's Central Valley where the Project would be situated. Low magnitude seismic events in Connecticut occur periodically, including as recently as November 2013. There have been larger events in the Central Valley, with earthquakes estimated to be magnitude 5.0 occurring near Hartford in 1837 and 1840, followed by events in 1925 and 1942. Lower magnitude events have continued to occur in Hartford County, most recently in 2011 (Riese, 2014).

Seismic probability for the Project areas are 3 to 4 percent, posing little risk for damage to pipeline facilities resulting from seismic activity (Frankel et al., 2002). The peak acceleration (levels of horizontal shaking) in the Project area is not expected to be more than 3 to 4 percent of gravity, with only a 10 percent probability of exceedance in 50 years (USGS, 2014b). Therefore, the risk of potential damage to the pipeline facilities from seismic ground accelerations would be minimal.

The Project would not cross mapped fault lines in New York, Massachusetts, or Connecticut. The nearest mapped and seismic faults are over 3,000 feet southwest of the New York Loop. The vast majority of mapped faults in the eastern United States have no seismicity associated with them and displacement of the earth's surface along a fault line during an earthquake is extremely rare in the eastern United States (Isachsen and McKendree, 1977).

Based on the low probability of a seismic event occurring near the Project area and the distance of the Project area from any active faults, we believe that seismic activity would not affect the Project area over the short-term or long-term.

Soil Liquefaction

Soil liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. In correspondence with Tennessee regarding the Project, the Connecticut Geological Survey and the Massachusetts Geological Survey noted the potential for soil liquefaction along the Connecticut Loop and at Compressor Station 261 due to the presence of thick glacial lake sediments composed of fine sands and clays (Mabee, 2014a; Riese, 2014). Should seismic events occur, water-saturated fine-grained sands, silts and clays, and construction and waste disposal fill areas may be susceptible to liquefaction caused by localized vibration. However, because the Project area has a low potential for seismic activity, soil liquefaction potential is considered to be low. No recent occurrences of soil liquefaction due to earthquake shaking in the Project area have been recorded.

Based on the low probability of soil liquefaction occurring in or near the Project area, impacts on the Project facilities or adjacent land due to soil liquefaction are not anticipated.

Landslides

Landslide susceptibility is the likelihood of a landslide occurring in an area on the basis of local terrain conditions. Between MPs 3.8 and 4.1 the New York Loop would cross an area of high landslide susceptibility and landslide incidence. A portion of the Massachusetts Loop would cross an area of low landslide incidence and landslide susceptibility, and part of the Connecticut Loop would cross an area of high landslide susceptibility and moderate landslide incidence (Radbruch-Hall et al., 1982; Godt, 2002). However, the area that would be crossed by the Massachusetts Loop and the Massachusetts portion of the Connecticut Loop is generally stable, with the exception of the area to the south/southeast of Lower Spectacle Pond, which is moderately unstable (Mabee, 2014a). Though the Connecticut Loop would be within an area mapped as having high landslide susceptibility, landslides and subsidence issues are not common along the Connecticut portion of the pipeline (Riese, 2014).

Steep slopes (greater than 30 percent) that would be crossed perpendicularly by the Project and that could potentially pose a higher risk for landslides are encountered between MPs 1.2 and 2.2 of the Massachusetts Loop in seven locations, for a total distance of 0.1 mile. These data are based on a desktop analysis using topography shown on the United States Geological Survey Topographic Quadrangle maps.

To minimize the potential risk of landslides associated with construction, Tennessee would install trench breakers and slope breakers according to the FERC Plan and Procedures. Trench breakers may be constructed of materials such as sand bags or polyurethane foam and are intended to slow the flow of water in the pipe trench and minimize the likelihood of oversaturating soils, which could undermine the pipeline or cause slope failures. To minimize surface runoff and, therefore, erosion and potential slope failure, Tennessee would install temporary and/or permanent slope breakers diagonally across the right-of-way to control erosion by reducing and shortening the length and concentration of runoff. In general, slope breakers would be installed in areas with slopes greater than 5 percent. Tennessee would determine the need and placement of slope breakers based on the degree of slope, soil characteristics, runoff area, and location of suitable outlets.

Upon completion of pipeline installation, disturbed areas and drainage patterns would be restored to pre-construction contours and elevations to limit erosion and prevent landslides to the extent practicable. Tennessee would also have an EI on site during construction to ensure compliance with approved design plans and specifications and environmental regulations. During construction, Tennessee would periodically inspect the right-of-way, and would conduct immediate inspection following significant storm events to ensure proper function of erosion control devices, as required in the FERC Procedures.

Tennessee would also develop a public awareness program, which enables landowners to report potential threats to the integrity of the pipeline (e.g., identification of a landslide event) and other emergencies by using a toll-free telephone number. Tennessee would maintain 24-hour emergency response capabilities, including an emergency-only phone number that accepts collect charges. The number would be included in informational mail-outs, posted on all pipeline markers, and provided to local emergency agencies in the vicinity of the pipeline facilities and compressor station.

Tennessee's operation and maintenance activities would include regularly scheduled aerial and terrestrial patrols of the pipeline right-of-way to provide information on potential threats to the pipeline, including areas of erosion and mass soil movement.

With implementation of these measures, impacts on the pipeline facilities or impacts from erosion and sedimentation during construction in areas of high landslide potential would be minor and temporary.

Land Subsidence and Karst Terrain

Ground subsidence is a lowering of the land-surface elevation that results from changes that take place underground. Common causes of land subsidence include dissolution of limestone or other carbonate rock in areas of karst terrain, collapse of underground mines, and the pumping of water, oil, and gas from underground reservoirs. Underground mines are not present and pumping of oil or gas does not occur in the proposed Project area (Mabee, 2014a, 2014b; Riese, 2014).

No portion of the Massachusetts or Connecticut Loops or Compressor Station 261 would be situated within karst terrain (Mabee, 2014a, 2014b; Riese, 2014). The New York Loop would be entirely within karst terrain where sinkhole development could occur (Tobin and Weary, 2004). Permanent soil stabilization could be affected by development of a sinkhole, which could lead to soil erosion and subsequent pipeline exposure. If karst features are encountered during construction, Tennessee would evaluate site-specific information in consultation with a qualified geotechnical engineer or equivalent personnel and FERC to determine the proper measures to use to minimize the likelihood of a sinkhole forming. Possible measures for minimizing the likelihood of a sinkhole occurring include:

- restoring the area as close as practicable to pre-construction contours;
- installing permanent stormwater control measures to limit surface water runoff within known karst terrain;
- monitoring sediment and erosion control measures after rain events and throughout construction to clean, repair, and replace structures as necessary; and

- maintaining natural stream features, such as riffles and pools.

If karst terrain is encountered, Tennessee would monitor identified karst features on an annual basis following construction to identify evidence of sinkhole development, and would implement the necessary measures to prevent further bedrock dissolution or sinkhole development. We conclude that land subsidence in Massachusetts and Connecticut would be unlikely and appropriate mitigation measures would be implemented along the New York Loop; therefore, impacts from land subsidence and karst terrain would be minimal.

Flash Flooding

The Federal Emergency Management Agency (FEMA) is responsible for mapping and delineating floodplains and determining the flood risk for susceptible areas. FEMA defines flood zones on Flood Insurance Rate Maps by geographic areas based on levels of flood risk (FEMA, 2015). The National Oceanic and Atmospheric Administration estimates that the average precipitation rate required for flooding in the counties within the Project area is 1.7 to 2.0 inches per hour (NOAA, 2014). Portions of the Project area would be situated in narrow stream or river valleys with steep valley walls, which could have the potential to flash flood. Section B.2.2 describes areas of the Project that would be within floodplains.

Based on the FEMA maps, the New York Loop would cross 303 feet of the flood zone of Vloman Kill. An access road associated with the Massachusetts Loop would cross the flood zones of Spectacle Pond Brook and Lower Spectacle Pond. The Connecticut Loop would cross the flood zones of Muddy Brook, Degrayes Brook, and Stony Brook.

Tennessee would cross most waterbodies during the summer months when there is a lower chance of storm events that could cause flash flooding. To handle potential large storm events, Tennessee would provide additional pumps for stand-by for dam-and-pump or flume crossings and select appropriately sized flumes to handle anticipated storm flows at flume crossings. Tennessee would bury the pipeline below potential scour depth to minimize chance of exposure or damage to the pipeline during high flow events when localized erosion could destabilize vegetative cover. In addition, Tennessee would follow the FERC Plan and Procedures and applicable permit conditions to avoid and minimize impacts on water quality at waterbody crossings. As such, we conclude that the likelihood of adverse effects from flash flooding would be minimal.

Blasting

About 2.3 miles of the Massachusetts Loop would cross areas with shallow bedrock, which the USDA Natural Resources Conservation Service (NRCS) defines as being within 5 feet of the ground surface (USDA, 2014). These areas have a moderate to high potential for requiring blasting during Project construction, as summarized in table B-1. No areas with shallow depth to bedrock were identified along the New York Loop or the Connecticut Loop based on USDA soil survey data (USDA-NRCS, 2015a). In the event that bedrock is encountered and blasting is required, the technique used for bedrock removal would depend on factors such as strength and hardness of the rock.

Table B-1

Areas with Moderate to High Potential for Bedrock Blasting Crossed by the Massachusetts Loop [a]

Begin Milepost	End Milepost	Distance (miles)
0.0	0.8	0.8
0.8	0.8	0.0
0.8	0.9	0.1
0.9	1.0	0.1
1.0	1.2	0.2
1.2	1.2	0.0
1.2	1.4	0.2
1.4	1.4	0.0
1.4	1.5	0.1
1.7	2.0	0.3
2.0	2.2	0.2
3.6	3.6	0.0
3.6	3.8	0.2
Project Total		**2.3**

[a] Based on on-site reconnaissance review completed by Tennessee.

Tennessee would attempt to use mechanical methods such as ripping or conventional excavation to remove the bedrock where possible. If required, blasting techniques would comply with federal, state, and local regulations governing the safe storage, handling, firing, and disposal of explosive materials. In addition, Tennessee has prepared a *Blasting Plan* which contains measures to minimize the effects of blasting and ensure safety during blasting operations. We have reviewed this plan and find it acceptable for this Project. In accordance with the *Blasting Plan,* a site-specific blasting plan would be developed for each area where blasting would be necessary and Tennessee would use the following measures to create a safe working environment and to minimize impacts on resources from blasting:

- use only the minimum charges needed;
- use heavy mats to prevent the scattering of debris;
- monitor and assess blasting within 150 feet of dwellings and private or public water supply wells;
- prohibit the use of perchlorate-containing explosives;
- install blasting mats in congested areas, in shallow waterbodies, or near structures that could be damaged by fly-rock;
- post warning signals, flags, and barricades;
- follow procedures for safe storage, handling, loading, firing, and disposal of explosive materials;
- have emergency response personnel on-call at valves for adjacent pipelines; and
- control excessive vibration by limiting the size of charges and using charge delays that stagger each charge in a series of explosions.

Based on the overall geologic conditions present in the Project area and Tennessee's proposed construction methods and impact minimization measures, we conclude that construction of the Project would have a minor and temporary effect on the geologic conditions of the area.

1.2 Soils

Soil types that occur within the Project area were identified by the USDA-NRCS Major Land Resource Areas classification and the Soil Survey Geographic Database (USDA-NRCS, 2015a). Potential impacts on these soils from the Project are generally associated with soil characteristics and limitations.

Standard Soil Limitations

Several general soil characteristics have the potential to affect, or be affected by, construction and operation of the Project. These include prime farmland and potential for soil compaction, soil erosion, shallow depth to bedrock, and low revegetation potential. Construction and operation of the proposed pipeline loops, aboveground facilities, temporary and permanent access roads, and contractor/pipeyards areas would affect 214.5 acres of soils. Table B-2 summarizes soil characteristics and limitations by Project component.

Table B-2

Soil Characteristics and Limitations for the Project

Component	Prime Farmland (acres) [b]	Severe Compaction Potential (acres)	Severe Erosion Potential (acres) [c]	Poor Revegetation Potential (acres)	Poor Drainage Potential (acres) [d]	Shallow Bedrock (acres)	Shallow Water Table (acres)
New York Loop [a]	18.4	8.7	6.4	3.3	0.9	0.0	24.2
Massachusetts Loop [a]	0.6	2.9	16.2	58.8	8.8	5.6	65.3
Connecticut Loop [a]	85.4	13.2	109.0	4.5	60.8	0.0	114.3
New MLV	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Totals	**104.7**	**24.8**	**131.6**	**66.6**	**70.4**	**5.6**	**203.7** [e]

ATWS = additional temporary workspace
NRCS = Natural Resources Conservation Service

[a] Totals include permanent and temporary workspace, ATWS, aboveground facilities including pig launcher/receiver sites, access roads, contractor storage/pipeyards, and staging areas. All work at Compressor Station 261 would be within the existing fence line and soils would not be affected.
[b] Includes Prime Farmland and Farmland of Statewide Importance.
[c] The NRCS has evaluated soils based on slope and soil erosion factor k values.
[d] Areas identified to have poor drainage potential (i.e., shallow water tables) are ranked as "poorly drained" or "very poorly drained" by the NRCS, also known as hydric soils.
[e] Total acreage does not exactly equal total Project acreage, as not all soils are classified in the categories presented in this table.

United States Department of Agriculture Designated Farmland Soils

The USDA defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses" (USDA-NRCS, 2015b). 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. In addition, soils that do not meet all of the requirements to be considered prime farmland may be considered soils of local importance if they are capable of producing a high yield of crops when treated or managed according to accepted farming methods. For the purposes of this report, prime farmland includes USDA designations of "prime farmland," "prime farmland if drained," "prime farmland of local significance," and "farmland of statewide importance" independent of whether these areas are or have been used for agricultural purposes.

The USDA defines "farmland of statewide importance" as land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Generally, farmlands of statewide importance are areas that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some states, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state law.

The Project would affect 104.7 acres of prime farmland during construction. Of this, 63.4 acres are currently under use as farmland as discussed in section B.5.1. About 0.3 acre of prime farmland would be permanently affected due to installation of MLV facilities. Of this, only 0.1 acre is currently under active farmland.

Tennessee would employ several methods to maintain fertility and protect agricultural lands that may be affected by Project construction, such as topsoil segregation. Other measures to mitigate impacts on agricultural land are described in section B.5.1.

Soil Compaction

Soil compaction modifies the structure of soil and, as a result, alters its bulk density and drainage properties. Soil compaction decreases pore space and water retention capacity and restricts the transport of air and water to plant roots. As a result, plant productivity and growth rates may be reduced, soils may become more susceptible to erosion, and natural drainage patterns may be altered. Consequently, soil compaction is of particular concern in agricultural areas, residential areas, and in areas of wetland (hydric) soils. The susceptibility of soils to compaction varies based on moisture content, grain size distribution (texture), structure, and organic content. Soils that formed under conditions of extended saturation, flooding, or ponding during the growing season and developed anaerobic conditions in the upper horizon are considered hydric (Federal Register, 2002). Hydric soils can have low soil strength and be prone to compaction and rutting due to extended periods of saturation.

Construction of the Project would affect 70.4 acres of hydric soils and 24.8 acres of soils that have a severe compaction potential. In accordance with the FERC Plan and Procedures, Tennessee would employ the following measures to prevent or mitigate soil compaction where the Project crosses agricultural, residential, and wetland areas:

- implement full right-of-way topsoil segregation in agricultural and residential lands and at least along the ditch line in unsaturated wetlands;

- use wooden mats, as necessary, in wetland areas along the equipment travel lane;
- implement ditch plus spoil-side topsoil segregation on residential lands if requested by the landowner and allowed by site-specific conditions;
- test topsoil and subsoil for compaction following restoration of residential and agricultural lands - tests would be conducted at intervals sufficient to determine the need for decompaction based on the soil type; and
- decompact areas identified during testing by deep tillage using devices such as a deep-shank heavy-duty subsoiler, paraplow, paratill, or other landowner-specified technique.

Severe Erosion Potential

Erosion is a natural process that can be accelerated by human disturbance. Factors such as soil texture, structure, slope gradient and length, vegetative cover, rainfall intensity, and wind intensity can influence the rates of erosion. Soils most susceptible to erosion by water typically have bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and are situated on moderate to steep slopes. Soils more resistant to erosion by water include those that occupy positions of low relief, are well vegetated, and have high infiltration capacity and internal permeability. Wind induced erosion often occurs on dry soil where vegetative cover is sparse and strong winds are prevalent. Clearing, grading, and equipment movement could accelerate the erosion process and, without adequate protection, has potential to result in the discharge of sediment to adjacent sensitive resources. About 131.6 acres of soils that would be affected by construction of the Project are considered susceptible to severe erosion by water and wind. Steep slopes can also add to the potential for erosion.

Poor Revegetation Potential

The Project would cross 66.6 acres of soils identified as having poor revegetation potential. Revegetation may be more difficult in areas that are considered to have poor drainage, shallow depth to bedrock, rockiness, and steep slopes. In accordance with the FERC Plan, Tennessee would implement the following measures to increase the potential for successful revegetation: pH and fertilizer amendments, consideration of seasonal constraints, application of mulch, use of erosion control fabric and matting on steep slopes, and proper seedbed preparation. Also, where broadcast or hydro-seeding is planned, the seedbed would be scarified to ensure sites for seeds to lodge and germinate. Where hand broadcast seeding is planned, the seed would be applied at one-half the rate in each of two separate, perpendicular passes to ensure complete and uniform coverage.

Poor Drainage Potential

Soil drainage roughly indicates the degree, frequency, and duration of inundation or near surface saturation (wetness). Soil drainage class refers to the frequency and duration of wet periods under conditions similar to those present when the soil formed. Areas classified as poorly drained and very poorly drained soils typically are associated with wetlands and most are classified as hydric soils. The Project would cross 70.4 acres of soils classified as poorly or very poorly drained. Tennessee would employ the techniques in the FERC Plan and Procedures to minimize effects on poorly drained soils.

Shallow Depth to Bedrock

The Project would cross 5.6 acres of soils with shallow depth to bedrock, which would have the potential to introduce rock into the topsoil. As discussed in section B.1.1, about 2.3 miles of the Massachusetts Loop would cross areas that have a moderate to high potential for requiring blasting during construction. No areas with a shallow depth to bedrock have been identified along the New York Loop and the Connecticut Loop based on USDA soil survey data (USDA-NRCS, 2015a). For areas where bedrock is encountered and interferes with pipeline installation, the technique used for bedrock removal would depend on factors such as strength and hardness of rock. Tennessee would attempt to use mechanical methods such as ripping or conventional excavation to remove the bedrock where possible. If required, bedrock blasting would be conducted in accordance with the *Blasting Plan*, a site-specific blasting plan, and applicable state and local regulations to ensure it is done in a safe manner and that off-site wells and structures are not affected.

Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench would be considered construction debris and disposed of properly or otherwise handled in accordance with landowner agreements. Tennessee would remove rock greater than 4 inches in diameter from the topsoil layer (up to 12 inches) during restoration of agricultural and residential lands. Unless otherwise specified in landowner agreements and based on the FERC Plan, **we recommend that:**

- **<u>Prior to the completion of final Project clean-up</u>, Tennessee should remove excess rock in all cultivated or rotated cropland, managed pastures, hayfields, and residential areas affected during construction. Rock that remains in the restored rights-of-way must be consistent with the size, density, and distribution of rock in adjacent areas not affected by construction.**

Shallow Depth to Water Table

The depth to seasonal mean high water table indicates the average shallowest depth of the water table measured from the ground surface at the wettest time of the year. High water tables may affect trenching design and construction methods. High water tables at or near the surface during part of the growing season are indicative of wetland hydrology and also generally coincide with the presence of hydric soils. Dewatering of the trench, conventional bore pits and/or additional precautions may be necessary where the groundwater is encountered during pipeline installation. Dewatering would be conducted in accordance with the FERC Plan, which would include discharging water into well-vegetated upland areas, using filter bags for energy dissipation where necessary, and monitoring the dewatering activities to avoid sedimentation of environmental resources or cultural resource areas. Impacts associated with hydric soils generally coincide with construction in wetlands. Within wetlands, Tennessee would segregate the top 12 inches of topsoil within the ditch line, except in areas where standing water is present or soils are saturated. In areas with standing water or excessively saturated soils, such as at wetland crossings, Tennessee may use concrete coated pipe or weights (e.g., saddle bags) on the pipe to counteract buoyancy. The Project would cross 203.7 acres of soils identified as having a shallow depth to the water table.

Inadvertent Spills or Discovery of Contaminants

Inadvertent spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. The impacts of such releases are typically minor because of the low frequency and small volumes of spills and leaks. Tennessee would implement the measures in its *SPRP* to prevent accidental spills of materials such as petroleum products and other hazardous products that may contaminate soils, and to ensure that inadvertent spills are contained, cleaned up, and disposed of in an appropriate manner.

No contaminated soils are known to be present in the area that would be crossed by the Project (EDR, 2014; Goertz, 2014; MassGIS, 2014; NYSDEC, 2014; Skiba, 2014a; Riese, 2014). Should

Tennessee encounter unanticipated contaminated soils during construction, it would evaluate and treat contaminated material according to its *Hazardous Materials Discovery Plan* and applicable federal and state requirements.

General Impacts and Mitigation

Construction activities such as clearing, grading, trench excavation, pipe installation, backfilling, and the movement of construction equipment along the right-of-way would affect soil resources. Clearing the right-of-way would remove protective vegetative cover and expose the soil to the effects of wind, rain, and runoff, which would increase the potential for soil erosion and sedimentation in erosion-prone areas. Grading, spoil storage, and equipment traffic could compact soil, reducing porosity and increasing runoff potential, and decrease vegetative productivity. Trenching of shallow depth to bedrock soils could bring stones or rock fragments to the surface that could interfere with agricultural practices and hinder restoration of the right-of-way. Construction activities could also affect soil fertility and facilitate the dispersal and establishment of weeds or invasive plants. In addition, contamination due to spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils.

Construction and operation of the proposed pipeline loops, aboveground facilities, temporary and permanent access roads, and contractor/pipeyards would affect 214.5 acres of soils. Of the soil limitation factors affecting the construction of the proposed Project, a total of 104.7 acres (49 percent) are considered to be prime farmland, 24.8 acres (12 percent) are considered to have severe compaction potential, 131.6 acres (61 percent) are considered to be highly erodible by water and wind, 66.6 acres (31 percent) are considered to have low revegetation potential, 70.4 acres are hydric (33 percent), 5.6 acres (3 percent) have a shallow depth to bedrock, and 203.7 acres (95 percent) have a shallow water table.

Tennessee would implement measures described in the FERC Plan and Procedures to minimize soil erosion and sedimentation. In particular, slope breakers or water bars and terraces constructed diagonally across the right-of-way on slopes would be used to reduce runoff and divert water into well-vegetated areas. Temporary erosion control devices, such as silt fences, hay/straw bales, and/or sandbags may be temporarily used in place of water bars during construction. Temporary erosion control measures would be installed immediately after initial disturbance of soil and regularly maintained throughout construction.

Tennessee plans to conduct tree clearing during the winter. Construction activities during the winter may require additional procedures to address snow handling, access road construction and maintenance, and freeze/thaw soil conditions; therefore, **we recommend that:**

- **<u>Prior to construction</u>, Tennessee should file a Winter Construction Plan with the Secretary of the Commission (Secretary) for review and written approval by the Director of the Office of Energy Projects (OEP). The plan should address all items included in Section III.I of the FERC Plan.**

We conclude that implementation of the measures in the FERC Plan, and development and implementation of a Winter Construction Plan would minimize and mitigate impacts on soil resources; therefore, the Project would have a minor and temporary effect on soils.

2. Water Resources and Wetlands

2.1 Groundwater Resources

Existing Groundwater Resources

Surficial aquifers in the area of the New York Loop consist of glacial deposits of sand, silt, and clay. In areas dominated by ice-contact deposits, well yields range from 10 to 1,000 gallons per minute (gpm) and may be as much as 3,000 gpm. In areas dominated by outwash deposits, well yields range from 10 to 400 gpm and may be as much as 2,000 gpm. Wells in the area have been shown to be susceptible to bacteria, viruses, and protozoa, which can originate from improperly maintained septic systems. Contaminants associated with agricultural activity and leaking storage tanks also have potential to impact groundwater resources.

The New York State Department of Health identifies 18 Primary Water Supply Aquifers across the state, which are defined as "highly productive aquifers presently utilized as sources of water supply by major municipal water supply systems" (NYSDEC, 2015b). The New York Loop would not cross any of the Primary Water Supply Aquifers identified by the New York State Department of Health. The NYSDEC also recognizes another type of aquifer, known as a Principal Aquifer, which are "aquifers known to be highly productive or whose geology suggests abundant potential water supply, but which are not intensively used as sources of water supply by major municipal systems at the present time" (NYSDEC, 2015b). The New York Loop would cross a Principal Aquifer from MP 3.7 to MP 4.1.

There are limited surficial and bedrock aquifer data available for the Massachusetts Loop area. MADEP indicated aquifer mapping for this area has not been conducted because it is not within a potentially productive river valley. Bedrock aquifers are commonly used for residential water supplies in the Project area. Massachusetts has three principal types of bedrock aquifers: crystalline, sedimentary, and carbonate (USGS, 1992).

The Connecticut Loop crosses the Connecticut Valley Lowlands Region, which was formed by erosion of sedimentary rocks typically composed of sandstone, shale, and conglomerate, interspersed with volcanic rocks. Pre-glacial streams cut deep channels into the soft sedimentary rock. During recent glaciation, a layer of till was deposited directly over the bedrock. Later, while the glaciers were melting, large quantities of meltwater were discharged. In some places, the meltwater streams eroded the till and deposited glacio-fluvial sand and gravel to form artesian aquifers. In Connecticut, the highest potential for development of aquifers is where coarse-grained deposits occur beneath fine-grained deposits. The Connecticut Loop area does not contain this stratigraphy, but rather contains other glacial meltwater deposits that have lower potential groundwater yield (CTDEEP, 2014a).

Designated Sole Source Aquifers

The United States Environmental Protection Agency (USEPA) designates Sole Surface Aquifers, which are defined as "an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer" (USEPA, 2012). There are no USEPA Sole Source Aquifers or designated wellhead protection areas in the Project area (, 2014; Deyoe, 2014; McPhee, 2014; Skiba, 2014b).

Public and Private Supply Wells

No private drinking water wells, springs, or wellhead protection areas have been identified within 150 feet of the proposed Project in New York or Massachusetts. Two private water supply wells are within 150 feet of the Connecticut Loop (see table B-3). The Connecticut Loop would not cross or be within 150 feet of any wellhead protection areas or springs.

Table B-3

Water Supply Wells Within 150 Feet of the Connecticut Loop

Milepost (approx.)	Well	Town/County	Distance from Centerline (feet)	Distance from Construction Work Area (feet)	Private or Public	Drinking Water
2.8	Water	Suffield/Hartford	135 SE	110 SE	Private	Yes
2.7	Water	Suffield/Hartford	165 SE	141 SE	Private	Yes

SE = southeast
Based on consultation with individual landowners and field surveys conducted in 2013 and 2014.

Contaminated Groundwater

Tennessee identified properties within 0.25 mile of the proposed pipeline routes that have the potential to affect the proposed workspace with hazardous materials by reviewing federal and state databases. Based on the New York Spills Database, there were two fuel spills near MP 3.0 and MP 4.0 of the New York Loop (EDR, 2014). These spills were cleaned up and no longer pose a risk of groundwater contamination. No areas were identified within 0.25 mile of the proposed workspace of the Massachusetts Loop. In Connecticut, 12 sites were identified within 0.25 mile of the proposed workspace; these were primarily associated with fuel spills or leaking underground storage tanks in a nearby industrial area. Of the 12 sites, 7 have been remediated and 4 sites located in East Granby are subject to ongoing investigations by the CTDEEP and could be considered active with potential sediment contamination present (EDR, 2014). Of the four remaining sites, one is within a high school and the issue on-site is the use of pesticides, and one is within an airport where clean-up is ongoing. Neither site would be affected by the proposed Project. One site is participating in a Voluntary Cleanup Program, and is, therefore, in the process of remediation. The last site is designated as low priority for further assessment by the Connecticut Contaminated or Potentially Contaminated Sites Database and is more than 500 feet east of the proposed loop. Another site in East Granby is designated by the CTDEEP as verified with an environmental land use restriction, which could restrict future use of the site; however, this site is more than 500 feet west of the proposed Project site and would not be affected by the Project.

Impacts and Mitigation

In areas where the water table is near the surface, water flow and recharge of groundwater could be temporarily and locally affected by trench excavation. Blasting could be required for pipeline installation where bedrock prevents conventional excavation. Impacts of blasting on groundwater resources could result in decreased water yields or quality in nearby wells. Construction activities would also require the use of heavy machinery within the right-of-way, which could compact soil and affect groundwater.

Tennessee would implement construction practices designed to reduce and/or mitigate potential impacts on groundwater during construction as detailed in the FERC Plan and Procedures as well as within Tennessee's *SPRP*. These practices would include procedures for trench breakers and dewatering as well as restrictions on refueling and storage of hazardous substances, including parking all equipment at least 100 feet from a waterbody and refueling equipment at least 100 feet from wetlands or waterbodies that could be a source for or conduit to groundwater, or identified wells. Furthermore, Tennessee would not refuel auxiliary fuel tanks within 400 feet of identified municipal or community water supplies.

Blasting may occur along the Massachusetts Loop, but is unlikely to occur along the New York and Connecticut Loops as there is no known shallow bedrock in these areas (see section B.1.2). Tennessee would also conduct all blasting activities according to its *Blasting Plan* which is designed to control energy release and safeguard personnel and property in the area. Tennessee would monitor the quantity and quality of water wells within 250 feet of blasting with pre- and post-blast surveys.

Testing would be conducted by a qualified independent specialist and would include water quality testing and/or quantity analysis where applicable. Tennessee would provide alternative water sources or other compensation to the well owner(s) if impacts occur on a private or public well. If a well is damaged during construction and cannot be restored to its former capacity and quality, Tennessee would either compensate the well owner or arrange for replacement of the well.

The New York Loop would cross the Town of Bethlehem Public Works water main. Tennessee would install the pipeline under the existing water main to maintain the required depth of cover over the pipeline, as well as provide a safe separation between the lines during construction and operation.

Two private water supply wells have been identified within 150 feet of the construction right-of-way for the Connecticut Loop. During operation, Tennessee would regularly inspect the pipeline and if any wells or septic systems encroach into Tennessee's existing permanent right-of-way, it would work with the landowner to resolve the encroachment. Tennessee would conduct additional surveys and contact landowners to confirm or identify the locations of additional wells prior to initiating construction. At the request of the landowner, any seeps or springs within 150 feet of construction workspaces would be reviewed by an expert to determine whether construction activities could have an impact and, if needed, to recommend construction alterations to avoid impacts; however, Tennessee has not committed to offer well testing to private owners of water supply wells within 150 of construction workspaces. We believe that testing should be offered to establish an appropriate baseline to evaluate any well owner complaints and assess construction impacts; therefore, **we recommend that:**

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

Based on our recommendation above, and implementation of Tennessee's *SPRP, Blasting Plan*, and the FERC Procedures, we conclude that the Project's impacts on groundwater resources would be minor and temporary.

2.2 Surface Water Resources

Existing Surface Water Resources

The Project would cross two major river basins (the Lower Hudson River basin in New York and the Connecticut River basin in Massachusetts and Connecticut). See table B-4 for a summary of the watersheds that would be crossed by the proposed Project.

Table B-4 **River Basin and Watersheds Crossed by the Project**			
Component	**County/State**	**Major Basin**	**Watershed**
New York Loop	Albany, NY	Lower Hudson	Hannacrois Creek-Hudson River
Massachusetts Loop	Berkshire, MA	Connecticut	West Branch Farmington River
Connecticut Loop	Hampden, MA Hartford, CT	Connecticut	Mill River-Connecticut River

Based on review of the United States Geologic Survey mapping, National Wetland Inventory mapping, state geographic information system (GIS) data, and field surveys conducted by Tennessee, the Project would cross 17 waterbodies for a total of 21 crossing locations. Four waterbodies along the Connecticut Loop would be crossed more than once at different locations. Of the 21 crossing locations, 11 are perennial waterbody crossings and the remaining 10 are intermittent waterbody crossings. Based on the waterbody width at the time of field survey, 13 crossings would be minor (less than 10 feet wide) and 8 crossings would be intermediate (10 to 100 feet wide). No major (greater than 100 feet) waterbody crossings were identified. Tennessee would install and maintain construction bridges at waterbodies with discernible flow at the time of crossing. Information on each of the waterbodies crossed by the Project, including the crossing method, is provided in appendix E.

Sensitive Waterbody Crossings

Muddy Brook and Stony Brook in Connecticut contain habitat for the dwarf wedgemussel *(Alasmidonta heterodon)*, a federally listed endangered freshwater mussel species, which is also known to occur in both waterbodies. No other waterbodies crossed by the Project in Massachusetts or New York include habitat for threatened or endangered species. See section B.4.1 for further information on threatened and endangered species.

Section 303(d) of the Clean Water Act (CWA) requires all states to submit a list every 2 years for USEPA approval of all surface waters in the state for which beneficial uses, such as drinking, recreation, aquatic habitat, and industrial use, are impaired by pollutants. One impaired waterbody, Muddy Brook, has been identified in the Project area along the Connecticut Loop. Muddy Brook is currently impaired for recreational uses due to high bacteria levels (USEPA, 2014a). No impaired waterbodies would be crossed in Massachusetts or New York.

The Nationwide Rivers Inventory is a list of river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values and are of local or regional significance (NPS, 2011). No surface waters that would be crossed by the Project are on the Nationwide Rivers Inventory. The National Wild and Scenic Rivers Act was created to preserve rivers with outstanding natural, cultural, and recreational values (BLM et al., 2015). The Project would not cross any national wild and scenic rivers. New York State's Wild Scenic Recreational Rivers Act further protects rivers that possess outstanding scenic, ecological, recreational, historic, and scientific values in New York State (NYSDEC, 2015c). No river segments in the Project area have been designated as wild, scenic, or recreational in New York State. In Massachusetts, the Riverways Program and its staff, representing the Commonwealth on the Wild and Scenic Committees, provides leadership and participates with municipalities, environmental organizations, and other state and federal agencies on issues related to National Wild and Scenic Studies and designated rivers. There are no river segments in the Project area that have been designated as wild, scenic, or recreational along the Massachusetts Loop. Through the Protected River Act in Connecticut, river corridors are designated for protection and preservation in accordance with an approved river corridor protection plan. Furthermore, the Connecticut Greenways Program protects natural resources, preserves scenic landscapes and historical resources or offers opportunities for recreation or public access, including waterways, trails, and unused right of ways. There are no river segments in the Project area that have been designated as protected or listed along the Connecticut Loop.

Surface Water Intakes and Surface Water Protection Areas

No potable water intakes or surface water protection areas have been identified within 3 miles downstream of any waterbody that would be crossed by the pipeline loops based on Tennessee's consultation with local, state, and federal agencies and GIS database searches in New York, Massachusetts, and Connecticut (Brady, 2014; Deyoe, 2014; McPhee, 2014; Skiba, 2014b).

Contaminated Sediments

Impaired waterbodies associated with hazardous waste sites in the Project vicinity could be a potential source of contaminated sediments. Tennessee contacted state environmental agencies in New York, Massachusetts, and Connecticut and searched federal and state databases to determine contaminated waterbodies crossed by the Project. Furthermore, Tennessee identified state and federal hazardous waste sites in the vicinity of the Project. No waterbodies that would be crossed by the New York Loop are known to have contaminated sediments. Tennessee identified two hazardous waste release sites within 0.25 mile of the New York Loop and 12 hazardous waste sites within 0.25 mile of the Connecticut Loop. No hazardous waste release sites were identified within 0.25 mile of the Massachusetts Loop. Tennessee would evaluate and treat any unanticipated hazardous materials uncovered during construction in accordance with its *Hazardous Material Discovery Plan* and applicable federal and state requirements.

General Impacts and Mitigation

Tennessee would use the conventional (open-cut), dam-and-pump, or flume method to cross waterbodies. The proposed crossing method for each waterbody is provided in appendix E. A description of each crossing method can be found in section A.7.2. Tennessee would follow the FERC Plan and Procedures and applicable permit conditions to avoid and minimize impacts on waterbodies. In general, Tennessee would minimize crossing length by constructing waterbody crossings so they are as perpendicular to the channel as engineering and routing conditions allow. In-water work, disturbance to the streambed, removal of riparian vegetation, and diversion of streamflow during waterbody crossings would temporarily impact water quality by increasing suspended sediment. However, Tennessee would reduce impacts on water quality by isolating the work area from the flowing water by using either the dam-and-pump or flume crossing method. Based on discussions with the USFWS regarding the dwarf wedgemussel in Muddy Brook and Stony Brook that would be crossed by the Connecticut Loop, and the evaluation by Tennessee that the horizontal directional drill method would not be feasible at these crossings, **we recommend that:**

- **<u>Prior to construction</u>, Tennessee should evaluate the use of the flume crossing method for Muddy Brook and Stony Brook to minimize impacts on the dwarf wedgemussel. Tennessee should file with the Secretary the evaluation, final proposed construction method, and site-specific drawings for review and written approval by the Director of OEP.**

Clearing, grading, and other construction activities using heavy machinery could result in physical impacts on waterbodies and floodplains. Waterbodies with steep banks, potentially unstable soils, high volume flows, and actively eroding banks would be more susceptible to impacts than others. Muddy Brook and Stony Brook in Connecticut have relatively steep banks with some evidence of erosion. Crossings for Vloman Kill, Phillipin Kill, and Dowers Kill in New York have the potential for erosion due to bank steepness and soil type. Tennessee would restore and stabilize disturbed streambanks immediately after pipeline installation and implement erosion and sediment control measures described in the FERC Procedures. No increase in impervious surfaces would occur within floodplains.

Tennessee would minimize potential adverse impacts on waterbodies using construction procedures specified within the FERC Plan and Procedures and Tennessee's construction measures for this Project. Section V.B.2.a of the FERC Procedures states that ATWS should be at least 50 feet away from waterbody boundaries. Tennessee has identified one area where ATWS would be needed within 50 feet of a waterbody and four that are within 50 feet of combined waterbody/wetland areas, and as such, is requesting approval for alternatives to the FERC Procedures (see appendix B). ATWS requested within 50 feet of wetland boundaries is addressed below in section B.2.3. Of these five ATWS areas, one is requested for soil storage to facilitate a roadway crossing, one is requested for soil and equipment storage for removal/relocation of pigging facilities, and the other three are requested for soil storage in areas with severe side slopes or in congested areas. We have reviewed these ATWS and agree that four are justified: ATWS 5, ATWS 17, ATWS 37, and ATWS 38. One ATWS (ATWS 25) affects a waterbody/wetland area at the beginning of the Massachusetts Loop and is requested to facilitate the removal and relocation of pigging facilities and is located in an area with steep slopes. Based on our review of the site constraints and sensitive resources in this area, we have included a recommendation in section 2.3.3 for ATWS 25.

Blasting

Blasting may be necessary to construct the pipeline in areas where bedrock is encountered at depths that interfere with conventional excavation or rock-ripping methods. The need for blasting within waterbodies is anticipated to be minimal because more than 80 percent of the proposed routes (11 miles) do not contain shallow bedrock (USDA-NRCS, 2015a). However, shallow depth to bedrock with moderate-to-high potential for blasting has been identified along the Massachusetts Loop (0.4 mile). Of the seven waterbodies that are within these areas of moderate-to-high potential for blasting, only three would be crossed by the centerline of the Massachusetts Loop. The remaining four waterbodies would be within the construction workspaces but not crossed by the centerline and, therefore, unlikely to be directly affected by blasting. Of the three waterbodies that would be crossed by the centerline, two are intermittent, minor waterbodies. One waterbody is a perennial warmwater fishery and is not used as a drinking water supply. Tennessee has developed a *Blasting Plan* for the Project, which outlines the procedures and safety measures that all contractors must adhere to while implementing blasting activities during Project construction. Specifically, the *Blasting Plan* identifies blasting procedures, including safety, use, storage and transportation of explosives as defined by applicable federal regulations. Prior to blasting, a site-specific blasting plan must be submitted by the contractor for approval by Tennessee. In the event that blasting would occur in streams, Tennessee must comply with the FERC Procedures regarding stream crossings.

Hydrostatic Testing

Tennessee would hydrostatically test the pipeline loops in accordance with USDOT regulations. Water sources for testing include one municipal hydrant with an estimated quantity of 374,000 gallons for the New York Loop, two municipal hydrants with a combined quantity of 1,000,390 gallons for the Connecticut Loop, and Lower Spectacle Pond with an estimated quantity of 1,025,000 gallons for the

Massachusetts Loop. No chemicals would be added to the hydrostatic test water. Hydrostatic test water would be pressured in a pipeline segment for 8 hours. After completion of hydrostatic testing, Tennessee would discharge the water through an energy dissipation structure into a vegetated upland area for infiltration and to prevent erosion in accordance with the FERC Procedures and with federal and state discharge permits.

Comments were received from the public regarding Tennessee's proposed hydrostatic test water withdrawal location for the Massachusetts Loop. Tennessee has coordinated with the Town of Sandisfield and MADEP for the use of water from Lower Spectacle Pond and would seek coverage under Title 33 Water Withdrawal Permit, and Massachusetts Water Resources Management Program (310 CMR 36.00). The proposed withdrawal for the hydrostatic test water would be about 1,025,000 gallons. To complete the withdrawal within 8 hours, the withdrawal rate would be about 2,000 gpm. There would be a reduction in depth about 0.5 inch over the entire 70-acre Lower Spectacle Pond and the timing of the water withdrawal would be coordinated with local officials to notify residents of any temporary restrictions on use of the pond. Tennessee would minimize environmental impacts from withdrawal and discharge of test water by implementing the measures in the FERC Procedures. Given the negligible reduction in water depth and because Tennessee would obtain and comply with a water withdrawal permit, we conclude this withdrawal would not have a significant or adverse effect on water quality.

Construction activities could also result in the accidental release of fuel or other contaminants into the water and may affect water quality. Tennessee would implement the measures in its *SPRP* to prevent accidental leaks or spills of materials that could affect surface water, and to ensure that inadvertent spills are contained, cleaned up, and disposed of in an appropriate manner.

Based on our recommendations and Tennessee's implementation of its *SPRP*, *Blasting Plan* and the FERC Procedures, we conclude that impacts on surface water resources would be minor and temporary.

2.3 Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE, 1987). The standards require avoidance of wetlands, where possible, and minimization of disturbance where impacts are unavoidable, to the degree practicable. Construction activities involving wetlands under the jurisdiction of the USACE would require a Section 404 permit from the USACE New England District and the USACE New York District (see table A-7). Section 404 of the CWA establishes standards to evaluate and reduce total and net impacts on wetlands under the regulatory jurisdiction of the USACE. Any unavoidable wetland impacts may require compensatory mitigation, as reviewed and approved by the USACE. Tennessee submitted applications for the necessary Section 404 and Section 401 permits in April and July of 2014, and is working with USACE on compensatory mitigation plans for unavoidable wetland impacts. If the Project is authorized by the Commission, Tennessee would not be allowed to commence construction until they have received all necessary federal authorizations.

Additionally, Section 401 of the CWA requires that proposed dredge or fill activities under Section 404 be reviewed and certified by the designated state agency in New York, Massachusetts, and Connecticut to ensure the Project meets state water quality standards.

Existing Wetland Resources

Tennessee conducted wetland surveys within the Project area in the fall of 2013 and spring of 2014. The Project would directly affect 13 wetland areas in New York, 19 wetland areas in Massachusetts, and 62 wetland areas in Connecticut (see appendix F, table 1). Wetlands are not present at the proposed aboveground facilities or contactor/pipeyards.

The wetlands were surveyed in accordance with the *USACE Wetlands Delineation Manual* (USACE, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE, 2012). The USFWS wetland classification system described by Cowardin et al. (1979) was used to classify the wetlands that would be affected by the Project. Wetlands were identified as Palustrine Forested (PFO), Palustrine Scrub-Shrub (PSS), Palustrine Emergent (PEM), or a combination of these three cover types as defined in table B-5.

Table B-5

Characteristics of Wetland Types

Wetland	Characteristics
PFO	Freshwater wetlands dominated by woody vegetation greater than 20 feet in height. Dominant species include mature canopy trees.
PSS	Freshwater wetlands dominated by woody vegetation less than 20 feet in height. Species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.
PEM	Non-tidal wetlands characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Usually dominated by perennial plants.

PFO = Palustrine forested wetland
PSS = Palustrine scrub-shrub wetland
PEM = Palustrine emergent wetland

While surveying for wetlands, Tennessee also conducted vernal pool surveys in the Project area in the spring of 2014. Vernal pools, often present within or near wetlands, are small, shallow ponds characterized by lack of fish and by periods of dryness. Vernal pool habitat is important to a variety of wildlife species, including some amphibians that breed exclusively in vernal pools and other organisms, such as fairy shrimp, which spend their entire life cycles, within vernal pools. Other wildlife species use vernal pools for breeding, foraging, and water supply.

Wetlands are further classified in New York's Freshwater Wetlands Act, the goal of which is to "preserve, protect and conserve freshwater wetlands and their benefits, consistent with the general welfare and beneficial economic, social, and agricultural development of the state" (NYSDEC, 2015d). To be protected under New York's Freshwater Wetlands Act, a wetland must be at least 12.4 acres in size. Smaller wetlands may be protected if considered of unusual local importance. The Project would not cross any wetlands classified under New York's Freshwater Wetland Act. Vernal pools are not directly discussed in New York's Freshwater Wetlands Act; however, one potential vernal pool was located within one wetland found along the New York Loop.

In Massachusetts, wetlands are regulated by the MADEP under the Massachusetts Wetlands Protection Act, which "protects wetlands and the public interests they serve, including flood control, prevention of pollution and storm damage, and protection of public and private water supplies, groundwater supply, fisheries, land containing shellfish, and wildlife habitat." The Massachusetts Wetlands Protection Act defines Bordering Vegetated Wetlands as "freshwater wetlands which border on creeks, rivers, streams, ponds and lakes and includes wet meadows, marshes, swamps and bogs." The Massachusetts Rivers Protection Act provides additional protection to land adjacent to perennial streams, such as Bordering Vegetated Wetlands, in the form of a 200-foot-wide corridor on each side of the waterbody (MAEEA, 2014). The Project would cross 15 wetlands classified as Bordering Vegetated Wetlands under the Massachusetts Wetlands Protection Act. In addition, vernal pools are considered Outstanding Resource Waters in Massachusetts. Seventeen vernal pools were identified within wetlands associated with the Massachusetts Loop. Tennessee submitted the CWA 401 Water Quality Certification application to MADEP in June 2015, which MADEP would also review for wetland impacts under the Massachusetts Wetland Protection Act.

Connecticut regulates inland wetlands under the Inland Wetlands and Watercourses Act, (Section 22a-36 through 45 of the Connecticut General Statutes). These state statutes are implemented through the Inland Wetlands and Watercourse Regulations as administered by the individual municipalities. Under Section 2 of the Inland Wetlands and Watercourses Act, a wetland is defined as "land, including submerged land…which consists of poorly drained, very poorly drained, alluvial and floodplain soils as defined by the National Cooperative Soils Survey. Such areas may include filled, graded or excavated sites which possess an aquatic (saturated) moisture regime as defined by the USDA Cooperative Soil Survey." All wetlands surveyed along the Connecticut Loop would be considered in the CWA Section 404 permit to the USACE, regardless of the wetland status according to the Inland Wetlands and Watercourses Act. In addition to the wetlands, a total of 33 vernal pools, also regulated by the Inland Wetlands and Watercourses Act, were identified within wetlands associated with the Project along the Connecticut Loop (see appendix F, table 2).

Impacts and Mitigation

Table B-6 summarizes the impact on wetland resources by the Project. Details regarding impacts on individual wetlands including location and wetland classification are provided in appendix F.

Table B-6

Summary of Wetland Impacts for the Project

Wetland Type [a]	Temporary Impacts [b, c]	Permanent Impact [b, c]
PEM	32.8	0.0
PFO	25.6	9.0
PSS	2.1	0.3
Project Total	**60.5**	**9.3**

[a] PEM = palustrine emergent; PSS = palustrine scrub-shrub; PFO = palustrine forested.
[b] Minor discrepancies are due to rounding.
[c] Temporary impacts based on use of all workspace during construction activities. Permanent impacts based on 30-foot right-of-way width permanently maintained in PFO wetlands and 10-foot width permanently maintained through PSS wetlands. No permanent impacts occur in PEM wetlands since there is no change to vegetative cover type after construction is completed.

Temporary wetland impacts may include soil disturbance, temporary alteration of hydrology, and loss of vegetation during construction. Temporary stockpiling of soil and the use of heavy construction machinery could lead to inadvertent compaction of soils, inhibit seed germination, and increase seedling mortality. In addition, altered wetland hydrology, runoff from Project features, and accidental spills could negatively affect water quality within the wetland.

Operation of the Project would result in the permanent conversion of 9.0 acres of PFO and 0.3 acre of PSS wetlands. Vegetation would be maintained in an herbaceous state within a 10-foot-wide corridor through wetlands, and trees that are within 15 feet of the pipeline loops (i.e., within a 30-foot-wide corridor centered over the pipeline) with roots that could damage the pipeline may be selectively cut and removed from the permanent right-of-way during routine maintenance. Therefore, the Project would result in permanent conversion of PFO wetlands to PSS or PEM wetlands within a limited area of the permanent right-of-way.

Tennessee would minimize potential adverse impacts on wetlands using construction procedures specified within the FERC Plan and Procedures for this Project. Section V1.B.1.a of the FERC Procedures states that ATWS should be at least 50 feet away from wetland boundaries. Tennessee has identified 30 areas where ATWS would be needed within 50 feet of wetland boundaries, and as such, is requesting approval for alternatives to the FERC Procedures (see appendix B). There are also four ATWS within 50 feet of combined waterbody/wetland boundaries that are addressed above in section B.2.2. Many of these ATWS areas are necessary to facilitate roadway crossings where wetlands are in proximity to the road surface, or for soil storage in steep slope, side slope, or congested areas.

Additionally, section VI.A.3 of the FERC Procedures limits the construction right-of-way width in wetlands to 75 feet or less. As shown in table B-7, Tennessee has identified 12 wetlands in Massachusetts and Connecticut where construction workspace would exceed the 75-foot-wide FERC limitation due to the addition of linear ATWS within the wetlands to facilitate construction in these areas.

Table B-7

Pipeline Construction Right-of-Way Widths Greater than 75 Feet within Wetlands

Wetland ID	Classification	Milepost	Crossing Length (feet)	Construction Workspace Width with ATWS (feet)	Justification	Justification Evaluation
Massachusetts Loop						
WMA-03	PEM/PFO	0.0	12	95	Tie-in with existing MLV 258 requires additional workspace	Acceptable
WMA-14	PEM/PFO	1.9	389	100	Steep slope terrain	Acceptable
WMA-15	PEM/PFO	2.0	242	100	Steep slope terrain	Acceptable
WMA-19	PEM/PFO	2.5	276	85	Bored road crossing method requires additional workspace	Additional justification requested
WMA-16	PEM/PFO	2.8	558	100	Bored road crossing method requires additional workspace	Additional justification requested
WMA-23	PEM/PFO	3.8	311	125	Pipeline tie-in with pig receiver requires additional workspace	Acceptable
Connecticut Loop						
WCT-02	PEM/PFO	0.4	25	125	Bored road crossing method requires additional workspace	Additional justification requested
WCT-56	PEM/PFO	0.4	1,624	125	Bored road crossing method requires additional workspace	Additional justification request

Table B-7

Pipeline Construction Right-of-Way Widths Greater than 75 Feet within Wetlands

Wetland ID	Classification	Milepost	Crossing Length (feet)	Construction Workspace Width with ATWS (feet)	Justification	Justification Evaluation
WCT-11	PEM/PFO	1.6	561	125	Bored road crossing method requires additional workspace	Additional justification requested
WCT-22	PEM	3.5	762	120	Bored road crossing method requires additional workspace	Acceptable
WCT-25	PEM/PFO	4.0	525	125	Bored road crossing method requires additional workspace	Acceptable
WCT-53	PEM/PFO	7.5	1,134	80	Point of inflection (i.e., turn in pipeline route) requires additional workspace	Acceptable

ID = identification number
MLV = mainline valve
PEM = palustrine emergent wetland
PFO = palustrine forested wetland

We have reviewed Tennessee's ATWS and construction methods and find some of them acceptable, while others require additional justification and possible modification. Of the 30 ATWS within 50 feet of wetlands, we consider 16 to be acceptable. For the remaining 14 ATWS and specific road crossings, **we recommend that:**

- **Prior to construction, Tennessee should file with the Secretary revised alignment sheets depicting the following workspace modifications, construction considerations, or file justification why the changes cannot be implemented, for the review and written approval of the Director of OEP:**

  a. Along the New York Loop:

  (1) use the open cut method for Meads Lane Road to avoid the need for or reduce the size of ATWS 56 and ATWS 57 at MP 3.4;

  (2) reconfigure ATWS 58 to avoid Wetland W009 at MP 3.7; and

  (3) reconfigure ATWS 62 to avoid Wetland W014 at MP 4.1.

  b. Along the Massachusetts Loop:

  (1) shift ATWS 25 to the east or reconfigure ATWS 24 to avoid Wetland WMA-03 and maintain a 50 foot set back from the tributary to Clam River SMA-03 at MP 0.0;

(2) reconfigure ATWS 42 or split ATWS 42 into multiple ATWS to avoid Wetlands WMA-14 and WMA-15 at MP 1.9;

(3) consider the open cut construction method to reduce impacts on Wetland WMA-16 at MP 2.8;

(4) extend the road bore at Cold Spring Road to avoid Wetland WMA-19 at MP 2.5;

(5) consider the open cut construction method at MP 2.8 for Cold Spring Road to eliminate the need for ATWS 47 and avoid Wetlands WMA-16 and WMA-17; and

(6) revise the footprint for the access road (#5) at MP 3.8 of the Massachusetts Loop to avoid impacts on Wetland WMA-23 on the north side of the access road.

c. Along the Connecticut Loop:

(1) extend the road bore at Hickory Street to avoid Wetland WCT-02 at MP 0.4;

(2) extend the road bore at Hickory Street to avoid Wetland WCT-56 at MP 0.4;

(3) shift ATWS 4 to the east to avoid Wetland WCT-04 at MP 1.2;

(4) consider the open cut construction method at MP 1.6 for Halladay Avenue West to minimize impacts on Wetland WCT-11;

(5) shift ATWS 13 to the west side of the proposed right-of-way to avoid Wetland WCT-37 at MP 5.7;

(6) shift ATWS 14 to the west side of the proposed right-of-way to avoid Wetland WCT-38 at MP 5.7;

(7) shift ATWS 15 to the north to avoid Wetlands WCT-41A and WCT-41B at MP 6.1; and

(8) reconfigure or eliminate ATWS 22 to avoid Wetlands WCT-53A and WCT-53B at MP 7.7.

To further minimize impacts on wetlands, upon completion of construction, Tennessee would backfill the trench with subsoil and restore the topsoil segregated during grading, restore contours to pre-construction conditions, stabilize the right-of-way as quickly as possible following backfilling, and maintain erosion control measures until revegetation within the wetlands is successful. Tennessee has provided a conceptual compensatory wetland mitigation plan for unavoidable impacts on Waters of the United States to the USACE New England and New York Districts to meet USACE, NYSDEC, MADEP, and CTDEEP permit requirements. According to the conceptual compensatory mitigation plans, Tennessee's mitigation for permanent conversion of PFO and PSS wetlands would incorporate a combination of off-site wetland restoration, enhancement, or creation measures.

Vernal pools were identified in 26 wetlands that would be affected by the Project. Several wetlands contain multiple vernal pools (appendix F, table 2). Within these wetlands, about 0.5 acre of vernal pool habitat would be temporarily affected during construction. About 0.2 acre of vernal pool habitat would be affected during operational maintenance. No permanent fill would take place within these vernal pools; however, construction related disruptions to vernal pools can alter the natural hydrology, substrate, and vegetation composition within the pools. Subsequently, these small habitats could be lost or fragmented from other similar habitats and wildlife species that use these habitats could be displaced. Tennessee would continue to coordinate with the USACE, CTDEEP, and MADEP to develop and implement approved measures to avoid or minimize potential adverse effects on vernal pools and amphibian breeding habitats as a result of the construction and operation of the Project. To ensure the results of Tennessee's consultations are incorporated into Project design and construction procedures, **we recommend that**:

- **Prior to construction, Tennessee should file with the Secretary documentation of completed consultations with CTDEEP, MADEP and USACE regarding vernal pools and the mitigation measures it would implement to avoid and minimize potential adverse effects on vernal pools.**

Tennessee has conducted wetland surveys at the South Beech Plain pipeyard; however, the results of the wetland delineations have not yet been verified by the required Sandisfield third-party reviewer. Tennessee has proposed a layout of the South Beech Plain pipeyard to avoid impacts on adjacent wetlands; however, because the surveys are not complete and available for our review, **we recommend that**:

- **Prior to construction, Tennessee should file with the Secretary all outstanding wetland and biological survey results.**

With implementation of Tennessee's mitigation measures, development of compensatory mitigation plans, and our recommendations described above, we believe that minor and temporary impacts on non-forested wetlands would occur as a result of the Project. Vernal pools and forested wetlands would experience long-term impacts, but the impacts would not be significant.

3. Vegetation, Fisheries, and Wildlife

3.1 Vegetation

Existing Vegetation Resources

The New York Loop and Connecticut Loop would be in the Eastern Broadleaf Forest (Oceanic) Province of the Eastern United States (Bailey et al., 1994). The Massachusetts Loop would be in the Adirondack-New England Mixed Forest-Coniferous Forest-Alpine Meadow Province. Construction and operation of the Project would affect three general upland vegetative cover types: upland forest, open lands (existing rights-of-way, open fields, non-agriculture), and agricultural lands. Impacts on wetland vegetation are discussed above in section B.2.3. Impacts on developed, agricultural, and residential lands are discussed in section B.5.1.

Open upland habitats in both provinces are characterized by sedges, grasses, and rushes, including little blue stem grass (*Schizachyrium scoparium*), Pennsylvania sedge (*Carex pennsylvanica*), poverty grass (*Danthonia spicata*), and many non-native species. In addition, some open upland areas contain a mix of herbaceous species, such as goldenrods (*Solidago* spp. and *Euthamia* spp.) and milk weeds, including butterfly weed (*Asclepias* spp. and *Asclepias tuberosa*).

In New York, forested upland habitats are characterized by Appalachian oak-hickory forests dominated by red oak (*Quercus rubra*), white oak (*Quercus alba*), black oak (*Quercus velutina*), and successional northern hardwoods that include quaking aspen (*Populus tremuloides*), bigtooth aspen (*Populus grandidentata*), balsam poplar (*Populus balsamifera*), paper birch (*Betula papyrifera*), gray birch (*Betula populifolia*), pin cherry (*Prunus pensylvanica*), black cherry (*Prunus serotina*), red maple (*Acer rubrum*), and white pine (*Pinus strobus*) (Edinger et al., 2002). In Massachusetts, the upland forest habitat is dominated by northern hardwoods-hemlock-white pine forest. Dominant tree species include sugar maple (*Acer saccharum*), red maple, white pine (*Pinus strobus*), black cherry, sweet birch (*Betula lenta*), red oak, and hemlock (*Tsuga canadensis*). Upland forested habitats in Connecticut are characterized by mixed oak forest, northern hardwoods–hemlock-white pine forests, successional northern hardwoods, and successional white pine forest (Edinger et al., 2002; Swain and Kearsley, 2011). The mixed oak forest is dominated by black oak, scarlet oak (*Quercus coccinea*), red oak, chestnut oak (*Quercus prinus*), and white oak while the successional white pine forest is dominated by white pine with a few hardwood species intermingled throughout. The northern hardwoods-hemlock-white pine and successional northern hardwoods communities in Connecticut are similar to those in both New York and Massachusetts.

Vegetation Communities of Special Concern

Tennessee consulted with the USFWS, NYSDEC Natural Heritage Program, Massachusetts Department of Fisheries and Wildlife (MADFW) Natural Heritage and Endangered Species Program, and Connecticut Natural Diversity Database (CTNDDB) to determine whether rare, threatened, or endangered plant species or natural communities exist within the proposed Project area. The CTNDDB stated that the Connecticut Loop at MP 7.0 would be about 1,118 feet from an area of sand barrens, which is a Connecticut Critical Habitat (McKay, 2013). Connecticut Critical Habitats are considered rare and specialized wildlife habitats within the state and are characterized as such in the Connecticut Comprehensive Wildlife Conservation Strategy (CTDEEP, 2014b). Federal- and state-listed special status species are discussed further in section B.4.2.

Impacts and Mitigation

The Project would temporarily impact 197.1 acres of vegetation during construction and permanently impact 50.9 acres during operation. Table B-8 summarizes the temporary construction and permanent operational impacts of the Project on each vegetation community type. Forested upland areas within the construction workspace would experience long-term impacts, as the regrowth of forested areas to pre-construction conditions would take 20 to 30 years for many species, such as white pine. Hardwood species, such as oaks, could take more than 50 years to reach maturity. Forested wetlands are discussed in section B.2.3.

The entirety of the Massachusetts Loop and the New York Loop would be within or directly adjacent to existing pipeline rights-of-way, which would reduce the amount of clearing needed to construct the pipeline loops. The majority (92 percent) of the Connecticut Loop would be within or directly adjacent to existing pipeline rights-of-way. Prior to construction, the right-of-way and ATWS would be cleared of vegetation to the minimum extent necessary to allow for safe working conditions. Herbaceous vegetation would be cut as close to the ground surface as feasible, leaving the root systems intact to facilitate natural revegetation. Within upland forests, mature tree stumps would either be removed or ground down to a level that would allow for safe equipment access and operation.

Table B-8

Construction and Operation Impacts on Vegetation Types in the Project [a]

Facility	Forested Upland		Forested Wetland [b]		Open Upland		Open Wetland		Agricultural		Total	
	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper	Const	Oper
Pipeline												
New York Loop	2.2	0.2	0.6	0.1	0.7	0.2	6.0	1.4	11.0	1.5	20.5	3.4
ATWS	0.9	0.0	0.0	0.0	0.0	0.0	0.1	0.0	5.3	0.0	6.3	0.0
Massachusetts Loop	28.2	8.9	5.7	2.1	4.7	0.4	3.0	0.2	2.3	0.8	43.9	12.4
ATWS	5.1	0.0	0.3	0.0	1.0	0.0	0.5	0.0	0.5	0.0	7.4	0.0
Connecticut Loop	12.2	6.3	18.9	8.9	3.1	1.4	25.8	11.0	15.0	5.7	75.0	33.3
ATWS	0.9	0.0	0.2	0.0	0.6	0.0	0.4	0.0	1.3	0.0	3.4	0.0
Pipeline Subtotal	**49.5**	**15.4**	**25.7**	**11.1**	**10.1**	**2.0**	**35.8**	**12.6**	**35.4**	**8.0**	**156.5**	**49.1**
Access Roads	1.5	0.8	0.0	0.0	2.1	0.5	0.1	0.1	1.7	0.4	5.3	1.8
Contractor/Pipe Yards	1.1	0.0	0.0	0.0	5.9	0.0	0.0	0.0	28.3	0.0	35.3	0.0
Compressor Station 261	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Project Total	**52.1**	**16.2**	**25.7**	**11.1**	**18.1**	**2.5**	**35.9**	**12.7**	**65.3**	**8.4**	**197.1**	**50.9**

Const = Construction (includes land needed for both construction and operation)
Oper = Operation (land permanently affected by Project operation)

[a] Totals may not add up due to rounding. Open water, developed land, and roadways are not included as categories in this table; therefore, Project totals are not directly comparable to those reported in appendix H and presented in section B.5.

[b] Wetland impacts reported in table B-6 are calculated using a 30-foot right-of-way width permanently maintained in forested (PFO) wetlands and 10-foot width permanently maintained through open (PSS and PEM) wetlands; therefore, they are not directly comparable to impacts reported in this table.

Cleared timber would be stockpiled on the edge of the right-of-way away from wetlands and waterbodies and out of public view for use by the landowner where requested or removed for off-site disposal, in accordance with landowner agreements and state and/or local agencies. Other woody vegetation would be chipped and hauled off-site for disposal or dispersed on the right-of-way with the approval of an EI. Wood chips would not be left in agricultural lands, or within 50 feet of wetlands or waterbodies. No burning of vegetation is proposed.

Clearing of upland forest vegetation within the construction workspace would cause long-term impacts on the regrowth of forested areas to pre-construction conditions. About 16.2 acres of upland forest vegetation would be permanently converted to an herbaceous state, as vegetation maintenance would prevent woody scrub-shrub vegetation from growing within a 10-foot-wide corridor centered over the pipeline and would prevent trees from growing in a 30-foot-wide corridor centered over the pipeline to maintain the integrity of the pipeline. Modifications to Compressor Station 261 would occur within developed land and would, therefore, not affect vegetation. In addition, Tennessee proposes to place a majority of the contractor staging areas, contractor/pipeyards, and temporary access roads in open lands or agricultural lands where the vegetation could revert to pre-construction conditions following stabilization.

The term "edge effect" is commonly used in conjunction with the boundary between natural habitats, especially forests, and disturbed or developed land, such as utility rights-of-way. Where land adjacent to a forest has been cleared, sunlight and wind can penetrate to a greater extent. These forces can result in tree destabilization from increased wind shear, drying out of the interior of the forest close to the edge, and encouraging growth of invasive species at the edge. Fragmentation of forested areas can result in changes in vegetation (e.g., invasion of shrubs along the edge); however, the majority of forested areas along the proposed pipeline loops have been fragmented by agriculture and other development, including existing utility rights-of-way, and only small patches of undisturbed forest still exist in the vicinity of the Project. Tennessee has collocated 95 percent of the pipeline loops with its existing infrastructure, which would minimize additional fragmentation.

Clearing of vegetation in open lands and agricultural areas would cause minor and temporary impacts, because these areas would return to their herbaceous vegetative cover within one to 2 years following construction. Tennessee would restore temporary workspaces using seed mixes recommended by the NRCS and soil and water conservation districts in open lands, and landowners in agricultural and residential areas.

During operation, maintenance of the permanent right-of-way would be necessary to allow for visibility and access for pipeline monitoring and maintenance activities. In upland areas, the permanent rights-of-way for the Massachusetts and New York Loops would be 35 feet wide. For the portion of the Connecticut Loop that is collocated with existing rights-of-way, the permanent right-of-way would be 25 feet wide, and for the 0.7 mile of the Connecticut Loop that is greenfield, the permanent right-of-way would be 50 feet wide. The entire permanent right-of-way could be mowed not more than once every 3 years to maintain an herbaceous to low scrub-shrub cover state, and a 10-foot-wide corridor centered on the pipeline could be mowed more frequently to maintain an herbaceous state and to allow for periodic pipeline surveys. In forested wetlands, the permanent right-of-way would be limited to a 30-foot-wide corridor centered on the pipeline where trees within 15 feet of the pipeline may be selectively cut and removed to prevent root damage to the pipeline.

To minimize impacts on vegetative communities from construction and operation of the Project, Tennessee would follow the FERC Plan and Procedures for restoration and post-construction monitoring and reporting. In particular, Tennessee would:

- minimize vegetative clearing through collocation with existing rights-of-way;
- use existing roads for access to the Project where practicable;
- install temporary erosion control measures, such as slope breakers, sediment barriers, and mulch; and
- annually monitor and report to FERC the status of revegetation until deemed successful.

Revegetation would be considered successful when native vegetation cover and diversity within the disturbed areas are similar to adjacent, undisturbed lands.

Noxious or invasive plant communities can out-compete and displace native plant species, thereby negatively altering the appearance, composition, and habitat value of affected areas. Non-native invasive plant species that have been documented in the Project area include purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), and multiflora rose (*Rosa multiflora*). Tennessee would implement its *Invasive Species Management Plan* to avoid the spread of invasive species during construction, operation, and maintenance of the Project. For example, prior to construction, Tennessee would provide a picture-based pamphlet identifying the noxious and invasive plants in the Project area to the EIs, as well as the other contractors working on the Project, so that populations of invasive species could be readily identified and either avoided or mitigation measures put in place. In addition, herbicides may be applied, as approved by state and local agencies, to minimize the spread of invasive species. Tennessee proposes to monitor the restored rights-of-way annually for up to 5 years following construction to manage invasive species within the restored right-of-way. In addition, **we recommend that:**

- **<u>Prior to construction</u>, Tennessee should develop preventive measures, such as setting up wash stations, in coordination with NYSDEC, MADFW, and CTDEEP, to prevent the spread of invasive species and noxious weeds resulting from construction and restoration activities. These measures should be included in Tennessee's *Invasive Species Management Plan* and filed with the Secretary for review and written approval by the Director of OEP.**

Based on the types and amounts of vegetation affected by the Project, Tennessee's proposed avoidance, minimization, and mitigation measures to limit Project impacts, and implementation of our recommendations, we conclude that impacts on vegetation from the proposed Project would be minor. Impacts on forested areas would be long-term, on the order of 20 to 50 years, and impacts on non-forested areas would be short-term, on the order of one to 2 years.

3.2 Aquatic Resources

All waterbodies crossed by the Project are freshwater and support warmwater, coolwater, and coldwater fisheries (see appendix E for the list of waterbodies crossed by the Project). In New York, the three waterbodies that would be crossed by the New York Loop and associated access roads are perennial and classified as warmwater fisheries (Davis-Ricci, 2013; USFWS, 2013a). The Massachusetts Loop would cross four waterbodies (two perennial and two intermittent), of which three are classified as supporting coldwater fisheries and one is classified as supporting warmwater fisheries (French, 2013a, 2013b). The Connecticut Loop would cross 10 waterbodies (5 perennial and 5 intermittent), with three of the 10 waterbodies crossed multiple times at different locations. Two of these waterbodies are classified as coolwater fisheries; the remaining seven waterbodies are classified as warmwater fisheries. The fishery classification is unknown for one waterbody. Many inland streams in Connecticut, including those crossed by the Project, can be considered coolwater fisheries and have temperatures between those typically associated with warmwater or coldwater fisheries (McKay, 2013; Hagstrom, 2014).

Warmwater habitat is generally characterized as slower-moving bodies of water and the streams are less oxygenated compared to coldwater waterbodies. Fish species associated with warmwater systems typically include sunfish, bullhead catfish, and perch. Warmwater waterbodies are unsuitable for the propagation of trout and are not capable of supporting a stocked trout population year round. Coldwater fisheries require water temperatures lower than 70 ºF due to species requirements for growth and reproduction, and typically have high oxygen levels. They are generally characterized as faster-moving bodies of water and are particularly sensitive to changes in water quality and/or quantity such as siltation and run-off, water level fluctuations, loss of riparian habitat, stream fragmentation and alterations of temperature regime (French, 2014). Coldwater systems support fish species such as trout, suckers, sculpins, and minnows.

Recreational fishing may occur in the perennial streams crossed by the Project; warmwater game fish in the Project area include brown bullhead, white and black crappie, largemouth and smallmouth bass, chain pickerel, and several sunfish species. Coldwater game fish in Massachusetts and Connecticut include brook trout, brown trout, rainbow trout, and smallmouth bass (French, 2014). There would be no coldwater fisheries crossed by the Project in New York and there are no waterbodies supporting commercial fisheries that would be crossed by the Project (McKay, 2013; French, 2013b).

Fisheries of Special Concern

Tennessee consulted with the USFWS, NYSDEC Bureau of Fisheries, MADFW, and the CTDEEP to determine whether fisheries of special concern or designated essential fish habitat occurred within the proposed Project area. No state-listed or federally listed fish species or other specialized habitats were identified in the vicinity of the Project (USFWS, 2013a; Chapman, 2014a). However, several perennial streams may provide habitat for state and/or federally listed aquatic amphibian and mussel species (McKay, 2014). Potential impacts on these species and other threatened and endangered species are discussed in section B.4.

Impacts and Mitigation

The proposed Project would result in 21 waterbody crossings of 17 streams. Waterbody crossing methods are described in detail in section A.7.2. In order to reduce potential impacts, all waterbody crossings would adhere to construction timing windows and mitigation measures in the FERC Procedures, such as restoration, bank stabilization, and revegetation. In-stream construction must occur between June 1 and September 30 for coldwater fisheries, and between June 1 and November 30 for coolwater and warmwater fisheries. Tennessee proposes to cross all waterbodies with discernible flow at the time of crossing using either the flume or dam-and-pump method. While the dam-and-pump crossing method would reduce turbidity and downstream sedimentation during construction, minor aquatic habitat alteration could still occur, primarily because species cannot travel through the working area. Temporary impediments, changes to behavior, loss of habitat, and/or the alteration of water quality could increase the stress rates, injury, and/or mortality experienced by fish. Generally, the flume crossing method minimizes the potential for sedimentation downstream, reducing the risk for the mortality of fish species during construction, and allows species to travel through the flume, if able. Streams that are dry at the time of crossing would be crossed using the conventional open-cut method in accordance with the FERC Procedures and applicable federal and state permit conditions.

To minimize impacts on waterbodies and fisheries, Tennessee would maintain a 25-foot-wide riparian strip for the full width of the permanent right-of-way and limit vegetative maintenance immediately adjacent to waterbodies to a 10-foot-wide-strip centered over the pipeline with vegetation maintenance. This would limit the long-term loss of riparian vegetation and, therefore, the potential for warming of coldwater streams. In-stream blasting would be limited to the extent practicable; however, shallow bedrock may require blasting at a limited number of waterbody crossings along the Massachusetts Loop. If in-stream blasting is required, Tennessee would follow measures in its *Blasting Plan,* would consult with state and federal agencies prior to in-water blasting, and would provide a qualified biologist to survey for any sensitive species, such as the eastern box turtle and wood turtle, prior to and following blasting. If blasting occurs, fish and aquatic organisms close to the blast could be injured or killed, and substrate could be altered. However, preparation of the trench and test drilling prior to blasting would likely displace most aquatic organisms in the vicinity of the blast site. In accordance with its *Blasting Plan*, Tennessee would consult with the appropriate agencies following in-stream blasting to determine the necessary habitat restoration measures.

Access roads associated with the Project would cross three perennial and two intermittent streams that may support fish. However, these access roads are pre-existing and have culverts that are passable by fish; therefore, Tennessee's proposed use of these access roads would not affect fish habitat. No aquatic habitats would be affected by construction or operation of the aboveground facilities.

Water withdrawals from Lower Spectacle Pond in Sandisfield, Massachusetts for hydrostatic testing could affect fisheries by entraining small fish and larvae during withdrawal. However, Tennessee would withdraw water through a screened intake to prevent fish entrainment according to the FERC Procedures. Based on input from MADFW, Lower Spectacle Pond contains various warmwater fish species but does not support federally or state-listed fish species. Two species of special concern, the wood turtle (*Glyptemys insculpta*) and the umber shadow dragon dragonfly (*Neurocordulia obsoleta*), may occur in the vicinity of the pond. However these species would be unlikely to be entrained or impinged by hydrostatic test water withdrawal due to their size and mobility, respectively. Following hydrostatic testing, Tennessee would discharge the used water into well-vegetated upland areas through an energy dissipation device and away from waterbodies and wetlands to prevent erosion, sedimentation, or excessive flow into a waterbody.

To minimize impacts on fisheries and aquatic resources from sedimentation and spills of hazardous materials, Tennessee would follow the FERC Procedures and implement its *SPRP,* which, include the following measures:

- expediting construction and limiting the amount of equipment and activities in waterbodies;
- coordinating construction activities to avoid high flow and spawning periods;
- installing erosion controls to prevent sediment and siltation from entering streams;
- maintaining ambient downstream flow rates; and
- permanently stabilizing stream banks and adjacent upland areas after construction.

As construction timing windows have not yet been confirmed by MADFW, **we recommend that:**

- **<u>Prior to construction</u>, Tennessee should consult with MADFW to determine the construction timing window for both coldwater and warmwater fisheries and file the supporting agency correspondence with the Secretary.**

Based on the minimization and avoidance measures proposed by Tennessee, the temporary nature of impacts on aquatic resources, and our recommendation to complete the consultation with MADFW regarding construction windows, we conclude that impacts on aquatic resources from the Project would be minor.

3.3 Wildlife Resources

Within the proposed Project area, there are several wildlife habitat types that correspond to the vegetative cover discussed in section B.3.1. Habitats include upland forest, open lands (existing rights-of-way, open fields, non-agriculture), agricultural lands, and wetlands (forested, scrub-shrub, and emergent). Upland vegetation types are described in detail in section B.3.1 and wetland vegetation types are described in section B.2.3. Forested upland habitat is primarily comprised of hardwood forests and coniferous forests dominated by oak and hickory species, and pine and hemlock species respectively. These forest types provide food, cover, and nesting habitat for larger mammals such as white-tailed deer (*Odocoileus virginianus*) and black bear (*Ursus americanus*); smaller mammals such as the gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), and raccoon (*Procyon lotor*); amphibians such as spotted salamander (*Ambystoma maculatum*), blue spotted salamander (*Ambystoma laterale*), and wood frog (*Rana sylvatica*); reptiles such as eastern box turtle (*Terrapene carolina carolina*); and various invertebrates such as American bumble bee (*Bombus pennsylvanicus*) and big dipper firefly (*Photinis pyralis*). Predatory species such as raptors and red fox (*Vulpes vulpes*) also are attracted to these forests due to the diversity of prey species.

Open or early successional uplands consist of scrub-shrub areas, open fields, agricultural land, and previously disturbed areas such as maintained rights-of-way. Early successional habitat is primarily comprised of grasses, herbs, and shrubs and, depending on vegetative development, provides food, cover, and nesting habitat for a variety of wildlife species. Species common to early successional uplands include mammals such as eastern cottontail (*Sylvilagus floridanus*), gray squirrel, red fox, Virginia opossum (*Didelphis virginiana*), and raccoon. Edges, where natural habitats lay adjacent to developed or maintained areas, also create habitat for certain species for food and nesting, and allow for travel between other habitats. Species that use edge habitats may include white-tailed deer, coyote (*Canis latrans*), eastern cottontail, and forest edge bird species, such as the American robin (*Turdus migratorius*), brown thrasher (*Toxostoma rufum*), field sparrow (*Spizella pusilla*), and the northern cardinal (*Cardinalis cardinalis*). Although agricultural and developed land do not generally support a multitude of wildlife species, they can provide forage for certain species, such as the white-tailed deer, bobolink (*Dolichonyx oryzivorus*), eastern meadowlark (*Sturnella magna*), and mourning dove (*Zenaida macroura*).

Three different types of wetland habitat occur in the Project area: PFO, PSS, and PEM. Additionally, some wetland habitats are best characterized as a mixture of habitat types (e.g., PEM/PSS, PFO/PSS). Wetland habitat types are described in detail in section B.2.3. PFO wetlands are dominated by hardwoods and provide food, cover, and habitat for mammals such as raccoon, beaver (*Castor canadensis*), and white-tailed deer; reptiles and amphibians, such as eastern garter snake (*Thamnophis sirtalis*), red-backed salamander (*Plethodon cinereus*), and wood frog; and birds such as great blue heron (*Ardea herodias*) and wood duck (*Aix sponsa*). Scrub-shrub wetlands supply an abundance of food and cover resources for mammals, reptiles, amphibians, and birds, including the American toad (*Bufo americanus*), black bear, muskrat (*Ondatra zibethicus*), and gray catbird (*Dumetella carolinensis*). Many PEM wetlands are dominated by reed canary grass, which is not generally considered to provide habitat for many species; however, other common herbaceous plants in the emergent wetlands encountered along the Project alignment provide habitat for species such as wading birds, ducks, and other aquatic species. Wildlife species use these areas for nesting, feeding, and migratory stopovers. Species commonly found in PEM wetlands include muskrat, great blue heron, and red-winged blackbird (*Agelaius phoeniceus*).

Managed and Sensitive Wildlife Areas

The USFWS, National Park Service, New York Natural Heritage Program, Massachusetts Natural Heritage Program, and CTNDDB were consulted to identify managed or sensitive wildlife habitats in the vicinity of the proposed Project. Agency consultation and review of GIS databases identified two State Forests in Massachusetts that would either be crossed by or within 0.25 mile of the Project, and a Connecticut Critical Habitat that would be within 0.25 mile of the Project.

Otis State Forest would be crossed by the Massachusetts Loop from MPs 0.0 to 0.3 and MPs 0.6 to 2.3. Sandisfield State Forest is within 0.25 mile of MP 3.8 of the proposed Massachusetts Loop. Both State Forests are managed for conservation and recreation and are discussed in section B.5.3.

Sand barrens are classified as Connecticut Critical Habitat, which are identified as rare and specialized wildlife habitats important to the Connecticut Comprehensive Wildlife Conservation Strategy (CTDEEP, 2014b). Although not directly managed by the State of Connecticut, these habitats are recognized as having the greatest conservation need. Sand barrens contain scrub-shrub or grassy vegetation and are maintained by fire. Wildlife species that may be present include raptors, grassland songbirds, several species of turtles and snakes, and several species of bats, including the northern long-eared bat.

Impacts and Mitigation

Construction and operation of the Project would result in various short- and long-term impacts on wildlife. Impacts would vary depending on the specific habitat requirements of the species in the area and the vegetative land cover crossed by the proposed right-of-way (see table B-8). Potential short-term impacts on wildlife include the displacement of individuals from construction areas and adjacent habitats to less suitable habitats, which could cause wildlife to expend energy to find alternate habitats and potentially reduce foraging or breeding success. Small, less-mobile mammals, reptiles, and amphibians could experience direct mortality as they may be unable to leave the construction area or leave quickly enough. Long-term impacts would include conversion of forested or early successional habitats to cleared areas and maintained right-of-way, and periodic disturbance of wildlife during operational maintenance. Altered habitat and periodic disturbance could also increase wildlife mortality, injury, and stress.

With the exception of 0.7 mile of the Connecticut Loop, Tennessee would collocate the proposed routes with existing rights-of-way to minimize disturbance on wildlife habitat. In total, construction of the proposed pipeline loops and associated workspace would affect 52.2 acres of upland forest, 18.1 acres of open land, and 60.5 acres of wetlands. During operation, 16.2 acres of upland forest and 9.3 acres of wetlands within the permanent right-of-way would be maintained in an early successional stage; the 2.5 acres of open land within the permanent right-of-way would not experience a vegetation change. For wetland impacts, refer to table B-6, as wetland impacts were based on a 30-foot-wide maintained right-of-way in forested areas (PFO wetland) and a 10-foot-wide maintained right-of-way in non-forested wetlands (PSS and PEM wetlands).

Fragmentation of forested areas results in changes in vegetation (e.g., invasion of shrubs along the edge) which may curtail movement of species between adjacent forest blocks, increase predation, and decrease reproductive success for some species (Rosenberg et al., 1999). Tennessee has collocated the majority of the Project with existing rights-of-way, which would avoid fragmentation in these areas and has routed the 0.7-mile greenfield portion of the Connecticut Loop within an area that would not cause forest fragmentation. Therefore, no forest fragmentation would occur.

If blasting is required, wildlife close to the blast could be injured or killed; however, the preparation of rock for blasting, such as drilling shot holes and the movement of machinery and people, would likely cause enough disturbance to displace most wildlife from the immediate vicinity prior to the blast. Tennessee would implement measures in its *Blasting Plan* to consult with agencies and provide a qualified biologist to survey the surrounding area for sensitive wildlife species, such as state-listed bird species and the eastern hognose snake, prior to blasting.

Tennessee proposes to use 16 existing access roads and 2 newly constructed access roads during construction of the pipeline facilities. Five permanent access roads, including 4 existing roads and one newly constructed road, would be used for aboveground facility operation. A total of 0.8 acre of forested uplands, 0.5 acre of open uplands, and 0.4 acre of agricultural land would be permanently affected access roads.

Tennessee has proposed pipeline looping routes that would minimize impacts on managed wildlife areas and sensitive lands and habitat types, and would implement impact minimization measures as described in the FERC Plan and Procedures. These measures include:

- minimizing the amount of extra workspace needed;
- not conducting vegetation maintenance over the full width of the permanent right-of-way in wetlands and maintaining a riparian strip;
- restricting maintenance clearing to August 2 through April 14 to avoid impacts on nesting birds;
- stabilizing and revegetating affected lands with seed mixes containing native species, as approved by federal and state agencies; and
- allowing revegetation by natural succession where practicable while still allowing for safe operation and maintenance of the pipelines.

Given the looping nature of the proposed Project and the presence of previously disturbed habitat, many of the wildlife species in the Project area are accustomed to changing habitat conditions and are capable of moving to adjacent areas to find alternative sources of food, water, and shelter until the disturbed habitats become re-established (DeGraaf et al., 1992). In addition to collocating the majority of the proposed Project, Tennessee has minimized the construction of new roads; therefore, impacts on wildlife due to construction or operational use of access roads would be minimal. Although individuals of some wildlife species could be affected, the effects would primarily be temporary and minor.

Based on the extent of collocation with existing rights-of-way, the presence of similar habitats adjacent to and in the vicinity of construction activities, and the implementation of impact avoidance and minimization measures, we conclude that construction and operation of the Project would not have population-level or measurable negative impacts on wildlife.

Migratory Birds

Migratory birds are species that nest in the United States and Canada during the summer and then migrate to and from tropical regions of Mexico, Central and South America, and the Caribbean for the nonbreeding season. Migratory birds are protected under the Migratory Bird Treaty Act (16 U.S. Code 703-711) and bald and golden eagles are additionally protected under the Bald and Golden Eagle Protection Act (16 U.S. Code 668-668d). 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 USFWS.

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

The New York Loop would be within Region 13 (Lower Great Lakes/St. Lawrence Plain) of the North American Bird Conservation Initiative, the Massachusetts Loop would be within Region 14 (Atlantic Northern Forest), and the Connecticut Loop would be within Region 30 (New England/Mid-Atlantic Coast). A variety of migratory birds could potentially occur in the proposed Project area, including Henslow's sparrow (*Ammodramus henslowii*), golden-winged warbler (*Vermivora chrysoptera*), Bicknell's thrush (*Catharus bicknelli*), Canada warbler (*Cardellina canadensis*), red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), white-breasted nuthatch (*Sitta carolinensis*), and a variety of migratory waterfowl. Bald eagles (Haliaeetus leucocephalus) could potentially be present within the Project area and are protected under the Bald and Golden Eagle Protection Act. To ensure that appropriate avoidance and minimization measures would be used for bald eagle nests within the vicinity of the Project area, **we recommend that:**

- **Prior to construction, Tennessee should consult with USFWS New York and New England field offices to determine whether any bald eagle nests are within the vicinity of the Project area, according to the USFWS bald and golden eagle nest database, and file that information with the Secretary.**

The primary concern for migratory birds is mortality of eggs and/or young, as mature birds generally avoid active construction. Tree clearing and ground disturbing activities could cause disturbance during critical breeding and nesting periods, potentially resulting in the loss of nests, eggs or young birds. In addition, forest fragmentation could increase predation, competition, and reduce nesting and mating habitat for migratory and ground-nesting birds (Faaborg et al., 1995). To minimize disturbance during migratory bird critical nesting periods, Tennessee would conduct all tree clearing activities between October 1 and March 31. To minimize impacts on ground-nesting birds during the operational life of the Project, Tennessee would not perform routine vegetation maintenance clearing during the general nesting season between April 15 and August 1, in accordance with the FERC Plan and USFWS guidelines.

Based on the extent of collocation with existing rights-of-way, the presence of similar habitats adjacent to and in the vicinity of construction activities, adherence to USFWS guidelines, and the implementation of impact avoidance and minimization measures, we conclude that construction and operation of the Project would not have population-level or measurable negative impacts on migratory birds.

4. Threatened, Endangered, and Other Special Status Species

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

To comply with the requirements of the ESA, Tennessee, as our non-federal representative, conducted informal consultations with the USFWS New York and New England field offices, NYSDEC, MADFW, and CTNDDB to determine if any federally or state-listed threatened and endangered species (including federal and state species of concern) or their designated critical habitats occur within the Project area. We also entered into formal consultation with USFWS regarding the dwarf wedgemussel by providing a Biological Assessment (BA) on October 6, 2015. The BA provides a summary of potential impacts on the dwarf wedgemussel from construction and operation of the proposed Project and requests USFWS concurrence with our determination of effect, discussed below.

Tennessee also conducted habitat assessment surveys, in coordination with the USFWS, NYSDEC, MADFW, and CTNDDB to identify potential habitats for threatened and endangered species within the proposed Project area. A description of federal- and state-listed species that may occur in the Project area, preferred habitats, and our determinations of effect are provided in appendix G. Tennessee is continuing to consult with the USFWS, NYSDEC, MADFW, and CTNDDB regarding potential impacts on listed species.

Federally listed species with a *no effect* determination and state-listed species with a "not likely to cause a trend toward federal listing" status (see appendix G) are not discussed further unless field surveys were conducted.

4.1 Federally Listed Threatened and Endangered Species

Five federally listed species were identified as potentially occurring in the Project area, including the recently listed northern long-eared bat. Additionally, the New England cottontail rabbit (*Sylvilagus transitionalis*) is a candidate for listing.

Indiana Bat

The federal- and state-listed endangered Indiana bat (*Myotis sodalis*) was identified during consultations with the USFWS as potentially occurring within the vicinity of the proposed Project area. Tennessee has proposed to reduce potential impacts by restricting tree clearing to the late fall and winter months when the bats would be in their hibernacula and not utilizing roosting trees associated with summer habitats. The USFWS New York field office has determined that the tree-clearing timing restrictions proposed by Tennessee would mitigate impacts on this species and surveys would not be required (Rayman, 2014). The USFWS New England field office indicated that if the tree-clearing timing restrictions could not be upheld by Tennessee, then further consultation would be required (Chapman, 2014b). Therefore, we conclude that the Project *may affect, but would not likely adversely affect* the Indiana bat.

Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) has been listed by the USFWS as threatened under the ESA effective May 4, 2015. The USFWS established an interim rule under the authority of section 4(d) of the Act that provides measures that are necessary and advisable to provide for the conservation of the northern long-eared bat.

The USFWS indicated that the New York Loop, the Connecticut Loop, and the Massachusetts Loop are within the known range of the northern long-eared bat (Chapman, 2014a; Rayman, 2014). The USFWS New England field office recommended conducting tree clearing between October 1 and March 30 to avoid clearing occupied summer roosting habitat, and concluded that meeting this restriction would eliminate the need for surveys or other mitigation (Chapman, 2014b). The USFWS New York field office also stated that conducting tree clearing during winter months would mitigate effects from Project construction (Rayman, 2014). Because Tennessee has committed to winter tree clearing to prevent impacts on bat species, we conclude that the Project *may affect, but would not likely adversely affect* the northern long-eared bat. Tennessee coordinated with USFWS prior to listing of the northern long-eared bat and has since re-engaged in informal consultation with the New England and New York field offices regarding the bat (O'Sullivan, 2014a; O'Sullivan, 2014b). Responses have not yet been received from USFWS. If winter tree clearing cannot be completed for the Project, Tennessee should re-consult with USFWS regarding the northern long-eared bat and potential coverage under the interim 4(d) rule.

New England Cottontail Rabbit

The New England cottontail rabbit is not currently a federally listed species. However, coordination with the USFWS New England field office indicated that it is listed on the 2010 Candidate Notice of Review to determine if the species should be added to the Federal Lists of Endangered and Threatened Wildlife and Plants. The USFWS indicated that the Massachusetts Loop is in an area within Berkshire County, Massachusetts known to be occupied by the New England cottontail rabbit (Chapman, 2014a).

Tennessee conducted surveys for the New England cottontail rabbit along the Massachusetts Loop between January and March 2015 and found no evidence of New England cottontail rabbit populations in the Project area. Preferred habitat for New England cottontail rabbit was also lacking from the Project area. Therefore, we conclude that the Project would have *no effect* on the New England cottontail rabbit.

Bog Turtle

Tennessee completed a Phase I Habitat Assessment survey for the bog turtle (*Glyptemys muhlenbergii*) along the New York Loop on June 5, 2014. No bog turtle habitat was observed and Tennessee has submitted a summary report to the USFWS New York field office. The bog turtle was not identified by the USFWS New England field office as a species of concern for the Massachusetts or Connecticut Loops. Based on survey results, we do not anticipate any impacts on bog turtles as a result of Project activities. Because habitat was not found to be present within the Project area, we conclude that the Project would have *no effect* on the bog turtle.

Mussels

Based on coordination with the USFWS and the CTDEEP and surveys previously completed by Tennessee in June 2014, the federal- and state-listed endangered dwarf wedgemussel is present in the Project area along the Connecticut Loop at the Muddy Brook and Stony Brook crossings at MPs 2.9 and 5.5, respectively. Surveys were conducted in accordance with USFWS guidelines at the proposed crossing locations, including 50 meters upstream of the crossing and 100 meters downstream of the crossing. The surveys resulted in confirmation of 26 live dwarf wedgemussels within the Muddy Brook survey area and 10 live dwarf wedgemussels within the Stony Brook survey area. To minimize impacts on this species, Tennessee has proposed a mussel survey and relocation plan to at the two waterbody crossings. As the relocation plan would require handling of individuals and Tennessee cannot guarantee all individuals would be recovered and relocated, FERC initiated formal consultation with the USFWS

New England field office on October 6, 2015 to determine appropriate impact minimization and mitigation measures for the dwarf wedgemussel. The BA submitted by FERC to the USFWS can be found in appendix I. While individual mortality may occur during mussel relocation and construction of the crossings, the individual losses would not likely negatively affect the species as a whole. Given the potential for direct impacts, we conclude the Project *may affect, and is likely to adversely affect,* the dwarf wedgemussel. However, based on survey results from Tennessee and previous surveys conducted in the area, we believe that population-level impacts would not occur due to construction and operation of the proposed Project. If the Project is authorized by the Commission, Tennessee would not be allowed to commence construction until they have received all necessary federal authorizations applicable to the approved facilities. Therefore, a Biological Opinion from the USFWS must be obtained to complete the ESA consultation process prior to construction along the Connecticut Loop at the Muddy Brook and Stony Brook crossings.

Karner Blue Butterfly

The New York Loop is within the range of the federal-and state-listed endangered Karner blue butterfly (*Lycaeides mellisa samuelis*) (USFWS, 2013a). The New York Loop does not cross any of the identified Karner blue butterfly recovery areas (USFWS, 2003), and field surveys did not identify any areas of wild lupine, the primary plant species used by the butterfly, growing in or around the Project area. In an email dated May 16, 2015, the USFWS New York field office concurred that the Project would not affect this species and would not require further action related to the Karner blue butterfly (Rayman, 2014). We agree that the Project would have *no effect* on the Karner blue butterfly.

To complete the required ESA consultations for Project, the FERC requires concurrence with our determinations of effect for the Indiana bat and the northern long-eared bat. Furthermore, formal consultation is not complete for the dwarf wedgemussel. Therefore, **we recommend that:**

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

4.2 State-Listed Threatened, Endangered, and Special Status Species

No state-listed rare, threatened, or endangered species were identified in New York through coordination with NYSDEC.

In Massachusetts, rare species are protected under the Massachusetts Endangered Species Act (321 CMR 10.00, amended 2010). The Massachusetts Natural Heritage and Endangered Species Program identified two state-listed endangered species and two species of special concern associated with the pipeyard in Tyringham, Massachusetts and Lower Spectacle Pond in Sandisfield, Massachusetts where water would be withdrawn for hydrostatic testing of the pipeline (French, 2014). The sedge wren and American bittern are listed as endangered and the wood turtle and the umber shadowdragon are listed as species of special concern. Tennessee would utilize construction matting and exclusion fencing at the Tyringham pipeyard to discourage use of the pipeyard by these species. At Lower Spectacle Pond, Tennessee would screen its hydrostatic water intakes to prevent entrainment of aquatic species. Therefore, we conclude the Project would not likely cause a trend toward federal listing of these species.

The CTNDDB identified four state-listed plant species as potentially occurring in the vicinity of the proposed Project (CTDEEP, 2014b). These include Bush's sedge (*Carex bushii*), squarrose sedge (*Carex squarrosa*), low frost weed (*Helianthemum propinquum*), and New England grape (*Vitis x novae-angliae*. Based on surveys conducted by Tennessee, nine populations of squarrose sedge were found within the vicinity of the proposed Project. Two populations squarrose sedge would be within the proposed construction workspace, but no specimens of Bush's sedge, low frostweed, or New England grape were identified. No state-listed rare, threatened, and endangered plant species were reported within the Project area (Davis-Ricci, 2013; French, 2013a, 2013b; CTDEEP, 2014b).

Based on initial coordination with the CTNDDB, 23 state-listed animal species, including 3 reptiles, 10 birds, and 10 invertebrates, were identified as potentially occurring within the Project area. Tennessee has committed to providing construction monitoring during the appropriate seasonal windows to identify and mitigate potential negative impacts on these species. The CTNDDB determined that surveys would not be required for these species; however, the details of the construction monitoring for these species would be developed in consultation with CTNDDB.

As consultation and coordination with the Massachusetts Natural Heritage and Endangered Species Program and CTNDDB regarding state-listed threatened and endangered species that may be present in the Project area is ongoing, **we recommend that:**

- **<u>Prior to construction</u>, Tennessee should complete the following and file with the Secretary:**
  - **a. a construction monitoring plan for the 23 Connecticut state-listed species, approved by CTNDDB; and**
  - **b. avoidance, minimization, and/or mitigation measures for the two squarrose sedge populations within the workspace.**

5. Land Use, Recreation, and Visual Resources

5.1 Land Use

Construction of the Project would impact land use along the pipeline route and the Compressor Station 261 site as described below. Land use types affected by the Project include agricultural, upland forest, open, wetlands, open water, developed, and residential.

The Project would affect a total of about 216.2 acres of land during construction, including the pipeline construction right-of-way, ATWS areas, contractor/pipeyards, access roads, and new aboveground facilities. Following construction, about 163.4 acres would be restored to pre-construction uses. The remaining 52.8 acres would be maintained for operation of the proposed Project. Appendix H summarizes the acreage of each land use that would be affected during construction and operation of the Project.

Agricultural Land

The proposed Project would cross agricultural land used for crop production (hay, corn, and tobacco) and pasture land. About 2.3 miles (17 percent) of the proposed Project route crosses agricultural land. About 65.3 acres of agricultural lands would be affected by construction and about 8.4 acres would be maintained after construction for operation of the Project as presented in appendix H. The remaining 56.9 acres would be allowed to revert to agricultural use. Prime farmland soils affected by construction of the pipeline loops are discussed in section B.1.2.

Tennessee would minimize adverse impacts on agricultural land by implementing the measures found in the FERC Plan and Procedures and, for the Project facilities in New York, the guidance provided in the NYSDAM *Pipeline Right-of-Way Construction Projects Agricultural Mitigation, through the Stages of Planning, Construction/Restoration and Follow-up Monitoring* document. For Project facilities in Massachusetts, Tennessee consulted with the Massachusetts Department of Agricultural Resources. For Project facilities in Connecticut, Tennessee consulted with the Connecticut Department of Agriculture. The Connecticut Department of Agriculture did not provide specific state-wide guidelines for farmland restoration, but requested that Tennessee minimize impacts on state-preserved farmlands by separating topsoil from subsoil and restoring areas to original condition to the extent possible (Dippel, 2014). Tennessee has committed to these measures to minimize impacts on state-preserved farmlands. In accordance with the FERC Plan, Tennessee would segregate up to 12 inches of topsoil in deep soil and make every effort to segregate the entire topsoil layer in soils with less than 12 inches of topsoil. At the time of filing of this EA, the Massachusetts Department of Agricultural Resources had not requested any specific state-wide guidelines.

Tennessee would work with applicable agencies and landowners in these areas to ensure that proper restoration of any impacted agricultural area occurs including replacement of segregated topsoil, stone removal, and compliance with reseeding recommendations and landowner requirements. Tennessee would protect active pasture land during construction through the installation of temporary fencing, the use of alternative locations for livestock to cross the construction corridor, and/or developing grazing deferment plans, as negotiated with the landowner. Within agricultural lands crossed by the Project, Tennessee would negotiate reimbursements to landowners/producers of products for any damages or loss to their product as a result of construction. Crops found in the Project area include hay and corn along the New York Loop; hay along the Massachusetts Loop; and hay, corn, and tobacco along the Connecticut Loop. The proposed Project would not affect any areas containing specialty crops or organic farms. Tennessee would continue to identify drainage systems through landowner discussions and would work with landowners to avoid these features where possible. Tennessee would minimize impacts by segregating topsoil and restoring agricultural lands, including Farmlands of Statewide Importance, as described below.

Tennessee has identified these measures to mitigate impacts on agricultural resources:

- retaining AIs on the New York Loop for each phase of the Project, including construction, initial restoration, post-construction monitoring, and follow-up restoration;
- preparing a Grazing Deferment Plan with landowners;
- installing construction entrances at paved road crossings in agricultural areas, with stone placed on top of geotextile fabric to facilitate removal of the stone during final restoration;
- providing open trench fencing and crossings, where requested;
- repairing any affected subsurface drains;
- segregating and stockpiling topsoil on cultivated lands;
- removing all stone and rock material from around the pipeline and within the upper 12 inches;
- performing subsoil decompaction and subsoil shattering;
- conducting monitoring and remediation for a period of no less than 2 years immediately following the in-service date for the pipeline or the completion of initial right-of-way restoration, whichever occurs last;

- conducting general monitoring and remediation measures to address topsoil thickness, rock content, trench settling, crop production, drainage, repair of fences, among others.;
- conducting specific monitoring and restoration measures to include compaction testing and remedial action, where necessary, and control of soil saturations and seeps; and
- protecting the functionality of drain tile and irrigation systems during construction and, if any damage occurred during construction of the Project, the systems would be repaired and restored to their original condition.

Following construction, and in accordance with terms of landowner easement agreements, crops would be visually inspected and revegetation would be considered successful when crop growth and yield are similar to adjacent undisturbed portions of the same field, construction debris has been removed (unless requested otherwise by the landowner or land managing agency), and proper drainage for agricultural land has been restored. Monitoring would be performed by the AI for no less than two growing seasons following the completion of initial restoration, or extended until restoration is deemed successful by the AI and FERC. AI monitoring would include an assessment of plant populations, general appearance, and yields appropriate to the crops being monitored. Tennessee would continue to monitor and correct problems with topsoil replacement, soil-profile compaction, rocks, drainage, and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is determined successful.

Forest Land

About 3.4 miles (25 percent) of the proposed Project route is upland forest land that primarily consists of northern hardwoods and mixed oak forests. About 52.3 acres of forest land would be affected by the Project, of which about 36.1 acres would be cleared for temporary use during construction. The remaining 16.2 acres would be converted to open and developed land, including 15.4 acres that would be maintained as permanent right-of-way and 0.8 acre that would be permanently converted to developed land for access roads.

Tennessee would locate the proposed pipeline loops within or adjacent to the existing cleared rights-of-way to the extent practicable to minimize impacts on upland forest land. Construction in upland forest areas would require the removal of trees to prepare the construction corridor and workspace. After construction, trees and shrubs would be allowed to grow within the temporary construction right-of-way and ATWS. Tennessee would work with individual landowners to develop replanting plans as part of easement negotiations. Although temporary, impacts on upland forest lands would be long-term but not significant, as it would take 20 years or more for mature trees to re-establish. Visual impacts from forest clearing are discussed in section B.5.4.

Open Land

About 1.0 mile (7.5 percent) of the proposed pipeline loops is open land primarily consisting of upland that is actively maintained in scrub-shrub and herbaceous vegetation and is mainly associated with existing rights-of-way and pasture. About 18.1 acres of open land would be affected by the Project, of which about 2.0 acres would be maintained as permanent right-of-way and about 0.4 acre would be maintained as permanent access roads. Areas within the temporary construction right-of-way as well as the permanent right-of-way would be allowed to revert to original condition after construction and remain open land; however, about 0.4 acre of open land maintained as permanent access road would be permanently converted to developed land. As such, impacts on open land would be predominantly short term and minor.

Wetlands

About 6.3 miles (46.8 percent) of the proposed Project are wetlands consisting of forested (i.e., PFO) and non-forested wetlands (i.e., PEM, PSS). Based on the extent of the proposed permanent right-of-way, about 61.6 acres of wetlands would be affected by the Project, of which about 23.8 acres would be maintained as permanent right-of-way (23.7 acres) and associated access roads (0.1 acre). Wetlands associated with access roads are discussed in section B.2.3 and additional information was requested from Tennessee regarding these impacts.

After construction, Tennessee would maintain the permanent right-of-way to facilitate inspection and operation of the Project. In accordance with the FERC Plan and Procedures, wetland vegetation would be maintained in an herbaceous state within a 10-foot-wide corridor through PEM and PSS wetlands, and trees that are within 15 feet of the pipeline loops (i.e., within a 30-foot-wide corridor centered over the pipeline) with roots that could damage the pipeline may be selectively cut and removed from the permanent right-of-way during routine maintenance. Therefore, the Project would result in permanent conversion of PFO wetlands to PSS or PEM wetlands within a limited area of the permanent right-of-way as well as permanent conversion of wetlands to developed land within a limited area maintained as access road. Operation of the Project would result in the permanent conversion of 9.0 acres of PFO and 0.3 acre of PSS wetlands. Additional information on wetland impacts, mitigation, and restoration is provided in section B.2.3.

Open Water

Less than 0.1 mile (0.4 percent) of the proposed pipeline loops would cross open waterbodies, characterized as waterbodies less than 100 feet wide. About 0.6 acre of open water would be affected by the Project. Section B.2.2 discusses the impacts and mitigation associated with waterbody crossings.

Developed Land

About 0.3 mile (2.4 percent) of the proposed Project route would cross developed land identified as roadways (federal, state, and local) and commercial properties. About 16.8 acres of developed land would be affected by the Project, of which about 1.5 acres would be maintained as permanent right-of-way (1.4 acres) and aboveground facilities (0.1 acre).

A total of 17 public roadways, ranging from paved town roads to state highways would be crossed by the Project. The Project would have minimal impacts on roadways, as most would be crossed by conventional subsurface boring methods. Tennessee identified three roadways that would be crossed by the open-cut method. One new permanent access road would permanently affect a wetland; additional information on these impacts and our recommendation can be found in section B.2.3. Additional information on transportation impacts is provided in section B.6.2.

Three commercial buildings are within 50 feet of the proposed construction work areas, as shown in table B-9. All three buildings are along the Connecticut Loop. Tennessee would minimize impacts on commercial land by timing construction to avoid peak use periods, maintaining access to businesses at all times, and expediting construction in these areas. Tennessee would coordinate directly with affected commercial landowners on an individual basis to further reduce potential adverse impacts. Affected commercial land would be returned to original conditions and uses after construction; therefore, impacts would be temporary and minor.

Table B-9				
Buildings within 50 Feet of Construction Work Areas				
Facility	**Building Type**	**Milepost**	**Distance to Workspace (feet)**	**Direction to Workspace**
Connecticut Loop	Commercial	0.7	1	South
	Residence	0.8	30	South
	Residence	0.8	29	North
	Residence	0.9	14	Southeast
	Commercial	8.0	18	Southeast
	Commercial	8.2	32	South

If blasting is required near structures, Tennessee would conduct blasting in accordance with its *Blasting Plan* to prevent damage to above and below ground structures. Tennessee would use an independent contractor to inspect structures prior to blasting within approximately 200 feet of the construction work area. During blasting, Tennessee would monitor ground vibrations at the nearest structure within 200 feet of the construction work area. Post-blast inspections would also be performed as necessary.

Residential Land

About 0.1 mile (1.0 percent) of the proposed Project route would cross active residential land. About 1.5 acres of residential land would be affected by the Project, of which about 0.5 acre would be maintained as permanent right-of-way. Three residences would be within 50 feet of the construction work areas, including one residence within 25 feet, as shown in table B-9. All three residences would be along the Connecticut Loop.

To minimize potential disruptions on residential areas near construction work areas, Tennessee would coordinate construction work schedules with affected landowners prior to construction. In addition, Tennessee would work to ensure construction activities progress in a timely manner to minimize the residence exposure to noise, dust, and the general presence of construction activities. Tennessee would maintain emergency vehicle access to residences by using temporary travel lanes or steel plate bridges over open trenches. To further minimize impacts on residential areas within the vicinity of construction work areas, Tennessee would:

- preserve mature trees and landscaping where practicable;
- maintain a minimum of 25 feet between the residence and construction work area for a distance of 100 feet on either side of the residence;
- install temporary safety fencing for a distance of 100 feet on either side of the residence to control access and keep equipment or materials such as spoil piles within the construction workspace;
- install pipe as quickly as reasonably possible;
- backfill trenches as soon as pipe is laid or use steel plates or timber mats to cover the open trench; and
- restore all lawn areas, landscaping, and disturbed areas according to the FERC Plan and Procedures and terms of individual easement agreements.

Tennessee developed site-specific construction plans for the three affected residences within 50 feet of proposed construction work areas, which are provided in appendix D. We have reviewed the plans and find them acceptable; however, we encourage the owners of each of these residences to review the plans and provide us with comments on the plan for their individual property.

In general, as the distance from the construction work area increases, the impacts on residences decrease. In residential areas, the greatest impacts associated with construction and operation of a pipeline would be temporary disturbances during construction and restrictions preventing construction of permanent structures within the permanent right-of-way during operation. Temporary construction impacts on residential areas could also include inconvenience caused by noise and dust generated by construction equipment, personnel, and trenching of roads or driveways; traffic congestion; ground disturbance of lawns; removal of trees, landscaped shrubs, or other vegetative screening between residences and/or adjacent rights-of-way; potential damage to existing septic systems or wells and other utilities; and removal of aboveground structures such as fences, sheds, or trailers from within the right-of-way.

In accordance with the FERC Plan, Tennessee would begin cleanup operations immediately following backfill, and would complete final grading, topsoil replacement, and installation of permanent erosion control structures within 10 days after backfilling the trench. Tennessee would be responsible for ensuring successful revegetation of soils disturbed by Project-related activities and restoring turf, ornamental shrubs, and specialized landscaping in accordance with the landowner's request, or compensating the landowner. Restoration work would be performed by personnel familiar with local horticultural and turf establishment practices.

Tennessee has not provided details of how it would handle landowner complaints during construction of the Project. Therefore, **we recommend that:**

- **Tennessee should develop and implement an environmental complaint resolution procedure. The procedure should 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 rights-of-way. Prior to construction, Tennessee should mail the complaint procedures to each landowner whose property would be crossed by the Project.**

  a. In its letter to affected landowners, Tennessee 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 Tennessee'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 Tennessee's Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

b. **In addition, Tennessee should include in its bi-weekly status report a copy of a table that contains the following information for each problem/concern:**

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

(2) **the location by MP 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.**

Given the measures outlined above, in conjunction with the site-specific plans and our recommendation, overall impacts on residences from construction of the Project would generally be short-term. Depending on the specific vegetation impacted and its ability to be restored to pre-construction conditions, some residences would experience long-term impacts associated with the visual changes in the landscape. Compensation would be negotiated between individual landowners and Tennessee during the easement process.

5.2 Planned Development

We identified no planned residential, industrial, or commercial developments within 0.25 mile of the Project. Further, the Project would not cross any areas identified as growth areas and/or planned road or bridge projects.

5.3 Public Land, Recreation, and Special Interest Areas

The Project would cross the Hudson River Valley Natural Heritage Area in New York; the Otis State Forest in Massachusetts; Sullivan Field in Connecticut; and a Capitol Region Council of Governments Priority Conservation Area in Connecticut.

Between approximate MPs 2.7 and 4.1 of the New York Loop, the Project would cross about 1.4 miles of the Hudson River Valley Natural Heritage Area. Construction of the Project would affect about 27.4 acres of the Natural Heritage Area, of which 3.6 acres would be affected by operation of the Project. The Hudson Valley Natural Heritage Area was designated by Congress in 1996 and stretches from New York City to Albany. The Hudson River Valley Greenway manages a network of Heritage Sites that have been established within the Natural Heritage Area to interpret the story of the entire region. These Heritage Sites are located through the Natural Heritage Area and are interspersed by cities, towns, and other developed areas. Although, the Project would cross about 1.4 miles of the Hudson River Valley Natural Heritage Area, it is not within the vicinity of a designated Heritage Site. In addition, the proposed Project would affect a very small portion of the Natural Heritage Area as a whole; therefore, impacts on the Natural Heritage Area would be minor.

The Project would cross a total of about 2.0 miles of Otis State Forest between MPs 0.0 and 0.3 and between MPs 0.6 and 2.3 of the Massachusetts Loop. We received several comments regarding the proposed crossing of lands protected under Article 97 of the Massachusetts State Constitution, which Otis State Forest is protected by. This Article provides that lands or easements acquired for conservation purposes shall not be used or disposed of for other purposes without the approval of two-thirds of the Massachusetts legislature. Article 97 was intended to be a legislative check to ensure that lands acquired for conservation purposes were not converted to other inconsistent uses. Tennessee provided information for the legislation with its application to the MAEEA in April 2015; a bill was subsequently introduced to the Massachusetts legislature in July 2015 to request an Article 97 easement through Otis State Forest (MASS Live, 2015).

In accordance with the Massachusetts Environmental Policy Act (MEPA), Tennessee submitted a Draft Environmental Impact Report (EIR) to the MAEEA Office on September 29, 2014, and the public comment period for the Draft EIR closed on November 8, 2014 (MAEEA Number 15205). Tennessee submitted the Final EIR to the MAEEA Office on February 27, 2015. The MEPA process provided Tennessee, interested parties, and each state and local permitting agency an opportunity to review and comment on the proposed Project and facilitated coordination of all environmental and development review and permitting processes of the Commonwealth of Massachusetts. The MAEEA Office issued a Certificate on the Final EIR on April 17, 2015 stating that it adequately and properly complies with MEPA and its implementing regulations. Alternatives considered for this area are discussed in section C.4.2.

Construction of the Project would affect about 28.8 acres of the state forest, of which 6.0 acres would be affected by operation of the Project. Otis State Forest was established in 1923 and is owned and operated by the MADCR. The forest comprises over 3,800 acres with numerous multi-use trails for hiking, snowmobiling, and snowshoeing; the historic Knox Trail; and areas for hunting and fishing.

Tennessee has proposed compensatory mitigation with the USACE for the permanent forested wetland impacts on Otis State Forest, and provided the draft compensatory mitigation plan to USACE in July, 2014, and MADEP in March, 2015, for consideration. The compensatory mitigation plan was provided to the FERC in November, 2014, and is available for viewing on our website (eLibrary under Docket No. CP14-529-000). Tennessee has committed to work with MADCR staff during the permitting and construction phases of the proposed Project to further reduce impacts and avoid certain features, as much as possible. At the time of the filing of this EA, Tennessee had reduced construction impacts by about 2.1 acres by modifying temporary workspaces. Tennessee, in collaboration with MADCR has developed a compensation plan for temporary and permanent impacts on Otis State Forest, which includes:

- compensation for the new permanent easement, as determined by the Commonwealth of Massachusetts Division of Capital Asset Management;
- compensation for temporary workspace;
- compensation for permanent impacts on Otis State Forest land resulting from expanding the existing right-of-way;
- forest products to be delivered to a MADCR designated location for MADCR use, sale, and management; and
- other mitigation in compliance with MADCR permitting conditions (e.g., gated access roads, all-terrain vehicle control, invasive species control and monitoring, wetlands replication, and monitoring).

While vegetation would need to be cleared within the construction right-of-way, Tennessee would locate the proposed pipeline loop within or adjacent to the existing cleared rights-of-way to the extent practicable to minimize impacts on the state forest. After construction, temporary workspaces would generally be returned to pre-construction conditions in accordance with the FERC Plan and Procedures. With these measures and implementation of the proposed mitigation, impacts would be minor.

Between MPs 3.8 and 3.9 of the Connecticut Loop, the Project would cross Sullivan Field in Suffield, Connecticut. Sullivan Field is a municipal-owned recreation area with several multi-use fields used for lacrosse and soccer. There would be no limits to the daily use of Sullivan field in the fall of 2016, since construction related activities and restoration work would have concluded before the fall season. Tennessee has committed to work closely with the Town of Suffield on any ongoing maintenance activities that might occur near the field. While vegetation would need to be cleared within the construction right-of-way, Tennessee would locate the proposed pipeline loop within or adjacent to the existing cleared rights-of-way to the extent practicable to minimize impacts on Sullivan Field. After construction, temporary workspaces would be returned to pre-construction conditions in accordance with the FERC Plan and Procedures.

Between MPs 6.8 to 7.3 of the Connecticut Loop, the Project would cross a Capitol Region Council of Governments Priority Conservation Area. Priority Conservation Areas include those forested wetlands or wetland areas, at least 500 feet from development that are not currently protected and have at least one of the following features: contain potential rare or threatened species, potential habitat area, aquifer protection area, or prime farmland soil; or abut protected lands (CRCOG, 2014). The Bradley Airport is located within this Priority Conservation Area and encompasses well-documented and regionally significant natural communities situated within the sandplain and glacial lake plain ecoregions. The area includes property owned by the airport and is a contiguous large tract of unfragmented land extending into the Town of Suffield. This large tract features a high density of small vernal pools supporting a forest amphibian community including spotted salamanders and wood frogs. The proposed Project is collocated with Tennessee's existing right-of-way through this area; therefore, fragmentation of the Priority Conservation Area would not occur. While two vernal pools would be affected during both construction and operation of the proposed Project in this area, both are within PEM wetlands. A large number of vernal pools are present within the larger forested tract of the Priority Conservation Area that would not be affected. Based on this information and our recommendation discussed in section B.2.3, we conclude impacts on the Priority Conservation Area would be minor.

The Project would be within 0.25 mile of the Erie Canalway National Heritage Corridor in New York; the Sandisfield State Forest in Sandisfield, Massachusetts; Airways Golf Course in Connecticut; and Crest View Country Club in Agawam, Massachusetts. However, because the Project does not directly cross these public and/or recreation lands, no impacts are anticipated on these lands from the Project.

The Project would not cross, nor would it be within 0.25 mile of any national park, national forest, wetland reserve program land, registered natural landmarks, national recreation trails, National Park Service wilderness areas, or urban parks and recreation recovery areas. There are no national wild and scenic rivers, national scenic and historic trails, and no national or state scenic byways crossed by the Project.

5.4 Visual Resources

The Project could alter existing visual resources in three ways: (1) construction activity and equipment may temporarily alter the viewshed; (2) lingering impacts along the right-of-way from clearing during construction could alter existing vegetation patterns; and (3) aboveground facilities would represent permanent alterations to the viewshed. The significance of these visual impacts primarily would depend on the quality of the viewshed, the degree of alteration of that view, the sensitivity or concern of potential viewers, and the perspective of the viewer.

The majority of land traversed by the proposed Project route consists of non-forested wetlands (28 percent), forested upland (25 percent), and forested wetlands (18 percent). The Project would be in proximity to three residences and three commercial buildings. It would cross through Otis State Forest in Massachusetts and includes improvements to a temporary access road near Lower Spectacle Pond noted by the Berkshire Planning Commission as a scenic waterbody. Some areas along the proposed pipeline routes are either inaccessible or do not provide long-range unobstructed views, but public viewpoints are present along some of the roadways in the area. The Project would not cross national wild and scenic rivers, national scenic byways, national wildlife refuges, national monuments, or wilderness study areas.

Impacts would be greatest during construction because of the increased workspaces needed for construction, the displaced soil, and the presence of personnel and equipment. While vegetation would need to be cleared within the construction right-of-way, Tennessee would locate the proposed pipeline loops within or adjacent to the existing cleared right-of-way to the extent practicable, which would minimize impacts on the viewshed from the Project. After construction, temporary workspaces would be restored according to the FERC Plan and Procedures. In areas where permanent impacts would occur due to tree clearing, Tennessee would coordinate its planting program with the NRCS and applicable state agencies (NYSDEC, MADEP, or CTDEEP) to develop site-specific visual impact mitigation plans if necessary. Physical and visual obstructions to the viewshed during construction would primarily be temporary with the exception of the permanent conversion of forest land to open land within the permanent right-of-way. After construction, trees and shrubs would be allowed to grow within the temporary construction right-of-way and other temporary workspaces. Although temporary, impacts from forest clearing on the viewshed would be long-term as it could take 20 years or more for mature trees to re-establish.

Visual impacts on Otis State Forest and the viewshed from Cold Spring Road would occur due to the widening of the existing cleared rights-of-way and would be permanent. Impacts on Lower Spectacle Pond and its viewshed would occur due to improvement of the existing temporary access road; however, these impacts would be temporary during construction. Tennessee would implement the restoration and revegetation measures described in the FERC Plan and Procedures. Following construction, disturbed areas would be seeded in accordance with written recommendations for seed mixes, rates, and dates obtained from MADCR. In accordance with the FERC Plan, Tennessee would monitor disturbed areas to determine the post-construction revegetation success for a minimum of two growing seasons, or until revegetation is successful.

The pig receiver site at MP 4.1 on the New York Loop could be viewed by a nearby residence about 800 to 900 feet away. Tennessee has committed to work with the existing landowner on a screening plan to mitigate the visual impacts of the receiver site. Tennessee would work with the landowner to provide suitable plantings around the fenced enclosure that would not interfere with the landowner's agricultural activities near the site. As these agreements are not yet confirmed, **we recommend that:**

- **<u>Prior to construction</u>, Tennessee should file with the Secretary a plan to minimize visual impacts from the pig receiver site at MP 4.1 on the New York Loop. This plan should be developed in consultation with the nearby landowner and filed for review and written approval by the Director of OEP.**

Based on Tennessee's plan to collocate the majority of the proposed Project with existing rights-of-way, minimal new aboveground facilities, and our recommendation, we anticipate visual impacts would be temporary for the majority of the Project and minimal.

6. Socioeconomics

6.1 Population, Economy, and Employment

Construction and operation of the Project could impact socioeconomic resources in the area. Some of these potential effects are related to the number of construction workers that would work on the Project and their impact on population, public services, and temporary housing during construction. Other potential effects are related to construction, such as increased traffic or disruption of normal traffic patterns. Beneficial effects associated with the Project include increased property tax revenue, increased job opportunities, and increased income associated with local construction employment.

The Project would primarily impact four counties in three states: Albany County in New York, Berkshire and Hampden Counties in Massachusetts, and Hartford County in Connecticut. Table B-10 provides a summary of selected demographic and socioeconomic conditions for affected communities in the Project area.

Construction of the Project would temporarily increase the population in the general Project area. Pending Commission approval, Tennessee plans to begin construction activities in the fourth quarter of 2015 with winter tree clearing and would continue through March 2016. The peak months for construction would be between May and October of 2016. Tennessee proposes to place the Project facilities in service by November 2016.

Tennessee estimates that one construction spread would be required for each of the three loop segments, for a total of three construction spreads. Construction of the New York Loop would require about 100 workers for a period of about 10 weeks in May through mid-June 2016, with a residual workforce of about 20 workers performing restoration from mid-June through August 2016. Construction of the Massachusetts Loop would require about 250 workers from May through October 2016. A crew of about 40 workers would perform restoration of the right-of-way through the end of November 2016. Construction of the Connecticut Loop, including about 580 feet of pipeline in Massachusetts originating at Compressor Station 261, as well as modifications to Compressor Station 261, would begin in May 2016 and extend until mid-October 2016. Construction of the Connecticut Loop would require about 250 workers during the first 5 months of construction and decrease to a smaller workforce of about 30 workers for restoration through the end of November 2016.

The construction workforce would include both local and non-local workers, of which about 70 percent would be local. Tennessee, through its construction contractors and subcontractors, may hire local construction workers that possess the required skills and experience. The total population change would equal the total number of nonlocal construction workers plus any family members accompanying them. Given the brief construction period, most non-local workers would not be expected to be accompanied by their families. Based on the populations of the counties within the Project area, the additional people that might temporarily relocate to the area would not result in a significant change in population. Additionally, this temporary increase in population would be distributed throughout the Project area and would not have a permanent impact on the population. A brief decrease in the unemployment rate could occur as a result of hiring local workers for construction and increased demands on the local economy.

Tennessee personnel who currently operate existing facilities would operate the new and modified facilities. No additional permanent workers would be required; therefore, the Project would not have a permanent impact on population in the Project area.

Table B-10

Existing Economic Conditions in the Vicinity of the Project

Facility County/State	Population (2010) [a]	Population Density (persons/square mile, 2010) [a]	Per Capita Income (2012) [a]	Civilian Labor Force (2012) [a]	Population Employed in Construction [a]	Unemployment Rate (percent) August 2013 [b c d]	Top Three Industries [a]
New York Loop							
State of New York	19,378,102	411.2	$32,382	9,984,364	506,514	7.7	• Educational, health, and social services • Professional, scientific, management, administrative, and waste management services • Retail trade
Albany, NY	304,204	581.9	$31,924	164,995	7,436	6.3	• Educational, health and social services • Public administration • Retail trade
Massachusetts Loop							
State of Massachusetts	6,547,629	839.4	$35,763	3,631,277	176,818	7.1	• Educational, health, and social services • Professional, scientific, management, administrative, and waste management services • Retail trade
Berkshire, MA	131,219	141.6	$28,939	68,442	4,081	7.1	• Educational, health, and social services • Retail trade • Arts, entertainment, recreation, accommodation, and food services

Table B-10

Existing Economic Conditions in the Vicinity of the Project

Facility County/State	Population (2010) [a]	Population Density (persons/square mile, 2010) [a]	Per Capita Income (2012) [a]	Civilian Labor Force (2012) [a]	Population Employed in Construction [a]	Unemployment Rate (percent) August 2013 [b c d]	Top Three Industries [a]
Connecticut Loop							
State of Connecticut	3,574,097	738.1	$37,892	1,950,121	99,444	7.4	• Educational, health, and social services • Professional, scientific, management, administrative, and waste management services • Manufacturing
Hampden, MA	463,490	751.0	$25,646	229,519	9,682	8.9	• Educational, health, and social services • Manufacturing • Retail trade
Hartford, CT	894,014	1,216.2	$34,356	482,935	20,531	8.1	• Educational, health, and social services • Finance, insurance, real estate, rental, and leasing services • Manufacturing

[a] Source: U.S. Census Bureau, 2010 and U.S. Census Bureau, 2013
[b] Source: New York Department of Labor, 2015
[c] Source: Massachusetts Labor and Workforce Development, 2015
[d] Source: Connecticut Department of Labor, 2015

6.2 Transportation

The Project would cross a total of 17 public roads. Construction of the Project could result in minor, temporary impacts along some roads due to construction within the roadway and movement of heavy equipment and personnel. Of the 17 public roads that would be crossed by the Project, 3 would be open cut, and 14 would be bored. Tennessee would obtain road crossing permits from applicable state and local agencies. Permit conditions would dictate the day-to-day construction activities at road crossings. For the three roads that would be open cut, the roadway would not be available for use to the public or landowners during active construction. To reduce traffic delays, Tennessee would establish detours before open cutting roads. If no reasonable detours are feasible, at least one traffic lane of the road would be left open, except for brief periods when road closure would be required to lay the pipeline. Tennessee would set up appropriate traffic management and signage, and develop necessary safety measures in compliance with applicable permits for work in the public roadway. Tennessee would make arrangements with local officials to have traffic safety personnel present during periods of construction.

The movement of construction equipment and materials to and from the construction areas may have minor impacts on the transportation system. Tennessee has identified 7 contractor/pipeyards where construction equipment and/or pipe would be staged and then transported to the construction right-of-way. Several construction-related trips would be made each day between the construction areas and the yards. Tennessee and its contractors would comply with local weight restrictions and limits, and would keep roads free of soil that may be deposited by construction equipment. When necessary for equipment to cross roads, mats or other appropriate measures (e.g., sweeping) would be used to reduce deposition of mud. We received comments concerning heavy construction equipment and the potential for the equipment to cause damage to roadways; however, the surfaces of roadways in the general area are not expected to be affected by heavy equipment because such equipment would be restricted to off-roadway operation once it reaches the Project area. The need for road detours and traffic control measures associated with the movement of large construction vehicles may temporarily increase the work load of county law enforcement.

Most construction personnel would travel to and from the Project area during off-peak traffic hours, which would help to minimize impacts on transportation systems. Buses may be provided by contractors to transport workers from common parking areas to the work areas. Therefore, we conclude that, overall, impacts on traffic and roadways in the proposed Project area would be minor and temporary.

6.3 Housing

As previously discussed in section B.6.1, construction of the Project would require a peak workforce of about 600 workers. Construction of the pipeline loops would occur along three separate construction spreads. There are seasonal and geographic variables in the temporary housing available in the Project area; however, daily, weekly, and monthly rentals are available in the form of homes/apartments, motels, hotels, campgrounds, and recreational vehicle parks. The demand for temporary housing increases during the summer months when tourism is at its highest. Housing conditions in the Project area are presented in table B-11.

Construction of the proposed Project could affect the availability of housing in the Project area; however, ample temporary housing would likely be available based on the number of housing units, motel and hotel rooms, campgrounds, and recreational vehicle parks in the vicinity of the Project area. Temporary housing may be more limited and more expensive during the summer months than the remainder of the year, due to the rise in tourism during the summer. The rental business sector may experience a temporary positive impact from increased rates of occupancy and potential increased rates associated with increased demand. Overall, based on the number of units available, we believe impacts on the housing market would be minor and temporary.

Table B-11

Housing Statistics by County in the Vicinity of the Connecticut Expansion Project

Facility County/State	Total Housing Units [a]	Rental Vacancy Rate [a]	Units for Seasonal or Occasional Use [a]	Number of Hotels [b]	Number of Campgrounds [c]
New York Loop					
Albany, NY	137,739	6.7	1,639	39	4
Massachusetts Loop					
Berkshire, MA	68,508	8.8	7,894	34	15
Connecticut Loop					
Hampden, MA	192,175	6.0	1,795	34	6
Hartford, CT	374,249	8.0	2,374	71	0

[a] Source: U.S. Census Bureau, 2010
[b] Source: ePodunk, 2015
[c] Sources: Massachusetts Office of Travel and Tourism, 2015; Connecticut Office of Tourism, 2015; Hudsonvalleyattractions.com, 2015

6.4 Public Service

A wide range of public services and facilities are offered in the counties crossed by the Project, including hospitals, full-service law enforcement, paid and volunteer fire departments, and schools. Sheriff's departments and fire departments are present in each county of the Project area, as well as independent school districts and some regional schools.

The number of non-local workers and associated family members anticipated to enter the area as a result of the Project would likely be small relative to the current populations in the Project area (see table B-10). Therefore, the increase in population during construction would result in minor, temporary impacts on local community facilities and services, such as police, fire, educational, and medical services. The counties, cities, and towns in the Project vicinity presently have adequate infrastructure and services to meet the needs of the anticipated non-local workers and family members.

A temporary effect may occur on local police forces in the event their services are required to control traffic during construction activities. In addition, accidents or emergencies may occur during construction that require police, fire, or medical services; however, these incidents are expected to be minimal and not exceed the current capabilities of these services. Given the infrequent nature of emergencies and accidents and the existing infrastructure in the Project area, we believe effects on public services would be minor.

Impacts on public services would also include temporary increases in demand for retail, recreation, and related services; however, these impacts would be minor and temporary given the expected number of construction workers and family members, and the length of construction. Additionally, we conclude that the education infrastructure in the vicinity of the Project could accommodate any temporary educational needs of construction worker family members.

6.5 Property Values

We received comments regarding the construction and operation of additional pipelines adjacent to Tennessee's existing pipeline system and the potential effect it could have on property values (i.e., the ability to sell homes and/or reduction in home values). The effect that a pipeline easement may have on a particular property's value is a damage-related issue that would be negotiated between the landowner and Tennessee during the easement acquisition process, which is designed to provide fair compensation to the landowner for the company's right to use the property for pipeline construction and operation. In addition, affected landowners who believe their property values have been negatively affected could appeal to the local tax agency for reappraisal and potential reduction of taxes.

The Interstate Natural Gas Association of America Foundation, Inc. (INGAA) conducted a national case study to determine if the presence of a pipeline on a piece of property affected the property value or sale price of the property (INGAA, 2001). The study revealed that there was no significant impact on property sales along natural gas pipelines and that the pipeline size or the product carried did not affect the sale price. The INGAA study also revealed that there were no significant impacts on demand for properties within the geographically diverse areas and that the presence of a pipeline did not impede development of the surrounding properties.

Other studies have also examined the effects of pipeline easements on sales and property values and evaluated the impact of natural gas pipelines on real estate. Studies conducted in 2008 by ECONorthwest (Fruits, 2008) for the Oregon LNG Project and PGP Valuation, Inc. (PGP, 2008) for Palomar Gas Transmission, Inc. reached similar conclusions as those in the INGAA study. These studies evaluated the potential effect on property values of a natural gas pipeline that was constructed in 2003 and 2004 in northwestern Oregon, including along the western edge of the Portland metropolitan area. The ECONorthwest study concluded that the pipeline had no statistically significant or economically significant impact on residential properties. The study also concluded that there was no relationship between proximity to the pipeline and sale price. The PGP Valuation study found that: 1) there was no measurable long-term impact on property values resulting from natural gas pipelines for the particular pipeline project studied; 2) interviews with buyers and brokers indicated no measurable impact on value or price; and 3) there was no trend in the data to suggest an extension of marketing periods (i.e., the time the property is on the market) for properties with gas pipeline easements.

Another study (Hansen et al., 2006) analyzed property sales near a pipeline accident location in Washington State, using methodologies that considered proximity and persistence over time. This study noted a decline in property values following the incident. However, the effect was very localized, and declined as the distance from the affected pipeline increased. The effect also diminished over time in the years following the incident.

Given the results of the studies noted above and that the Project would be primarily collocated with existing pipeline facilities, we conclude the Project would not have significant effects on overall property values outside the proposed pipeline rights-of-way or aboveground facility boundaries.

6.6 Tax Revenue

Comments were received asserting that the Project would have negative economic impacts, including a reduction in the tax base of local towns through decreased property values, foreclosures, and the inability of landowners to obtain mortgages and insurance. As discussed above, the Project would result in short-term, beneficial impacts in terms of increased payroll, housing rentals, and local material purchases.

Tennessee estimates that the total payroll for Project construction would be about $16 million. Because more than half of the workers would be local, and non-local workers would temporarily relocate to the Project vicinity, a substantial portion of the payroll would be spent with local vendors and businesses, resulting in increased state and local sales tax revenues. Payroll taxes would also be collected from the workers employed on the Project in accordance with federal, state, and local tax rates.

Construction of the Project would also result in increased state and local sales tax revenues associated with the purchase of construction materials. While most of the construction materials would be purchased from national vendors, some common supplies (e.g., stone and concrete, automotive supplies, landscaping materials) would be purchased, as available, from vendors within the Project area. Tennessee estimates the total approximate cost of materials would be $14 million. Tennessee would also pay ad-valorem taxes on the installed pipeline and other facilities as applicable in each state.

The increased tax revenues during Project construction and operation would be a beneficial impact for local governments in the state and counties crossed by the Project.

6.7 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was signed by the President in 1994. It requires that each federal agency address the potential for disproportionately high and adverse health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. An environmental justice area is defined as an area where the community's minority population is equal to or greater than 50 percent of the community population and/or a community in which the percentage of persons living below the poverty level is higher than the county average, based on poverty statistics published by the U.S. Census Bureau. If a proposed action would result in significant adverse effects on minority or low-income populations or Native American tribes, the NEPA analysis should address those impacts as part of the alternatives analysis and identify appropriate mitigation measures to address the effects.

Each federal agency must also ensure that public documents, notices, and hearings are readily available and accessible to the public. As part of the preparation of this EA, the NEPA review process must provide opportunities for effective community participation and involve consultation with affected communities. We received several comment regarding the potential for the Project to adversely effect the community of Sandisfield, Massachusetts. As described in section A.3, we provided affected landowners in the Project area with several opportunities to comment throughout our environmental review, including the NOI and three public scoping meetings. In addition, FERC staff participated in a site visit. Consultation with Native American groups is described in section B.7.4.

Table B-12 provides data on minority population and income for the communities that would be affected by the Project, along with data on comparison areas. Per capita income in the vicinity of the Project is provided in table B-10.

Table B-12

Minority Populations and Poverty Levels in the Vicinity of the Project

Facility County/State	Minority Populations as a Percentage of Total Population	Percent of the Population Below Poverty Level
New York Loop		
State of New York	32.4	15.3
Albany, NY	20.0	13.0
Massachusetts Loop		
State of Massachusetts	17.1	11.4
Berkshire, MA	5.3	12.8
Connecticut Loop		
Hampden, MA	20.3	17.7
State of Connecticut	19.9	10.2
Hartford, CT	24.7	11.6

Source: U.S. Census Bureau, 2013

Based on the U.S. Census Bureau data, minority and low income populations comprise less than 50 percent of the population in the states and counties affected by the Project. The proposed Project primarily involves looping Tennessee's existing pipeline system and modifications to its existing compressor station and other aboveground facilities; therefore, the placement of the proposed facilities was based on proximity to existing infrastructure rather than socioeconomic status of the communities. As such, we find that the Project would not disproportionately affect minority or low income populations.

7. Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires that the FERC take into account the effects of its undertakings on properties on or eligible for listing in the National Register of Historic Places (NRHP) and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on its undertakings. Tennessee, as a non-federal party, is assisting the Commission in meeting these obligations under Section 106 and the implementing regulations at 36 CFR 800 by preparing the necessary information, analyses, and recommendations, as authorized by 36 CFR Part 800.2(a)(3).

We received several comments regarding cultural resources. The MADCR requested that Tennessee clearly map all stone walls on state property. On December 11, 2014, Tennessee filed supplemental maps that depicted in more detail the locations of cultural resources in relationship to Project activities.

We received a comment letter from Ronald M. Bernard and Jean Atwater-Williams, who are the current owners of the NRHP-eligible Josiah Hulet House. They expressed concern about Project impacts on their property, including vibration from heavy equipment using the nearby Cold Spring Road. Additionally, they expressed concern about damage to windows from blasting debris. They also mentioned concern over Project impacts to the historic Knox Trail.

The closest Project work area is about 290 feet from the Josiah Hulet House. That distance, coupled with Tennessee's adherence to their *Blasting Plan* would ensure that there would be no effects to the structure from blasting, including direct impacts such as flying debris, and indirect impacts such as vibration. Therefore, we are not requiring any additional plans or avoidance measures to account for blasting. As addressed below, we are recommending that Tennessee address the effects of construction traffic on Cold Spring Road on the Josiah Hulet House.

The Knox Trail is a significant historic resource in the area. However, as the commentor noted, it is located approximately 1 mile from the Project area and, therefore, there would be no effects to the trail as a result of the Project.

7.1 Cultural Resource Investigations

Tennessee conducted cultural resources investigations for all pipeline rights-of-way, associated temporary workspaces, pipeyards, and access roads. The cultural resources investigations included an overview survey, archaeological survey, and architectural survey. The overview survey included a review of state files for information on previous investigations, previously recorded archaeological sites and architectural properties, and included a review of maps, atlases, and town histories. The information from the overview survey was used to identify areas of low, moderate, and high sensitivity for archaeological sites. The archaeological survey of the pipeline rights-of-way in New York and Massachusetts was a 400-foot-wide corridor. In Connecticut, archaeological survey was undertaken for a 200-foot-wide corridor for the pipeline right-of-way. Architectural survey was undertaken in a 300-foot-wide corridor for all three states.

Archaeological field survey methods included pedestrian survey and shovel testing in areas of high and moderate sensitivity in Connecticut and Massachusetts and areas of high, moderate, and low sensitivity in New York.

7.2 Archaeology Survey Results

New York

The archaeological survey of the New York portion of the Project identified one historic period archaeology site. Additionally, the survey identified a historic cemetery, and several isolated artifacts including one prehistoric and several historic finds. The historic site represents a dump site of refuse from a hotel, and was recommended as not eligible for listing on the NRHP. The Britt-Luke Cemetery is associated with the Britt-Luke House addressed below. Tennessee has developed an avoidance and protection plan to protect the cemetery during construction. In a letter dated August 20, 2015, the New York State Historic Preservation Office(r) (SHPO) concurred that through implementation of the avoidance plan, the Project would have no adverse effect on historic properties.

Massachusetts

The archaeological survey of the Massachusetts portion of the Project identified two historic period archaeological sites: the G. Dunham Foundation Site (SAN-2) and the Allen Foundation Site (SAN-3). Both sites have previously been recommended by the Massachusetts SHPO as potentially eligible for listing in the National Register. The G. Dunham Foundation Site has an archaeology site associated with it, the Dunham Site (19-BK-173), which consists of an isolated prehistoric artifact. However, Tennessee's survey did not recover any additional prehistoric artifacts at that site. Tennessee provided *Archaeological Site Avoidance and Protection Plans* to avoid effects to the G. Dunham Foundation Site and the Allen Foundation Site. The Massachusetts SHPO has concurred that through implementation of the avoidance plans, the Project would have no adverse effects on the G. Dunham and Allen Foundation archaeological sites.

Tennessee's pedestrian survey documented a total of 38 stone walls in Massachusetts. Where feasible, Tennessee would avoid impacts on stone walls during construction. In the event that Project-related impacts cannot be avoided, Tennessee would restore stone walls following construction. These procedures are detailed in Tennessee's *Stone Wall Documentation and Restoration Procedures* that have been reviewed and approved by the Massachusetts SHPO. In letters dated August 13, 2014, December 23, 2014, February 27, 2015, and September 3, 2015, the Massachusetts SHPO concurred with the results of the archaeology survey reports, and indicated that the Project would have no adverse impacts on the G. Dunham and Allen Foundation archaeological sites.

Connecticut

Archaeological surveys in Connecticut identified three archaeological sites. Tennessee's survey identified seven isolated finds that they recommended as not eligible for listing on the NRHP. However, the Connecticut SHPO assigned three site numbers; two for individuals finds, and a third for a group of isolated finds. All three sites contained prehistoric lithic artifacts. In a letter dated September 5, 2014, the Connecticut SHPO concurred that the three archaeology sites were not eligible for listing on the NRHP. An addendum survey in Connecticut identified concrete foundations associated with a World War II period structure at Bradley Field. However, these foundations did not retain significance and were recommended as not eligible for listing on the NRHP. In a letter dated April 20, 2015, the Connecticut SHPO concurred that the three sites were not eligible for listing on the NRHP.

7.3 Architectural Survey Results

In total, for all three states, survey for architectural resources identified 17 properties that are recommended as eligible or potentially eligible for listing on the NRHP. These properties are described in table B-13, below.

In New York, the Britt-Luke House and associated cemetery are recommended as potentially eligible for listing on the NRHP. The construction corridor for the pipeline would be over 100 feet from the known cemetery boundaries; therefore, Tennessee recommended that the Project would have no adverse effect on that resource. In a letter dated, August 20, 2014, the New York SHPO concurred that the Project would have no adverse effect on historic properties.

In Connecticut, Tennessee identified one property that is listed in the NRHP, 12 properties that are potentially eligible for listing in the NRHP, and one property listed in the state register of historic places. For most of these properties, the pipeline right-of-way would have no effect due to the distance from the Project and the presence of an existing pipeline right-of-way. Project effects would be limited to the duration of construction and, when complete, the right-of-way would be returned to its current condition and would not introduce any new elements. Only one of these properties, the Agricultural Complex at 190-271 Hill Street, Suffield, Connecticut, was judged to be close enough to the Project to potentially be at risk of direct effects. Several tobacco barns are immediately adjacent to the right-of-way and access roads. Tennessee would implement avoidance and protection plans to ensure that the property is not subject to direct impacts associated with Project-related construction activity. In a letter dated April 20, 2015, the Connecticut SHPO concurred that the Project would have no effect on historic properties.

In Massachusetts, three historic properties were identified that have the potential to be affected by Project activities. The Clark-Slater House and the Ira Brewer House are located adjacent to a pipeyard. Project effects on these properties would be temporary, and there would be no permanent adverse effects. The Josiah Hulet House is situated about 290 feet from Project workspace and would not be affected by blasting. Additionally, the view of construction would be minimized by existing trees. However, the Josiah Hulet House lies approximately 30 feet from Cold Spring Road, which presumably would be used to access the pipeline right-of-way. The Massachusetts SHPO has encouraged FERC to consider noise, vibration, and other potential Project effects on historic architectural properties and to prepare plans to protect those properties through avoidance and minimization of heavy truck traffic and blasting. Therefore, **we recommend that:**

- **Prior to construction, Tennessee should address the effects of construction traffic on the Josiah Hulet House and file any necessary avoidance and mitigation measures with the Secretary for the review and written approval of the Director of OEP.**

Table B-13

Historic Architectural Properties Identified in the Area of Potential Affect

Survey Number	Resource Name	Recommended NRHP Status	Assessment of Effect
New York			
USN N0. 00102.000658	Britt-Luke House and Cemetery	Potentially Eligible	No adverse effect; Avoidance and Protection Plan in place
Massachusetts			
MHC No. SAN.86	Josiah Hulet House	Potentially Eligible	No adverse effect
MHC No. TYR.21	Ira Brewer House	Potentially Eligible	No adverse effect; Temporary visual impact
MHC No. TYR.16	Clark-Slater House	Potentially Eligible	No adverse effect
Connecticut			
SHRI No. 100; Connecticut Barn Survey	Eliphalet King House and Barn	Potentially Eligible	No adverse effect
N/A	Agricultural Complex A	Potentially Eligible	No adverse effect
N/A	Agricultural Complex B	Potentially Eligible	No adverse effect
SHRI No. 210	Residence and Barn	Potentially Eligible	No adverse effect
SHRI No. 209	Residence	Potentially Eligible	No adverse effect
N/A	Residence and Barn	Potentially Eligible	No adverse effect
N/A	Suffield Country Club	Potentially Eligible	No adverse effect
N/A	Agricultural Complex D	Potentially Eligible	No adverse effect; Temporary visual impact
SHRI No. 274; Connecticut Barn Survey	Horatio J. Lothorp Farmstead	State Register Listed (03/05/2014)	No adverse effect
N/A	Residence and Barn	Potentially Eligible	No adverse effect
N/A	Coulter Homestead	Potentially Eligible	No adverse effect
N/A	Gideon Granger Farmstead	Potentially Eligible	No adverse effect
NRIS No. 88001318	East Granby Historic District	Listed (08/25/1988)	No adverse effect

NRHP = National Register of Historic Places

7.4 Native American Consultation

On September, 4, 2013, Tennessee provided Project information to nine federally recognized Native American tribes, three non-federally recognized Native American tribes, and two state agency tribal representatives, and requested to be notified of any concerns about properties of traditional religious or cultural significance that may be affected by the Project. Tennessee received responses from two of the federally recognized Native American tribes, the Delaware Tribe of Indians and Mashantucket Pequot Tribal Nation. Both tribes indicated their interest in being consulted during Project planning activities. We did not receive responses from any other tribes or tribal representatives.

On July 24, 2014, Tennessee submitted the archaeological survey reports to all of the Native American tribes identified in table B-14. In the same submittal, Tennessee also submitted its draft *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*, to the nine federally recognized tribes, the three non-federally recognized tribes, and the two state agencies.

Table B-14

Native American Tribes and State Agency Tribal Representatives Contacted for the Project

Tribes	Dates Contacted	Response Dates
Federally Recognized Tribes		
Delaware Nation of Oklahoma	9/4/13, 7/24/14	No response
Delaware Tribe of Indians	9/4/13, 7/24/14	9/20/13
Mashantucket Pequot Tribal Nation	9/4/13, 7/24/14	3/6/14
Mashpee Wampanoag Indian Tribe	9/4/13, 7/24/14	No response
Mohegan Indian Tribe	9/4/13, 7/24/14	No response
Narragansett Indian Tribe	9/4/13, 7/24/14	No response
St. Regis Mohawk Tribe	9/4/13, 7/24/14	No response
Stockbridge-Munsee Community Band of Mohican Indians	9/4/13, 7/24/14	No response
Wampanoag Tribe of Gay Head/Aquinnah	9/4/13, 7/24/14	No response
Non-Federally Recognized Tribal Organizations		
Eastern Pequot Tribal Nation	9/4/13, 7/24/14	No response
Golden Hill Tribe of Paugussett	9/4/13, 7/24/14	No response
Schaghticoke Tribal Nation	9/4/13, 7/24/14	No response
State Agency Tribal Representatives		
Connecticut Indian Affairs Council	9/4/13, 7/24/14	No response
Massachusetts Commission on Indian Affairs	9/4/13, 7/24/14	No response

On October 10, 2014, we sent copies of the NOI to the tribes listed above. The NOI invited participation in the scoping process, including public scoping meetings.

On September 20, 2013, which was prior to the filing of Tennessee's application, we received an email from the Mashantucket (Western) Pequot Tribal Nation that indicated that the tribe was interested in receiving and reviewing the survey reports when completed. The Mashantucket (Western) Pequot Tribal Nation followed up with another email dated August 20, 2014 that indicated they had reviewed the survey reports for Connecticut, New York, and Massachusetts, agreed that the research design and testing strategy met acceptable professional standards, concurred with the recommendations, and asked to be kept informed of any further developments with respect to the Project.

We received a letter dated August 29, 2014, from the Stockbridge-Munsee Tribe stating that it had reviewed the archaeological findings for the Project, its cultural resource concerns were satisfied, and it concurred with the Massachusetts SHPO's letter dated August 13, 2014.

On September 3, 2014, the FERC Tribal Liaison received a letter from United Southern and Eastern Tribes (USET) about the Project. USET includes the following tribes that have an interest in the project area: Mohegan Tribe, Mashantucket Pequot Tribe, Narragansett Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah). USET expressed concerns that tribes had not been consulted with, indicated that there may be ceremonial stone landscapes in the vicinity of the Project, and requested a meeting. On September 29, 2014, FERC staff met with USET. Representatives from the Wampanoag Tribe of Gay Head and Narragansett Indian Tribe participated in the USET meeting. USET expressed concern over a number of issues including ceremonial stone landscapes, and indicated that they thought these features may be present on the Project. It was discussed that a site visit to see the specific area of concern would be appropriate. As FERC staff began the process of setting up a site visit, it became clear that the immediate area of concern was not a part of the Connecticut Expansion Project, but was a part of the Algonquin Incremental Market Project (AIM Project).

On October 17, 2014, FERC staff for both the AIM and Connecticut Expansion Projects attended a site visit at the AIM Project in order to understand the issues regarding ceremonial stone landscape features. At that meeting, FERC staff discussed with the tribe whether a ceremonial stone landscapes survey would be appropriate for the Connecticut Expansion Project. FERC staff agreed with the tribe that a survey would be appropriate. Notes from the meeting were put into the docket in FERC's eLibrary system for the project on November 5, 2014.

Additionally, in a comment filed on December 3, 2015, the Mashpee Wampanoag Tribe requested documents needed to complete a Section 106 review for the Project.

On February 27, 2015, we sent letters to the above-listed tribes inviting them to be consulting parties for the Commission's review of the Project. However, to date, a meeting regarding ceremonial stone landscape survey has not yet occurred.

7.5 Unanticipated Discovery Plan

Tennessee has developed *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*, to be implemented in the event that previously unreported archaeological sites or human remains are encountered during the Project. The plan provides for the notification of interested parties, including Native American tribes, in the event of any discovery. This plan has been reviewed by the Massachusetts SHPO. Review by the Connecticut and New York SHPOs is pending.

7.6 Compliance with the National Historic Preservation Act

We have not yet completed compliance with Section 106 of the NHPA. To ensure that FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **<u>Prior to construction or implementation of any treatment plans/measures</u>, Tennessee should:**

  a. file with the Secretary any outstanding cultural resources survey and evaluation reports, any necessary treatment plans, and the New York, Massachusetts, and Connecticut SHPO's comments on any reports and plans;

b. **allow ACHP the opportunity to comment if historic properties would be adversely affected; and**

c. **ensure that FERC staff reviews and the Director of the OEP approves all cultural resources reports and plans, and notifies Tennessee 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."

8. Air Quality and Noise

8.1 Air Quality

Construction of the proposed Project could potentially have an effect on local and regional air quality. Federal and state air quality standards have been designed to protect human health and the environment from airborne pollutants. The USEPA has developed National Ambient Air Quality Standards (NAAQS) for criteria air pollutants such as nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), and inhalable particulate matter ($PM_{2.5}$ and PM_{10}). $PM_{2.5}$ includes particles with an aerodynamic diameter less than or equal to 2.5 microns, and PM_{10} includes particles with an aerodynamic diameter less than or equal to 10 microns.

States and municipalities are free to adopt standards more stringent than the NAAQS. The NYSDEC, MADEP, and CTDEEP have adopted all of the NAAQS as promulgated by USEPA. The current NAAQS for these criteria pollutants are summarized in table B-15.

Table B-15

National Ambient Air Quality Standards

Pollutant	Primary Standards ($\mu g/m^3$)	Averaging Times	Secondary Standards ($\mu g/m^3$)
Carbon Monoxide	40,000	1-Hour [a]	—
	10,000	8-Hour [a]	—
Lead	0.15	3-month [b]	0.15
Nitrogen Dioxide	188	1-hour [c]	—
	100	Annual [b]	100
Particulate Matter (PM_{10})	150	24-Hour [d]	150
Particulate Matter ($PM_{2.5}$)	35	24-Hour [e]	35
	12	Annual [f]	15
Ozone	150	8-Hour [g]	150
Sulfur Oxides	196	1-Hour [d]	—
	—	3-Hour [a]	1,300

[a] Not to be exceeded more than once per year.

[b] Not to be exceeded.

[c] To attain this standard, the 3 year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).

Table B-15			
National Ambient Air Quality Standards			
Pollutant	**Primary Standards ($\mu g/m^3$)**	**Averaging Times**	**Secondary Standards ($\mu g/m^3$)**

[d] Not to be exceeded more than once per year on average over 3 years.
[e] To attain this standard, the 3 year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m3 (effective December 17, 2006).
[f] To attain this standard, the 3 year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 12.0 μg/m3.
[g] To attain this standard, the 3 year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.

In addition to the NAAQS, there are certain national parks and wilderness areas that require additional Clean Air Act (CAA) protection. These areas are collectively referred to as federal Class I areas. The primary focus is to prevent negative impacts on visibility within these special locations. The closest Class I area to the proposed Project is the Lye Brook Wilderness in Vermont. Table B-16 lists the general distance between each of the proposed pipeline loops to the Lye Brook Wilderness.

Table B-16

Distance to Nearest Federal Class I Area

Facility	Nearest Class I Area	Distance to Class I Area
New York Loop	Lye Brook Wilderness	53 miles
Massachusetts Loop	Lye Brook Wilderness	62 miles
Connecticut Loop	Lye Brook Wilderness	74 miles
Compressor Station 261	Lye Brook Wilderness	74 miles

Potential air quality impacts associated with the Project would be temporary because emissions are associated with the construction phase of the Project only, with the exception of minor fugitive methane (CH_4) emissions. The Project would not require any new or modified state or federal air permits. Greenhouse gases (GHGs), the most common of which are carbon dioxide (CO_2), CH_4, nitrous oxide, O_3, hydrofluorocarbons, and perfluorocarbons, are naturally-occurring pollutants in the atmosphere as well as products of human activities, including burning fossil fuels. Fossil fuel combustion emits CO_2, CH_4, and nitrous oxide. GHG emissions are generally calculated in terms of carbon dioxide equivalents (CO_2e) where the warming potential of each gas is expressed as a multiple of the warming potential of CO_2e.

Existing Ambient Air Quality and Attainment Status

The USEPA has established Air Quality Control Regions (AQCRs) in accordance with Section 107 of the CAA of 1970, defined as contiguous areas considered to have relatively uniform ambient air quality, and treated as single geographical units for reducing emissions and determining compliance with the NAAQS.

Attainment with the NAAQS is determined based on whether or not measured ambient air pollutant concentrations are above or below the NAAQS and/or state ambient air quality standards. Each AQCR is required to develop an implementation plan identifying how applicable air quality standards are achieved and maintained. Table B-17 lists the AQCR for each loop and Compressor Station 261.

Table B-17 **Summary of Air Quality Control Regions for the Project**		
Facility	**County/State**	**Air Quality Control Region**
New York Loop	Albany/NY	Hudson Valley Intrastate
Massachusetts Loop	Berkshire/MA	Berkshire Intrastate
Connecticut Loop	Hampden/MA	Hartford-New Haven-Springfield Interstate
	Hartford/CT	Hartford-New Haven-Springfield Interstate
Compressor Station 261	Hampden/MA	Hartford-New Haven-Springfield Interstate

The USEPA designates the attainment status of an area for each criteria pollutant based on whether an area meets the NAAQS. Areas that meet the NAAQS are termed "attainment areas." Areas that do not meet the NAAQS are termed "nonattainment areas." Areas for which insufficient data are available to determine attainment status are termed "unclassified areas." Areas formerly designated as nonattainment areas that subsequently have reached attainment are termed "maintenance areas."

The attainment status designations for the AQCRs appear in 40 CFR Part 81. The regulatory review process is determined by the attainment status of the region and the projected Project emission rates. Table B-18 summarizes the attainment status for specific pollutants within counties crossed by the proposed Project. With the exception of O_3, all pollutants are in attainment/unclassifiable (or not designated) status. Because New York, Massachusetts, and Connecticut are part of the Ozone Transport Region, the proposed Project areas are treated as moderate O_3 nonattainment for volatile organic compounds (VOC) and NO_x for certain permitting activities (USEPA, 2015).

Because the only air emissions associated with the Project would be temporary associated with construction activities, the proposed Project is only subject to the general conformity rule in the CAA. The Project would not require any federal or state air permits.

Table B-18 **Summary of Attainment Status by County Crossed by the Project**				
Pollutant	**Albany County, NY**	**Berkshire County, MA**	**Hampden County, MA**	**Hartford County, CT**
SO_2	Attainment	Attainment	Attainment	Attainment
PM_{10}	Not Listed	Not Listed	Not Listed	Unclassifiable
$PM_{2.5}$	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Unclassifiable/ Attainment
NO_2	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Unclassifiable/ Attainment
CO	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Attainment	Attainment
Ozone (8-hr 1997 standard)	Nonattainment (Subpart 2/Marginal)	Nonattainment (Subpart 2/Moderate)	Nonattainment (Subpart 2/Moderate)	Nonattainment (Subpart 2/Moderate)
Ozone (8-hr 2008 standard)	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Nonattainment (Marginal)
Ozone (OTR)	Nonattainment (moderate)	Nonattainment (moderate)	Nonattainment (moderate)	Nonattainment (moderate)

Table B-18 **Summary of Attainment Status by County Crossed by the Project**				
Pollutant	**Albany County, NY**	**Berkshire County, MA**	**Hampden County, MA**	**Hartford County, CT**
Pb	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Unclassifiable/ Attainment	Unclassifiable/ Attainment

Nonattainment = any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.

Attainment = any area that meets the national primary or secondary ambient air quality standard for the pollutant.

Unclassified = any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Not Listed = treated as attainment for permitting purposes.

CO = carbon monoxide

Pb = lead

NO_2 = nitrogen oxide

$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 microns

PM_{10} = particles with an aerodynamic diameter less than or equal to 10 microns

OTR = ozone transport region

SO_2 = sulphur dioxide

Source: EPA Greenbook, 2015 and 40 CFR Part 81

Clean Air Act General Conformity

The CAA mandates the general conformity rule to ensure that federal actions in nonattainment and maintenance areas do not interfere with timely attainment of the NAAQS by the states. The general conformity rule divides the air conformity process into two parts, applicability analysis and conformity determination. The applicability analysis process requires federal agencies to determine if proposed action(s) within nonattainment and maintenance areas would increase emissions of criteria pollutants above preset threshold levels (40 CFR section 93.153). The applicability thresholds vary, depending on the severity of the nonattainment area. These applicability thresholds are shown in table B-19.

Table B-19 **General Conformity Thresholds**	
Pollutant/NAA	**Tons/Year**
Ozone (VOCs or NO_x)	
Serious NAAs	50
Severe NAAs	**25**
Extreme NAAs	10
Other ozone NAAs outside an OTR	100
Other ozone NAAs inside an OTR	
VOC	50
NO_x	100
Carbon monoxide: All NAAs	100
SO_2 or NO_2: All NAAs	100
PM_{10}	
Moderate NAAs	100

Table B-19 General Conformity Thresholds	
Pollutant/NAA	**Tons/Year**
Serious NAAs	70
$PM_{2.5}$	
Direct emissions	100
SO_2	100
NO_x (unless determined not to be a significant precursor)	100
VOC or ammonia (if determined to be significant precursors)	100
Lead: All NAAs	25

Source: 40 CFR 93.153
NAA = nonattainment area
NO_2 = nitrogen oxide
NO_x = nitrogen oxides
OTR = ozone transport region
$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 microns
PM_{10} = particles with an aerodynamic diameter less than or equal to 10 microns
SO_2 = sulphur dioxide
VOC = volatile organic compounds

For this Project, the counties listed in table B-18 require an applicability analysis due to the nonattainment status for the 8-hour O_3 standard. Because the nonattainment status is associated with O_3, the only pollutants that need to be evaluated for the Project are VOC and NO_x.

Construction emissions of VOC and NO_x per county are listed in table B-20 and compared to the appropriate General Conformity Thresholds. As shown in the table, the estimated Project emissions are below the respective *de minimis* levels, thus a general conformity determination is not required.

Table B-20

General Conformity Analysis by County Crossed by the Project

County/State	Source(s)	NO_x (tons/year)	VOC (tons/year)
Albany/NY	New York Loop Total	2.9	0.2
	Applicability Threshold	100.0	50.0
Berkshire /MA	Massachusetts Loop Total	7.7	0.5
	Applicability Threshold	100.0	50.0
Hampden/MA	Connecticut Loop Total (MA portion) [a]	0.5	0.0
	Applicability Threshold	100.0	50.0
Hartford/CT	Connecticut Loop Total (CT Portion)	18.6	1.2
	Applicability Threshold	100.0	50.0

[a] Includes Compressor Station 261 modifications
NO_x = nitrogen oxide
VOC = volatile organic compounds

Air Quality Impacts

Construction of the Project would result in temporary increases in emissions of some pollutants due to the use of construction equipment powered by diesel engines. Construction activities would also result in the temporary generation of fugitive dust due to disturbance of the surface and other dust generating actions. Indirect emissions during the construction period would be associated with delivery vehicles and construction worker commuting.

The quantity of fugitive dust generated depends on the size of the area disturbed and the intensity of construction activity, and also on the silt and moisture content of the soil, the wind speed, and the speed, weight, and volume of vehicular traffic. Fugitive dust emissions would be mitigated, as necessary, by spraying water to dampen the surfaces of dry work areas. Worst-case fugitive particulate matter emissions for PM_{10} and $PM_{2.5}$ were calculated based on USEPA AP-42 recommended emission factors for heavy construction activities along with estimates of the extent and duration of active surface disturbance. The use of the heavy construction emission factor from AP-42 is meant to be general in nature to cover a wide range of construction operations. This may overestimate potential fugitive dust generated by the proposed construction. The estimated emissions are summarized in table B-21.

Tennessee estimated emissions of NO_x, CO, $PM_{10.5}$ $PM_{2.5}$, SO_2, VOCs, GHG and hazardous air pollutants from construction equipment engines used during Project construction based on the anticipated types of non-road and on-road equipment, and their levels of use. Emission factors for diesel on-road vehicles were developed from USEPA's MOVES2010b model. Emission factors for diesel non-road equipment engines were obtained from USEPA's NONROAD model documentation. For added conservatism, emission factors using Tier 2 diesel engine standards have been assumed to apply to construction equipment engines during 2015 and do not reflect the anticipated phasing-in of more stringent emissions standards. Ultra-low sulfur diesel use was assumed for the non-road diesel vehicles. Table B-21 presents these emission estimates by major construction activity for the proposed Project.

Table B-21

Emissions From Construction of the Project

	Total Site Emissions (tons/year)							
Facility ID	**NO_x**	**VOC [a]**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**GHG [b]**	**HAPs [c]**
New York Loop	2.91	0.19	1.03	0.005	19.23	2.98	403.02	0.03
Massachusetts Loop	7.66	0.48	2.69	0.01	45.68	7.11	1,020.94	0.09
Connecticut Loop [d]	19.11	1.26	6.94	0.03	60.11	9.66	2,616.98	0.24
Total	29.68	1.93	10.65	0.05	125.02	19.75	4,040.94	0.36

Table B-21								
Emissions From Construction of the Project								
	Total Site Emissions (tons/year)							
Facility ID	**NO_x**	**VOC [a]**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**GHG [b]**	**HAPs [c]**

[a] VOC – non-methane/ethane volatile organic compounds.
[b] GHG – as carbon dioxide equivalents (CO_2e)
[c] HAPs – as aggregated total HAPs
[d] Emissions associated with minor modifications at Compressor Station 261 are included in the Connecticut Loop totals.
CO = carbon monoxide
GHG = greenhouse gases
HAP = hazardous air pollutants
NO_x = nitrogen oxides
$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 microns
PM_{10} = particles with an aerodynamic diameter less than or equal to 10 microns
SO_2 = sulphur dioxide
VOC = volatile organic compounds

Construction would generate potential air pollutant emissions of PM_{10}, $PM_{2.5}$, NO_x, CO, SO_2, VOC, GHG, and hazardous air pollutant emissions. These emissions would be temporary and of limited duration, would occur only as a result of construction activities, and would not significantly increase ambient air pollutant concentrations.

Exhaust emissions from diesel-fueled construction equipment and vehicle engines would be minimized by federal design standards imposed at the time of manufacture of the vehicles and would comply with USEPA mobile and non-road emission regulations (40 CFR Parts 85, 86, and 89). Emissions also would be controlled by purchasing commercial diesel fuel products whose specifications are controlled by federal and state air pollution control regulations applicable to fuel suppliers and distributors.

Fugitive dust would result from land clearing, grading, excavation, and vehicle traffic on paved and unpaved roads. The amount of dust generated would be a function of construction activities, soil type, moisture content, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions would be greater during dry periods and in areas of fine-textured soils subject to surface activity. Tennessee would implement dust control measures as necessary. These measures would include application of water or dust-control agents during clearing and grading and on unpaved traffic areas, and prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment.

Emissions would occur over the duration of construction activity and would vary along the length of the Project. While there may be local elevated dust levels, we conclude that impacts from construction would be temporary and would not result in a significant impact on regional air quality or result in any violation of applicable ambient air quality standards. As stated previously, minor fugitive CH_4 emissions during operation would not result in impacts on local air quality.

8.2 Noise and Vibration

In 1974, the USEPA published its Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety providing information for state and local regulators to use when developing their own ambient noise standards. The USEPA has determined that a day-night sound level (L_{dn}) of 55 decibels on the A-weighted scale (dBA) protects the public from indoor and outdoor activity noise interference. An L_{dn} of 55 dBA is equivalent to a continuous noise level of 48.6 dBA. For comparison, normal speech at a distance of 3 feet averages 60 to 70 dBA 24-hour equivalent sound level (L_{eq}). Noise quality can be affected both during construction and operation of pipeline projects. The magnitude and frequency of environmental noise may vary considerably over the course of the day, throughout the week, and across seasons, in part due to changing weather conditions and the effects of seasonal vegetative cover. Two measures to relate the time-varying quality of environmental noise to its known effect on people are the L_{eq} and L_{dn}. The L_{eq} is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. The L_{dn} is the L_{eq} plus 10 dBA added to account for people's greater sensitivity to nighttime sound levels (between the hours of 10 p.m. and 7 a.m.). The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies. The human ear's threshold of perception for noise change is considered to be 3 dBA; 6 dBA is clearly noticeable to the human ear, and 9 dBA is perceived as a doubling of noise.

Tennessee does not propose to drill wells or conduct horizontal directional drilling, and no additions or modifications would be made to the compression at Compressor Station 261 as part of the Project. The primary noise associated with the Project would be from construction equipment and blasting, if required. The following state and local noise regulations were identified.

There are no applicable statewide noise regulations in New York. Chapter 81 of the Bethlehem Town Code discusses noise abatement and containment. Any noise which disturbs, injures, or endangers the comfort, repose, health, peace, safety, or welfare of a reasonable person of normal sensibilities is prohibited. Construction equipment and tools must not be operated between 10:00 p.m. and 6:00 a.m. and during the day (e.g., 6:00 a.m. to 10:00 p.m.) above 65 dBA at the property line of the parcel from which it is emanating or at a distance of 20 feet if it is emanating from a piece of equipment on a roadway. A special permit with exemptions from the provisions can be obtained from the Zoning Board of Appeals.

The Division of Air Quality of the Commonwealth of Massachusetts has a noise policy for enforcing Regulation 310 CMR 7.10: Noise. Under this noise policy, a source of sound is considered to be in violation if it increases the broadband sound level by more than 10 dBA above ambient levels, or if it produces a "pure tone" condition. The criteria are measured at both the property line and the nearest inhabited residence, but in practice, only the residential level location is required to meet the criteria. The ambient level is the background A-weighted sound level that is exceeded 90 percent of the time during equipment operating hours. This regulation does not apply to construction equipment; therefore, this regulation is not applicable to the Project. The Town of Sandisfield bylaws do not have any noise ordinances or restrictions.

The CTDEEP has regulations (CT Gen Stat section 22a-67, 2012) for the control of noise. The regulations have a daytime (7:00 a.m. to 10:00 p.m.) noise contribution limit of 61 dBA for Class C sources (e.g., industrial land uses) affecting Class A receptors (e.g., residences). The corresponding nighttime limit is 51 dBA. There are also requirements regarding impulse noise, discrete tones, infrasonic, and ultrasonic sounds. Construction noise (including blasting related to construction) is exempt. The Town of Suffield zoning regulations do not have any noise ordinances or restrictions.

Section VI, Part B of the Town of East Granby Zoning Regulations discusses noise regulations. For all uses in all zones, no noise shall be emitted beyond the boundaries of a lot or parcel in excess of the established noise levels. The noise levels are based on the emitter's and receptor's zone types and daytime and nighttime hour restrictions. Daytime is defined as 7:00 a.m. to 10:00 p.m. on weekdays and Saturdays, and 9:00 a.m. to 10:00 p.m. on Sunday. The remaining hours are considered nighttime. For industrial emitters, the limits are 51 dBA at night by residential/agricultural zone receptors, 61 dBA during the day by residential/agricultural zone receptors, 66 dBA by business zones receptors, and 70 dBA by industrial zone receptors. Activities that are exempt under the CTDEEP regulations, including construction noise, are also exempted from the Town of East Granby's requirements.

Chapter 21 of the Agawam Town Code addresses noise, but does not include specific time or decibel restrictions. The code includes the provision that the creation of or failure to abate or control an unreasonably loud, disturbing and/or unnecessary noise is prohibited.

Construction Noise and Vibration Impacts

Construction noise is highly variable as equipment operates intermittently. The type of equipment operating at any location changes with each construction phase. The sound level impacts on noise-sensitive areas (NSAs), such as residences, churches, and schools, along the pipeline right-of-way due to construction activities would depend on the type of equipment used, the duration of use for each piece of equipment, the number of construction vehicles and equipment used simultaneously, and the distance between the noise source and receptor. Project construction is expected to last three to four months and equipment would be operated on an as-needed basis during daylight hours. The most prevalent sound source during construction is anticipated to be the internal combustion engines of construction equipment (75 to 100 dBA at 50 feet). Site earth work would be expected to result in the highest construction noise due to multiple pieces of equipment operating simultaneously.

Pipeline construction noise would temporarily affect the local area as construction activities move along the right-of-way. For pipeline construction, worst-case conditions where multiple pieces of equipment are used simultaneously may result in sound levels exceeding 55 dBA L_{dn} at NSAs closest to pipeline construction activities; however, noise would be intermittent and limited to short periods at any one location. Due to the temporary nature of typical construction activities, no long-term noise effects are anticipated from construction of the Project. Tennessee would comply with local ordinances, and we conclude that noise impacts on nearby NSAs would be minor.

Certain activities such as hydrostatic testing, tying in, purging, and packing may require 24 hours of activity for a limited number of workers and for limited time periods (presumably one to 3 days). Any heavy equipment required for these activities would not be operated at night, with the exception of water pumps to fill the pipeline during testing. Unmitigated water pump operation would generate noise levels from 70 to 80 dBA at 50 feet; therefore, any NSAs within 400 feet could experience noise levels greater than an L_{dn} of 55 dBA. NSAs further than 400 feet would experience lower noise levels, but operation of the pumps may still be perceived. NSAs may experience locally elevated noise levels during these activities; however, the effects would be temporary during construction only.

Blasting may be required to excavate the pipeline trench where bedrock could be encountered at depths that may interfere with conventional excavation or rock-trenching methods. Blasting would be conducted according to Tennessee's *Blasting Plan*, which includes mitigation measures designed to prevent damage to nearby structures, such as the use of blasting mats to prevent the scattering of loose rock. Blasting activity would be performed by licensed professionals using controlled energy release with all required permits secured prior to any blasting activity. Blasting would occur during daytime hours after notifying nearby residents and building inhabitants. During the construction and restoration phases of the Project, Tennessee would provide a 24-hour phone hotline to handle and address landowner concerns, including noise complaints. Blasting vibration would be controlled using charge size limits and charge delays that stagger each charge in a series of explosions. A contractor retained by Tennessee would inspect structures within 200 feet of a blast site and other structures at the request of the pipeline contractor or an affected landowner. The contractor would perform pre-blast inspections, monitor ground vibrations at the nearest structure or well during blasting, and perform post-blast inspections as warranted. Based on these vibration control measures, we conclude construction vibration impacts on NSAs would be minor and temporary.

Operational Noise and Vibration Impacts

The Project would have no significant impact on operational noise and vibration. The Project would not add to or modify the amount of compression at any compressor stations. The Project would add and relocate pig launchers and receivers, miscellaneous piping, valves, fittings, and insertion meters, which could affect general flow noise. New valves and piping would be below grade, which would inhibit sound transmission. Tennessee would perform occasional maintenance or repair activities along the right-of-way after construction. Maintenance and repair activities would be infrequent and would involve a limited number of vehicles and equipment. Given the temporary nature of construction and the infrequent nature of maintenance and repair activities, we conclude operational noise and vibration impacts on NSAs would be minor.

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 $^{\circ}$F and is flammable at concentrations between 5 and 15 percent in air. An unconfined mixture of CH_4 and air is not explosive; however it may ignite if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses upward rapidly in air.

9.1 Safety Standards

The USDOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under 49 U.S. Code Chapter 601. The USDOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA's safety mission is to ensure that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at 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 the federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state may also act as USDOT's agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement action. The States of New York, Connecticut, and Massachusetts have been authorized by PHMSA under Section 5(a) to assume all aspects of the safety program for intrastate facilities. Connecticut and New York, among other states, have been authorized by PHMSA to act as interstate agents on behalf of the federal government. In this role, State personnel inspect interstate pipelines and submit reports to PHMSA, which carries out compliance and enforcement action as necessary. The USDOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses natural gas pipeline safety issues.

Under a Memorandum of Understanding on Natural Gas Transportation Facilities dated January 15, 1993, between the USDOT and FERC, the USDOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection. Alternatively, an applicant must certify that it has been granted a waiver of the requirements of the safety standards by the USDOT in accordance with Section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum of Understanding to promptly alert the USDOT. The Memorandum of Understanding also provides for referring to the Commission, complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

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

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

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

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

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

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

The proposed Project would be constructed through 8.56 miles of Class 1, 2.47 miles of Class 2, and 2.39 miles of Class 3 areas. Over the life of the pipeline, Tennessee would monitor population changes in the vicinity of the pipeline. If a subsequent increase in population density adjacent to the right-of-way results in a change in class location for the pipeline, Tennessee would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness if required, to comply with the USDOT requirements for the new class location.

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

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

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

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[7] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[8]; or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

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

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

[7] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in psig multiplied by the square of the pipeline diameter in inches.

[8] The potential impact circle is a circle of radius equal to the potential impact radius.

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 HCAs. The USDOT regulations specify the requirements for the integrity management plan at Section 192.911. Tennessee has identified one HCA along the proposed pipeline loop routes, between MPs 7.6 and 7.9 along the Connecticut Loop.

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

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, 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.

Tennessee would incorporate the Project into its existing gas monitoring and control systems. Tennessee would maintain a monitoring system that includes a gas control center that monitors system pressures, flows, and customer deliveries on its entire system. The center is staffed 24 hours a day, 7 days a week, and 365 days a year. Tennessee's gas control group and field operations group would remotely monitor and control the Project facilities, with the exception of the new MLV which would be manually operated and monitored by the field operations group. The new MLV would have an automatic pressure-sensitive shut off device. Tennessee proposes to use automatic closing valves at each MLV along the pipeline for standardization purposes and ease of response time in the event of an emergency. Tennessee's gas control center can communicate with existing compressor stations by telephone or wide area network.

The new pipeline would be connected to Tennessee's existing cathodic protection[9] system to prevent corrosion, and Tennessee would add anodes to the existing ground beds to meet additional current requirements for the proposed facilities. Upgrades to the existing cathodic protection system may also be made by Tennessee to accommodate the proposed facilities. In addition, one new cathodic protection system would be installed along the Connecticut Loop near MP 8.1. Tennessee states that its corrosion technicians would check impressed current rectifiers or other impressed current sources for proper operation, and read and record output at least six times each calendar year, not to exceed two and a half months between inspections. In addition, Tennessee would check all impressed current rectifiers for proper operation, output in accordance with ground bed limits, tightness of electrical connections, adequate ventilation (including removal of accumulated dust and debris throughout the cabinet), serviceability of surge or lightning protection devices, and isolation of transformer from cabinet grounds once per year (not to exceed 15 months between inspections). Tennessee would also require its corrosion technicians to measure pipe-to-soil readings at least once each calendar year (not to exceed 15 months

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

between inspections) at established test points. Technicians may increase inspection frequency when conditions warrant. Tennessee would require that the new pipeline segments have a cathodic protection system installed and in operation and a pipe-to-soil survey performed within 1 year of the installation date.

The USDOT requires that each operator establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Tennessee would provide the appropriate training to local emergency service personnel before the pipeline is placed into service. No additional specialized local fire protection equipment would be required to handle pipeline emergencies.

We received numerous comments expressing concern about the pipeline rupture that occurred on the Tennessee system in Sandisfield, Massachusetts in 1981, and we requested additional information from Tennessee regarding this incident. Tennessee stated that the incident resulted from the removal of a large boulder adjacent to its existing 24-inch-diameter Line 1 in Otis, Massachusetts and failure to follow established blasting procedures. A large boulder was impeding the installation of the new pipeline and was in the process of being fractured to facilitate removal. The rock was drilled, charges placed, and the detonation set off. The detonation caused the release of a large section of the boulder (fly rock) and its subsequent impact on the existing pipeline caused the rupture. The investigation of the incident for the Commonwealth of Massachusetts, led by the State Fire Marshal, determined that proper qualified blasting supervision was not present at the time of the incident, that too many charges had been set to detonate at the same time, and that adequate precautions were not taken to address the presence of significant subsurface rock in the soils. The blasting process did not use adequate matting or padding over the blast area as prescribed by the contract to minimize these issues. After this review, Tennessee made changes in the supervision and process for blasting activities to address the issues raised in the investigation. The work was authorized to proceed a week after the incident and the remaining work was completed without incident.

Tennessee states that it has reinforced the procedures and specifications for blasting activities for its projects since 1981. These procedures and specifications are included in the *Blasting Plan* for the Project. Among other procedures, Tennessee proposes to bring in outside blasting experts to assist in the design of the site-specific blasting plans, taking into account rock hardness, geology, and proximity to sensitive features, including existing pipelines. The outside blasting experts would assist Tennessee's contractor and its subcontractor in the design of the final blasting plan to address all issues found in the field prior to any blasting work commencing, and the remainder of the *Blasting Plan* procedures would then be followed.

Because Tennessee anticipates that blasting may be necessary given the geology of the Project area, its *Blasting Plan* was submitted as part of the July 31, 2014 certificate application filing. At the request of the Commission, Tennessee revised the *Blasting Plan* to include specific procedures for in-stream blasting, and submitted this revised version of the blasting plan on February 11, 2015. We have reviewed this *Blasting Plan* and find it to be sufficiently protective of public safety.

9.2 Pipeline Accident Data

The USDOT requires all operators of natural gas transmission pipelines to notify the USDOT of any significant incident and to submit a report within 30 days. Significant incidents are defined as any leaks that:

- cause a death or personal injury requiring hospitalization; or
- involve property damage of more than $50,000 (1984 dollars).[10]

During the 20-year period from 1995 through 2014, a total of 1,265 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table B-22 provides a distribution of the causal factors as well as the number of each incident by cause.

Table B-22

Natural Gas Transmission Pipeline Significant Incidents by Cause (1995-2014) [a]

Cause	Number of Incidents	Percentage
Corrosion	290	22.9
Excavation [b]	207	16.4
Pipeline material, weld or equipment failure	334	26.4
Natural force damage	148	11.7
Outside force [c]	79	6.2
Incorrect operation	40	3.2
All Other Causes [d]	167	13.2
Total	**1,265**	**—**

[a] All data gathered from US Department of Transportation Pipeline Hazardous Materials Safety Administration Significant incident files, July 14, 2015

[b] Includes third-party damage

[c] Fire, explosion, vehicle damage, previous damage, intentional damage

[d] Miscellaneous causes or unknown causes

The dominant causes of pipeline incidents are corrosion and pipeline material, weld, or equipment failure constituting 49 percent of all significant incidents. The pipelines included in the data set in table B-22 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, since corrosion is a time-dependent process. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed

[10] $50,000 in 1984 dollars is about $112,467 as of January 2015 (U.S. Department of Labor - Bureau of Labor Statistics, 2015).

after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe.

Outside forces are the cause in 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.

Older pipelines have a higher frequency of outside force 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 force incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movement. Table B-23 shows the various causes of outside force incidents.

Table B-23

Outside Forces Natural Gas Transmission Pipeline Incidents by Cause (1995-2014) [a]

Cause	Number of Incidents	Percent of all Incidents
Third-party excavation damage	172	40
Operator excavation damage	24	6
Unspecified equipment damage/previous damage	11	3
Heavy rain/floods	72	17
Earth movement	35	8
Lightning/temperature/high winds	28	6
Natural Force (other)	15	3
Vehicle (not engaged with excavation)	47	11
Fire/explosion	8	2
Previous mechanical damage	6	1
Fishing or maritime activity	7	2
Intentional damage	1	<1
Electrical arcing from other equipment/facility	1	<1
Unspecified/other outside force	7	2
TOTAL	**434**	**—**

[a] All data gathered from PHMSA Significant incident files, July 14, 2015.
Includes Excavation, Outside Force, and Natural Force from table B-22.

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 (for example, oil pipelines and cable television) to provide pre-construction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

Impact on Public Safety

As stated above, Tennessee would comply with the USDOT pipeline safety standards as well as regular monitoring and testing of the pipeline. While pipeline failures are rare, the potential for pipeline systems to rupture and the risk to nearby residents are discussed below.

The service incidents data summarized in table B-23 include pipeline failures of all magnitudes with widely varying consequences. Table B-24 presents the average annual injuries and fatalities that occurred on natural gas transmission lines for the 5-year period between 2009 and 2013.

Table B-24

Injuries and Fatalities – Natural Gas Transmission Pipelines

Year	Injuries	Fatalities
2010 [a]	61	10
2011	1	0
2012	7	0
2013	2	0
2014	1	1

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

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

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table B-25 to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to the other categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, or floods.

Table B-25

Nationwide Accidental Deaths by Cause [a]

Type of Accident	Annual Number of Deaths
All injuries (unintentional)	123,706
Motor vehicle accident	43,945
Poisoning (unintentional)	29,846
Falls (unintentional)	22,631
Drowning (unintentional)	3,443
Fire, smoke inhalation, burns (unintentional)	3,286
Floods [b]	89
Tornados [b]	74
Lightning [b]	52

Table B-25	
Nationwide Accidental Deaths by Cause [a]	
Type of Accident	**Annual Number of Deaths**
Natural gas distribution lines [c]	14
Natural gas transmission pipelines [c]	2

[a] All data, unless otherwise noted, from U.S. Census Bureau, 2012.
[b] NOAA, 2014.
[c] PHMSA significant incident files, July 14, 2015.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1995 to 2014, there were an average of 63 significant incidents, 10 injuries, and 2 fatalities per year. The number of significant incidents over the more than 300,000 miles of natural gas transmission lines indicates that the risk is low for an incident at any given location. The operation of the Project would represent a slight increase in risk to the nearby public.

10. Cumulative Impacts

In accordance with NEPA and FERC policy, we evaluated the potential for cumulative effects of the Project in the context of the proposed action when added to other past, present, and reasonably foreseeable future activities. Cumulative impacts represent the incremental effects of a proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of the agency or party undertaking such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time.

This cumulative effects analysis generally follows the methodology set forth in relevant guidance (CEQ, 1997, 2005; USEPA, 1999) and focuses on potential impacts from the proposed Project on resource areas or issues where their incremental contribution would be potentially significant when added to the potential impacts of other actions. To avoid unnecessary discussions of insignificant impacts and projects and to adequately address and accomplish the purposes of this analysis, an action must first meet the following three criteria to be included in the cumulative analysis:

- affect a resource potentially affected by the Project;
- cause this impact within all, or part of, the Project area; and
- cause this impact within all, or part of, the time span for the potential impact from the Project.

Information regarding present and future planned developments was obtained through Tennessee's research as well as our own. Tennessee consulted sources including federal, state, and local agency and municipality websites, reports and direct communications; permit applications with various agencies; and paid and free-access database searches.

Potential cumulative impacts associated with existing or proposed projects evaluated for potential cumulative impacts or activities in the region of influence were identified and are listed in appendix J. Past projects are considered in the baseline environmental analysis discussed in section B of this EA; therefore, this cumulative analysis is focused on the projects listed in appendix J. Projects identified in appendix J were assessed using available information; however, changes may be made to the projects over time during development and construction.

The region of influence varies for each resource and, therefore, different projects would influence the cumulative effects on different resources. The projects that were identified within the region of influence include 12 oil and gas projects, 20 utility and electric projects, 56 transportation projects, 4 alternative energy projects (i.e., hydropower, solar, and wind), 4 commercial projects, 11 residential projects, and 15 other projects (see appendix J). Each project is associated with one or more region of influence in which it is located. The resource discussions below state the region of influence that was identified for cumulative impacts on that resource. Regions of influence range from distances from the proposed Project (0.25 mile, 0.5 mile, 5 miles, 10 miles) to watersheds, and counties in which the Project is located.

Potential impacts likely to be cumulative with the Project's impacts are related to geology and soils, water resources and wetlands, vegetation and wildlife (including federal- and state-listed threatened and endangered species), land use and visual resources, air quality and noise, climate change, socioeconomics, and cultural resources. The proposed pipeline facilities could contribute to these cumulative impacts; however, Tennessee would minimize adverse Project impacts by implementing appropriate measures as described in section B of this EA.

10.1 Geology and Soils

The region of influence considered for cumulative impacts on geology and soils is 0.25 mile from the Project, as impacts are generally localized to the construction right-of-way due to implementation of mitigation measures, including erosion and sediment control measures and site-specific blasting plans, among others. These cumulative impacts would be most significant if the projects were constructed at or near the same time and within proximity to one another. Three projects were identified within the region of influence and are included in appendix J.

It is reasonable to expect that current, proposed, or reasonably foreseeable future projects would involve grading and other temporary ground disturbance activities associated with construction. The construction of these projects has the potential to affect near-surface geologic resources and soils through wind and water erosion, blasting, and poor post-construction soil stabilization and restoration. Permanent impacts would occur if other past, present, or reasonably foreseeable future projects have or will convert land to impervious surfaces; however, this impact would not be significant based on the minor permanent impacts proposed from access roads and facility modifications for the proposed Project.

Construction associated with the proposed Project would result in temporary and minor impacts on near-surface geology and soils, as discussed in section B.1. Cumulative impacts on soils could occur if the projects are constructed concurrently or if one project re-disturbs an area that had been previously stabilized and restored by another project.

The NED Project would affect a portion of the areas that would be affected by the Connecticut Expansion Project along the New York Loop and the Connecticut Loop. As the proposed Project would be constructed in 2015 and 2016, the disturbed areas would be restored prior to the start of the NED Project which is estimated to be constructed in 2017 and 2018, should it receive a Certificate from the Commission. Cumulative impacts could occur where both projects disturb the same areas, which, if it occurs, would likely be along the westernmost 0.5 mile of the New York Loop where the Market Path portion of the NED Project would be collocated with the proposed Project and along the Connecticut Loop near MP 8.3 where the loop would terminate at Tennessee's existing East Granby Meter Station and the 300 Line Connecticut Loop of the NED Project would begin. The cumulative impacts are expected to be minor based on the small overlap of construction workspaces of the two projects, and both projects would adhere to similar erosion and sedimentation control plans and procedures to minimize erosion impacts.

As described in section B.1, effects from the construction and operation of the proposed pipeline facilities would be relatively minor and would be minimized by implementation of Tennessee's construction plans (e.g., *Blasting Plan*) and the FERC Plan. In addition, other projects would likely be required to apply for similar federal and state permits that would require implementation of erosion and sediment control measures, such as CWA Section 404 permits with the USACE; therefore, we conclude that cumulative impacts on geologic resources and soils would not be significant.

10.2 Water Resources and Wetlands

The region of influence considered for cumulative impacts on water resources and wetlands is the watershed boundary Hydrologic Unit Code (HUC) 8, which contains the proposed Project, as impacts within waters or wetlands could migrate downstream within the watershed. The health of a water system and cumulative impacts are both traditionally assessed on a watershed level. Of the projects in appendix J, 101 projects were identified within the region of influence.

We expect that the projects identified in appendix J would involve grading and other ground-disturbing activities that have the potential to affect surface water and wetlands within the watersheds crossed by the proposed Project. The construction of these projects has the potential to affect surface water and wetlands through increased turbidity due to direct impacts associated with waterbody crossings and potentially reintroducing buried contaminated sediments into the water column, and indirect impacts associated with improper erosion control devices and increased pollutants due to the potential for leaks and spills. General impacts on water quality resulting from these projects are anticipated to be similar to those described for the proposed Project in section B.2, and other projects would be required to apply for permits with the USACE if wetlands would be affected, leading to potential mitigation for impacts.

Groundwater

Construction activities for the Project would not require the withdrawal or use of groundwater; therefore, we do not anticipate Project construction or operations would affect groundwater quality or supply. Localized impacts may occur due to trenching and dewatering; however, these impacts would be short-term during construction only and minimized through the use of mitigation measures. Given this, we do not expect the Project's minor additive impacts on groundwater would contribute to any significant cumulative impacts associated with groundwater quality, or withdrawal and depletion. Blasting may occur along the Massachusetts Loop, but is unlikely to occur along the New York and Connecticut Loops as there is no known shallow bedrock in these areas (see section B.1.2). Because blasting may occur, there is a potential for cumulative impacts to occur by the progressive weakening of structures or water wells due to multiple blasts occurring within the same blasting influence area, even if blasting were to occur multiple years apart. However, of the projects listed in appendix J, only the NED Project would occur within 400 feet of the proposed Project. Tennessee stated in its application for the NED Project that it would test wells within 200 feet of the proposed workspace and remediate or replace the wells if necessary, as discussed in its application.

As described in section B.2.1, effects from the construction and operation of the proposed Project facilities would be relatively minor and would be minimized by implementation of the FERC Plan and Procedures and our recommendations; therefore, we conclude that cumulative impacts on groundwater resources would not be significant.

Surface Water

Construction of the Project would result in temporary impacts on 17 waterbodies (see section B.2.2 and appendix E). We estimate that the projects listed in appendix J would cross a number of waterbodies within the three watersheds (region of influence) that would contain the proposed Project. A majority of the projects in appendix J would be required by various federal, state, and local agencies to use mitigation measures to minimize erosion and sedimentation into surface water resources. In addition, the proposed Project would not result in any permanent fill of surface water resources or alterations of flow. Therefore, construction and operation associated with the proposed Project and current, proposed, or reasonably foreseeable future projects would result in temporary and minor impacts on surface water resources. The greatest potential for cumulative impacts would come from an increase in sediment loading from construction within or runoff into wetlands or waterbodies. During Project construction, water withdrawals from surface waters would be minimal. Water from municipal sources would be used for the New York and Connecticut Loops, while the Massachusetts Loop would use water from Lower Spectacle Pond if a permit is approved by MADEP. As discussed in section B.2.2, Tennessee would implement measures in its *SPRP* and the FERC Procedures to prevent and manage inadvertent spills.

Of the 17 waterbodies crossed by the proposed Project, 4 along the New York Loop would also be crossed by the NED Project. However, as noted above, the projects listed in appendix J would also cross a number of waterbodies within the watersheds that contain the proposed Project but none were identified within the same footprint of the Connecticut Expansion Project.

The greatest potential impacts from current, proposed, or reasonably foreseeable future projects would result from stream crossings and stormwater runoff from disturbed areas during and after construction. While the actual impacts of the individual actions may vary from our estimates, the scale of the cumulative impacts of the combined projects in context of the available surface resources within the watershed would be minor.

As described in section B.2.2, effects from the construction and operation of the proposed pipeline facilities would be temporary, relatively minor, and would be further minimized by implementation of Tennessee's construction plans (e.g., *Blasting Plan*) and the FERC Plan and Procedures. Therefore, we conclude that the Project's minor additive impacts on waterbodies would not contribute to significant cumulative impacts on water resources within the affected watersheds.

Wetlands

Construction of the Project would result in temporary impacts on 60.5 acres of wetlands, while operations would permanently affect about 9.3 acres of wetlands mostly through the conversion of PFO and PSS wetlands to PEM wetlands (see section B.2.3). Cumulative impacts on wetlands would occur when construction and operation of other past, present, and reasonably foreseeable future projects result in the filling or conversion of the same wetland type within the watershed. Individual wetlands could be cumulatively affected if multiple projects affect the same wetlands in the same general timeframe, which would encompass both the construction period and the time necessary for wetlands to restore to former functionality.

None of the wetlands crossed by the Massachusetts Loop or Connecticut Loop would likely be adversely affected by another known current, proposed, or reasonably foreseeable future project. The NED Project would cross 2 of the 13 wetlands that would be affected by the proposed Project along the New York Loop. There is the potential for cumulative impacts to occur from wetland vegetation clearing, access road construction, or sedimentation which may occur from construction within or around a wetland. The USDA-NRCS (2011) land use data indicate that there are about 115,341 acres of wetlands within the Middle Hudson watershed. Of this acreage, a minimal portion (likely less than 1 percent) would be affected by multiple projects.

Most of the estimated impacts on wetlands would be temporary as the proposed Project does not include permanent fill of a wetland and most impacts would be from conversion of PFO and PSS wetlands to PEM wetlands. The creation of new wetlands and restoration or enhancement of existing wetlands through compensatory mitigation as approved by the USACE and other state agencies are expected to appropriately mitigate for impacts on wetland resources and minimize any cumulative wetland impacts from past, present, and reasonably foreseeable future projects.

As described in section B.2, effects from the construction and operation of the proposed Project facilities would be relatively minor and minimized by implementation of Tennessee's construction plans (e.g., *Blasting Plan*), the FERC Plan and Procedures and our recommendations. Therefore, we conclude that the Project's minor contribution of additive impacts in the watershed would not contribute to significant cumulative impacts on wetlands.

10.3 Vegetation, Fisheries, Wildlife, and Threatened, Endangered, and Special Status Species

The region of influence considered for cumulative impacts on vegetation, fisheries and wildlife is the watershed boundary HUC 8, which contains the proposed Project, as vegetation, fisheries, and wildlife species can be specialized within a watershed. A 5-mile region of influence for cumulative impacts on threatened and endangered species was used due to the localized nature of the impacts, particularly for less mobile species. Of the projects in appendix J, 101 projects were identified within the region of influence for vegetation, fisheries and wildlife; 39 projects were identified within the region of influence for threatened and endangered species.

It is reasonable to expect that the projects in appendix J would involve vegetation clearing, grading, and other ground-disturbing activities that have the potential to affect fish, wildlife, and vegetation resources within the region of influence. General impacts on these resources would be similar to those described for the proposed Project in section B.3 and B.4 and include temporary displacement, habitat loss, increased susceptibility to invasive species, and increased mortality rates due to direct impacts and decreased water quality. Construction at the same time or in proximity to the proposed Project would increase impacts and would lengthen the recovery time for affected vegetative communities and habitats. The primary impacts of the construction of the proposed Project and other current, proposed, or reasonably foreseeable future projects on vegetation, fisheries, and wildlife would be short-term due to removal of vegetation and the displacement of wildlife from construction areas.

Vegetation

Cumulative impacts on vegetation would occur if current, proposed, or reasonably foreseeable future projects within the geographic boundary affected a large percentage of any existing vegetation type or caused a large amount of fragmentation, thus blocking the efficiency of seed distribution. The introduction or spread of invasive, non-native species, such as noxious weeds, also has the potential to cumulatively affect native plant populations. Construction of the proposed Project would temporarily affect about 197 acres of various vegetation types and permanently impact about 51 acres of vegetation, including 27 acres of forested land. No forest fragmentation would occur by construction or operation of the proposed Project. Crops and native low growing vegetation would be allowed to regrow within the rights-of-way and would recover within 1 to 2 years. Forested upland areas within the construction workspace would experience long-term impacts, as the regrowth of forested areas to pre-construction conditions would take 20 to 30 years for many species, while hardwood species could take more than 50 years to reach maturity. This would most likely also be the case for power line and other pipeline projects, while roads and residential or commercial development would limit the regrowth of all native vegetation.

As described in section B.3, effects from the construction and operation of the proposed pipeline facilities would be relatively minor and would be minimized by implementation of Tennessee's construction plans (e.g., *Invasive Species Management Plan*), the FERC Plan and Procedures and our recommendations; therefore, we conclude that additive impact of the Project on vegetation in consideration of other current, proposed, or reasonably foreseeable projects would not be significant.

Fisheries

Cumulative impacts on fisheries and aquatic resources could occur if current, proposed, or reasonably foreseeable future projects occur within the same segment of a waterbody as the proposed Project, and would be compounded if they have similar construction timeframes. In addition to potential impacts from habitat alteration, destruction of stream cover, interruption of fish migration and spawning, water depletions, and entrainment or entrapment during construction, the greatest potential impacts are related to water quality degradation through sedimentation, turbidity, erosion, and accidental spills.

The six waterbodies proposed to be crossed by the New York Loop are warmwater fisheries. As stated above in section B.10.2, four of these waterbodies would also be crossed by current, proposed, or reasonably foreseeable future projects. Construction that would occur within the waterbodies or on the banks has the potential to cause temporary sedimentation that would be compounded if multiple projects occurred simultaneously. The Hudson River, within the watershed where the New York Loop is located, contains threatened and endangered species and anadromous fisheries. Other projects cross over, under or are buried underneath the Hudson River within the watershed (see appendix J). Combined, these projects would result in water quality impacts and could potentially affect anadromous fisheries within the Hudson River. The proposed Project would not cross the Hudson River, but it would cross its tributaries, thereby contributing to cumulative impacts on the larger waterbody, even if only to a minimal degree.

Along the Massachusetts Loop, Lower Spectacle Pond and Spectacle Pond Brook are warmwater fisheries, while all of the other waters that would be crossed by the loop are tributaries to Clam River and are identified as coldwater fisheries. Based on available information, it is not likely that the streams crossed by the proposed Massachusetts Loop would be crossed by other projects; however, as listed in section B.10.2, other projects would occur within the Farmington Watershed.

None of the waterbodies that would be crossed by the Connecticut Loop contain any state or federally listed fish species. Based on available information, it is not likely that the streams crossed by the proposed Connecticut Loop would be crossed by other projects; however, as listed in section B.10.2, other projects would occur within the watershed affected by the Connecticut Loop. The Connecticut River contains threatened and endangered species and anadromous fisheries. Some of the other projects within the Lower Connecticut watershed would cross over or under the Connecticut River (appendix J). The Connecticut Loop would not cross the Connecticut River, but it would cross its tributaries thereby contributing to cumulative impacts on the larger waterbody, even if only to a minimal degree. This would include potential impact on anadromous fisheries.

We expect impacts to be minimized by implementation of Tennessee's construction plans (e.g., *SPRP)* and the FERC Plan and Procedures, as well as applicable state and federal permit requirements. In addition, there is no Essential Fish Habitat near the proposed Project area, and no significant fisheries of commercial or recreational value were identified that would be crossed by or adversely affected by the proposed Project. Furthermore, given the separation in time between construction of the proposed Project and other projects, we conclude that cumulative impacts on fisheries resources would not be significant.

Wildlife

Construction of the proposed Project and other current, proposed, or reasonably foreseeable future projects would cause a cumulative impact on wildlife. These cumulative impacts would be most significant if the projects were constructed at or near the same time (including the timeframe for habitat restoration) and within proximity to one another. The primary impact of the construction of the proposed Project and other current, proposed, or reasonably foreseeable future projects on wildlife would be short-term due to removal of vegetation habitat and the displacement of wildlife from construction areas. Temporary impacts are commonly associated with projects of this type which include but are not limited to impacts on food, cover, and water sources. Construction noise would most cause mobile species to avoid areas during construction.

Tennessee would collocate its Project with its existing rights-of-way for most of the pipeline alignment (and thus follow existing forest edges) to minimize impacts on wildlife habitat. This would decrease the impacts associated with undisturbed habitats and vegetation, which would limit the Project's contribution to cumulative impacts on vegetation communities and wildlife habitats, including migratory birds. It is understood that many of the other projects would also be entirely within or adjacent to existing rights-of-way, and most disturbed areas would be allowed to return to pre-existing conditions minimizing long-term impacts.

The effect of workspace clearing on forest habitat wildlife species would be greater than on open habitat wildlife species in regard to restoration and growth rate of forested habitat. This would potentially result in the cumulative loss of individuals of small mammal species, amphibians, reptiles, nesting birds, and non-mobile species from these areas. Typically project restoration activities would restore some vegetation cover in the forested areas unless the habitat was removed for structures or impervious surfaces. Typically when restoration has been completed in an area, wildlife will return to the construction areas and adjacent areas to use the habitat. To minimize impacts, temporary disturbance areas would be revegetated following construction and it is reasonable to assume that other projects subject to environmental reviews or regulatory programs would also be required to do the same.

As described in section B.3, effects from the construction and operation of the proposed Project facilities would not affect wildlife populations and would be minimized by implementation of the FERC Plan and Procedures and our recommendations; therefore, we conclude that cumulative impacts on wildlife would not be significant.

Threatened, Endangered, and Special Status Species

A total of five federally listed species and one candidate species, under the jurisdiction of the USFWS, were identified as potentially occurring in the proposed Project area. Through consultation with the state agencies, 31 state-listed threatened, endangered, or special concern species were identified as potentially occurring in the Project area. There are no state-protected vegetation species or habitat present or in close proximity to the proposed Project. Cumulative impacts on these species could occur, as 39 projects are within the region of influence and could affect same species or their habitat.

Of these six federally listed or candidate species, three would not be present within the Project area due to lack of habitat. Two could potentially be present based on the presence of habitat, and one species was confirmed within the Project area. The proposed Project would have no effect on three of these species – the bog turtle, the Karner blue butterfly, and the New England cottontail rabbit. We have determined that the Project *may affect, but would not likely adversely affect* the Indiana bat and the northern long-eared bat. Tennessee proposes to adhere to conservation measures to avoid, minimize, and mitigate impacts on the two bat species by conducting tree clearing within the winter months.

Consultations with USFWS regarding these measures is ongoing. Dwarf wedgemussels were found within and adjacent to the Project's footprint. Tennessee has proposed to relocate the dwarf wedgemussels out of the construction area prior to construction commencement, and would monitor the success of the relocations and provide full reports to the New England USFWS field office and CTNDDB. We have determined that the Project *may affect, and would likely adversely affect* the individual dwarf wedgemussels being relocated within Muddy Brook and Stony Brook; however, the FERC would not allow the Project to proceed as proposed unless the USFWS makes a determination, through issuance of its Biological Opinion, that the proposed action would not jeopardize the continued existence of the species within its range. Avoidance measures and/or conservation measures would likely be required for the 39 other projects within the region of influence by the relevant jurisdictional agencies to minimize potential impacts on federal- and state-listed species. Therefore, by clearing trees in the winter months and completion of ESA consultation with the USFWS, the Project would not jeopardize the continued existences of the listed or candidate species or adversely affect critical habitat.

A portion of the Farmington River within the Massachusetts Loop watershed contains threatened and endangered species with additional classification as Wild and Scenic in relation to the National Wild and Scenic River System. The proposed Project would not cross the Farmington River, but in combination with other projects within the watershed the Project, could potentially contribute minor additive effects to waterways feeding the Farmington River by increasing sedimentation or releasing petroleum products.

In addition to the federally listed or candidate species, 31 state-listed species were identified that could potentially occur within the proposed Project workspace. The majority of these species are migratory birds and, as the birds are highly mobile, it is likely that they would avoid the Project area during construction activities. Several less mobile species, such as reptiles and plants, were also identified. However, Tennessee proposes to conduct surveys for the listed species for which suitable habitat is present during the appropriate season to minimize impacts. Therefore, we believe that the proposed Project, in conjunction with other projects, would not result in significant cumulative effects to state-listed species.

As described in section B.4, construction and operation of the proposed pipeline facilities would not affect or would not likely adversely affect five of the six federally listed or candidate species in the proposed Project area. Impacts on the dwarf wedgemussel would be minimized by relocating the mussels within the Project area and within a buffer area surrounding the Project workspace. The relocation areas would be located upstream and outside of the buffer area surrounding the Project workspace; therefore, it can be reasonably deduced that, should future expansion occur in the Project area, the relocated dwarf wedgemussels would be far enough away from project workspace to minimize impacts. In addition, the proposed Project would not adversely affect the state-listed species identified as potentially occurring within the Project area. Based on our review, we conclude that cumulative impacts on five of the six federally listed or candidate species and the state-listed species would be minor. The proposed Project would adversely affect individual dwarf wedgemussels; however, the proposed Project, in conjunction with other projects, would not jeopardize the continued existence of the species. We expect impacts to be minimized through by implementation of Tennessee's construction plans (e.g., *Blasting Plan*), the FERC Plan and Procedures and our recommendations. Therefore, we conclude that cumulative impacts would not be significant.

10.4 Land Use and Visual Resources

The region of influence that was identified for cumulative impacts on land use, recreation and visual resources is a 10-mile radius from the Project footprint to encompass any large areas with specialized or recreational uses, as well as potential visual impacts. Of the projects in appendix J, 64 projects were identified within the region of influence. The construction and operation of the Project and other current, proposed, and reasonably foreseeable future projects would result in temporary and permanent cumulative impacts on land use. Advantages gained from the Project's collocation with existing utility corridors include avoidance of forest fragmentation, an expansion of a current land use (i.e., maintained right-of-way) instead of introduction of an entirely new corridor, and fewer visual impacts. However, we recognize that collocation with existing utility corridors may, in some cases, also have negative consequences to particular tracts, such as small privately held properties. Although collocation may reduce cumulative impacts overall, the cumulative impacts of two or more rights-of-way on individual properties or managed sites may be magnified. The proposed New York Loop and the proposed Massachusetts Loop would be collocated with Tennessee's existing 200 Line system; therefore, the proposed loops would be the third pipes within the rights-of-way in both New York and Massachusetts.

While many of the impacts would be temporary, construction of the Project would result in some permanent land use changes from forested areas to maintained right-of-way or aboveground facilities. Visual impacts along the right-of-way would be minor, with the largest impacts related to a conversion of forested land to open land. Visual impacts from aboveground facilities from the proposed Project would be minimal, as two pig receivers would be relocated to new positions along the rights-of-way and one new MLV would be constructed; the remainder of the aboveground facilities would be located with other existing aboveground facilities and would, therefore, not result in any visual impacts not already occurring. If the Project were built at the same time as other projects, cumulative impacts could result on recreation and special-interest areas if other projects affect the same areas or feature at the same time. As most of the projects listed in appendix J would not affect the same area or feature at the same time as the proposed Project, and because almost 95 percent of the proposed Project would be constructed adjacent to existing rights-of-way, we conclude that cumulative impacts on current land use and visual resources would not be significant.

10.5 Socioeconomics

The proposed Project and other projects in the region have the potential to affect the socioeconomic condition of entire counties, as demographic statistics are generally assessed on a county basis. The region of influence for socioeconomic factors is defined as the counties in which the proposed Project would be located. Of the projects included in appendix J, 92 projects were identified within the region of influence.

The activity associated with these various projects would result in a range of cumulative socioeconomic impacts in the region of influence, such as increased employment and tax revenues. The proposed Project, would contribute short-term positive economic impacts during the construction phase. The majority of these benefits would be temporary and minor, including increased activity from construction crews at restaurants, hotels/motels, and retailers. State and local communities would also benefit from local sales and property taxes that Tennessee would pay during ongoing operation of the proposed Project, and indirect and induced impacts within the region of influence. Other major energy projects, infrastructure improvements, and residential/commercial projects in the region of influence, such as the Atlantic Bridge Project proposed by Spectra Energy, would likely have similar impacts on the economy during construction.

Although several projects have the potential to occur within the same counties at the same time, they may be separated by 50 miles or more. As such, adverse impacts on housing, public services, and infrastructure associated with a given project may be localized and not contribute to a cumulative adverse impact countywide. Projects, including the proposed Project, would be required to apply for state and/or local permits for road crossings and heavy equipment use of particular roads. No long-term cumulative impact on infrastructure and public services is anticipated. Because each community is required to collect state sales and use taxes and counties assess annual property taxes, a net positive economic impact on any local community would have a net positive impact at the county and state level as well.

As described in section B.6, effects from the construction and operation of the proposed pipeline facilities would be relatively minor and would be minimized by implementation of the FERC Plan and Procedures and our recommendations; therefore, we conclude that cumulative impacts on socioeconomic resources would not be significant.

10.6 Cultural Resources

The region of influence for cultural resources is 0.25 mile from the Project. This smaller region of influence is used because cumulative impacts on cultural resources would only occur if other projects were to affect the same historic properties as the proposed Project and cultural resources are stationary. During surveys, a total of 6 archaeological sites and 17 historic properties either listed or potentially eligible for listing were identified. Tennessee has developed *Avoidance and Protection Plans* for certain resources, which have been approved by the appropriate agencies. Therefore, no adverse impacts are anticipated on cultural resources from the proposed Project.

Based on the available information for the projects identified, three projects were identified within the region of influence and are included in appendix J; these projects could occur within the same areas as the cultural resources affected by the Project. However, these projects would be required by federal and/or state regulation to avoid, minimize, and mitigate impacts on cultural resources in a similar manner to the proposed Project. These projects may incrementally add to the cumulative effects of other projects that may occur at the same time; however, this incremental increase would not be significant.

10.7 Air Quality and Noise

The region of influence for cumulative impacts on air quality and noise is 0.5 mile from the Project footprint. Given the temporary nature of Project construction and the limited geographic scope of each construction spread, construction-related air quality impacts would be intermittent, highly localized to the pipeline construction rights-of-way and/or the aboveground facility areas. The modifications proposed by Tennessee for the Project would not include adding compression; therefore, no changes would occur in operational emissions and aboveground facilities would not result in cumulative impacts on air quality or noise. Of the projects in appendix J, three projects were identified within this region.

The impacts most likely to be noticed by local residents would be from fugitive dust from construction of projects within the region of influence. The combined effect of multiple construction projects occurring in the same area and timeframe as the proposed Project could temporarily add to the ongoing air quality effects of existing activities. These impacts may be minimized by mitigation measures, such as using properly maintained vehicles, using commercial gasoline and diesel fuel products with specifications to control pollutants, implementing fugitive dust control measures, and using erosion control devices to prevent erosion. However, the contribution of the proposed Project and other projects would be temporary and minimal, as effects would generally be localized and other projects would be required to comply with the CAA and state air quality regulations. Based on this information, we conclude cumulative air quality impacts would not be significant.

Similarly, noise impacts associated with the Project would only occur during construction. Noise impacts are highly localized and attenuate quickly as the distance from the noise source increases; therefore, cumulative impacts are unlikely, unless one or more of the other projects are constructed at the same time and location. The Marcy to Pleasant Valley Project and Champlain Hudson Power Express may be constructed at the same time as the proposed Project. The actual location of the Marcy to Pleasant Valley Project is still to be determined; therefore, cumulative impacts on noise are unknown until the location is determined. The two projects at Bradley International Airport would not likely contribute any additional noise greater than the airport itself. Most noise impacts associated with the Project and other projects would occur during daytime hours and be intermittent rather than continuous. In addition, other projects would be required to adhere to similar noise requirements and mitigation measures as the proposed Project; therefore, cumulative noise impacts on residents and surrounding communities would not be significant.

10.8 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer is not an indication of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The U.S. Global Change Research Program's report notes the following observations of environmental impacts that may be attributed to climate change in the Northeast region:

- more frequent days with temperatures above 90º F;
- a longer growing season;
- increased heavy precipitation;
- less winter precipitation falling as snow and more as rain; and
- rising sea surface temperatures and sea level.

GHG emissions are a primary cause of climate change (USEPA, 2014b). Of the GHGs emitted, CO_2 is the most prevalent, accounting for 82 percent of all United States emissions in 2012 (USEPA, 2014c). CH_4 is the second most prevalent, accounting for 9 percent of the total United States emissions (USEPA, 2014d). Between 1990 and 2012, natural gas and petroleum systems accounted for 29 percent of CH_4 emissions in the United States. Although the amount of CH_4 being emitted into the atmosphere is significantly less than that of CO_2, the comparative impact of CH_4 on climate change over a 100-year period is more than 20 times greater (USEPA, 2014e). Fugitive CH_4 emissions are common in natural gas systems and can occur during natural gas production, transmission, storage, and distribution (USEPA, 2014f).

Emissions of GHGs from the proposed Project would not have any direct impacts on the environment in the area of the other projects on the local level (e.g., criteria pollutants). The GHG emissions from the construction and operation of the proposed Project would be negligible compared to the global GHG emission inventory. Additionally, burning natural gas results in less CO_2e compared to other fuel sources (e.g., fuel oil or coal).

Currently there is no standard methodology to determine how the Project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment. However, the emissions would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to climate change. However, because the Project's contribution to GHG emissions would only be through construction equipment, the contribution to GHG emissions would not be significant.

10.9 Conclusion on Cumulative Impacts

We conclude impacts associated with the Project would be relatively minor, and would be further mitigated by our recommended additional measures to reduce the environmental impacts associated with the Project. A majority of the cumulative impacts identified from other projects or activities in the region of influence would also be temporary and minor. Short-term cumulative benefits would be realized through the creation of jobs and purchase of local goods and services from projects. We find that each of these projects would also result in mostly temporary and minor effects during construction and each current or foreseeable future project would also contribute to small impacts on resources in the counties identified as the region of influence for this Project. Consequently, a small, but insignificant cumulative effect is anticipated when the impacts of the Project are added to other projects in the regions of influence.

C. ALTERNATIVES

In accordance with NEPA and FERC 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, pipeline route alternatives, minor route variations, and aboveground facility alternative sites. 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 published studies, comments and suggestions from regulatory agencies, analyses prepared for similar projects, our site reviews of the Project area, comments from the public, and data provided by Tennessee in its application and supplemental filings.

Each alternative was considered to the point where it was clear the alternative was not reasonable, would result in greater environmental impacts than those of the proposed Project, or it could not meet the Project objective.

It should be recognized that the routing of the proposed Project reflects alternative modifications to the originally proposed route provided in Tennessee's application. Based on discussions with landowners, land managing agencies, Project engineers, and FERC staff's Environmental Information Requests, Tennessee incorporated route modifications into its proposed Project to avoid or minimize impacts on sensitive resources, reduce or eliminate engineering and constructability concerns, and/or avoid or minimize conflicts with existing land uses. The associated environmental consequences are included in our environmental analysis throughout section B of this EA.

In addition to these adopted route alternative modifications, minor alignment shifts may be required prior to and during construction to accommodate currently unforeseeable site-specific constraints related to construction, safety, engineering, landowner, and/or environmental concerns. All such alignment shifts would be subject to review and approval by FERC prior to construction, with the exception of minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

1. No Action Alternative

If the Commission were to deny Tennessee's application, the Project would not be built and the environmental impacts identified in this EA would not occur. Under this alternative, Tennessee would not be able to provide the infrastructure to increase natural gas delivery capacity as agreed to in its binding precedent agreements with Project shippers. As a result, the objectives of the Project would not be met and the customer needs would not be realized.

Under the no-action alternative, other natural gas transmission companies might propose to construct similar facilities to meet the demand for new service. Such actions could result in impacts similar to or greater than the proposed Project, and might not meet the Project's purpose and need within the proposed timeframes. Therefore, we have concluded that the no-action alternative would not satisfy the Project objectives.

2. System Alternatives

System alternatives would make use of existing, modified, or proposed pipeline systems to meet the stated objectives of the Project. Although some modifications or additions to existing or proposed pipeline systems may be required, implementation of a system alternative would deem it unnecessary to construct all or part of the Project. These modifications or additions could result in environmental impacts that are less than, similar to, or greater than those associated with construction and operation of the Project. The purpose of identifying and evaluating system alternatives is to determine whether the environmental impacts associated with construction and operation of the Project could be avoided or reduced by using another pipeline system, while still meeting the objectives of the Project.

The proposed Project is an expansion of Tennessee's existing pipelines that already make use of existing infrastructure thereby minimizing environmental impacts. However, our analysis of system alternatives includes an examination of existing and proposed natural gas systems that currently or would eventually serve the markets targeted by the proposed Connecticut Expansion Project, and considers whether those systems would meet the proposed Project's objectives while offering a significant environmental advantage over the proposed Project. The section also includes a discussion of Tennessee's existing system and other modifications that could be made to meet the objectives of the proposed Project.

In addition to Tennessee's system, the Algonquin Gas Transmission Pipeline (Algonquin) is an existing system that is located in proximity to the proposed Project area and has the potential to transport supplies of natural gas in the market area. Algonquin received a FERC Certificate authorizing its AIM Project on March 3, 2015, with an anticipated in-service date of November 2016. Algonquin has signed long-term binding contracts with 10 shippers to deliver all of the natural gas capacity of the AIM Project, and is therefore at full subscription, to its respective service areas in Connecticut, Massachusetts, and Rhode Island as discussed in its application and the EIS which are available for viewing on our website (eLibrary under Docket No. CP14-96-000). Because the AIM Project is fully subscribed, in order to meet the proposed Project objectives, the Algonquin system would also require additional infrastructure for new receipt and delivery points to make the system accessible as an alternative to the Connecticut Expansion Project. Furthermore, if the AIM Project is not constructed and operated, other modifications to the Algonquin system would be required to meet the objectives of the proposed Project because its capacity is also fully subscribed. Therefore, we conclude that the Algonquin system is not a viable alternative to the proposed Project.

FERC staff evaluated two compression-only alternatives, which included construction of new compression facilities and increasing compression horsepower at existing compressor stations, rather than constructing portions of the proposed Project. No viable alternative were assessed that would be able to replace the entire proposed Project with increasing compression horsepower only.

A compression alternative along Tennessee's pipeline system was evaluated that would increase compression by 3,500 horsepower at the existing Compressor Station 261 in Agawam, Massachusetts and would remove the need for the proposed Massachusetts Loop. The additional compression was reviewed and it was determined that it would result in greater air emissions. Furthermore, it would result in lower pressures upstream (west) of Compressor Station 261, which would be exacerbated during periods of peak demand, thereby affecting natural gas flow reliability to existing shippers, as well as reducing pressure and reliability (east) in Massachusetts, when gas is in greatest demand. For this reason, FERC staff does not consider this a viable alternative to the proposed Project. Another compression alternative was evaluated that would include the construction and operation of a new compressor station which would remove the need for the Connecticut Loop. This alternative would include a new 4,500-horsepower compressor station near Tennessee's existing MLV 354-1 site on its 300 Line. Although there is no standard size for a compressor station site, they are generally constructed on 10 to 40 acre parcels. Additional acreage may also be purchased to provide necessary noise attenuation and visual buffers. Compressor stations represent a permanent conversion of land use and involve operational air and noise emissions that are not associated with pipeline looping expansions. By comparison, the Connecticut Loop would temporarily impact 84 acres, with 35 acres retained as a permanent easement. In addition, 7.6 miles of the 8.3-mile-long pipeline loop would be collocated immediately adjacent to Tennessee's existing right-of-way. Following construction, the right-of-way would be restored and the majority of previous land uses could return, and there would be no operational air or noise emissions. While the compressor station alternative would impact less acreage during construction, operational impacts would be similar. Furthermore, a new compressor station would result in increased air and noise emissions, and a permanent impact on land use. Therefore, we do not consider this to provide a significant environmental advantage to the proposed Project.

No other existing, modified, or proposed systems were evaluated that have the ability to meet the needs of the Project.

3. Route Alternatives and Variations

A route alternative deviates from a proposed pipeline alignment for a substantial length and distance in an effort to reduce overall environmental impacts. Route variations are identified in response to specific local concerns and may not always clearly display an environmental advantage other than to reduce impacts on a localized level. While route variations may be less than a few miles in length, most are relatively short and in proximity to the proposed route. The minor route alternatives and variations discussed in this section were identified after the formal filing of Tennessee's application on July 31, 2014.

3.1 New York Loop Route Alternatives and Variations

No route alternatives were identified during or after our scoping period for the New York Loop. After the scoping period for the Project and at the request of a landowner, a route variation was evaluated north of the originally proposed pipeline right-of-way near MP 2.8 to reduce impacts on the landowner's property. The request was provided through a comment filed on the docket by the landowner on June 10, 2015 and Tennessee provided the results of its evaluation to the FERC in its response to Environmental Information Request on June 24, 2015. The route was shifted north of Tennessee's existing pipelines where a crossover would be used at the far eastern edge of the property prior to tie the proposed New York Loop back to the existing pipeline. We reviewed this route variation and determined no additional impacts on sensitive resources, including wetlands, would result. Tennessee incorporated this route into its proposed route for the New York Loop, thus it is further evaluated as part of the Project in section B of this EA.

3.2 Massachusetts Loop Route Alternatives and Variations

In response to comments FERC received during our scoping period and from comments received through the MEPA scoping process, FERC staff evaluated three route alternatives and one route variation for the Massachusetts Loop to either avoid or reduce impacts on the Otis State Forest property that is owned and operated by the MADCR.

Two route alternatives were evaluated by FERC staff that would avoid the proposed 2.0 miles of the Massachusetts Loop that crosses MADCR property, including Otis State Forest. Alternative 1 is about 14.1 miles long and is located north of the existing Tennessee right-of-way. Alternative 2 is about 11.4 miles long and is located south of the existing Tennessee right-of-way. Both alternatives begin near the proposed starting point for the proposed loop at MP 0.0 and interconnect with the existing 200 Line system southeast of the proposed loop about 6 miles and 4 miles, respectively. Figure 9 shows both alternatives in relation to the proposed Project. As summarized in table C-1, the construction and operation impacts of both alternative routes are significantly greater than the proposed Massachusetts Loop. Due to the significant increase in length and crossing of previously undisturbed land (lack of collocation), both alternatives would significantly increase impacts on resources including wetlands, forested areas, and waterbodies. The proposed route significantly reduces short- and long-term effects by maximizing collocation. When compared to the two alternative routes which avoid MADCR property, the proposed route minimizes environmental impacts. Therefore, we conclude that Alternative 1 and Alternative 2 are not environmentally preferable alternatives to the proposed Project.

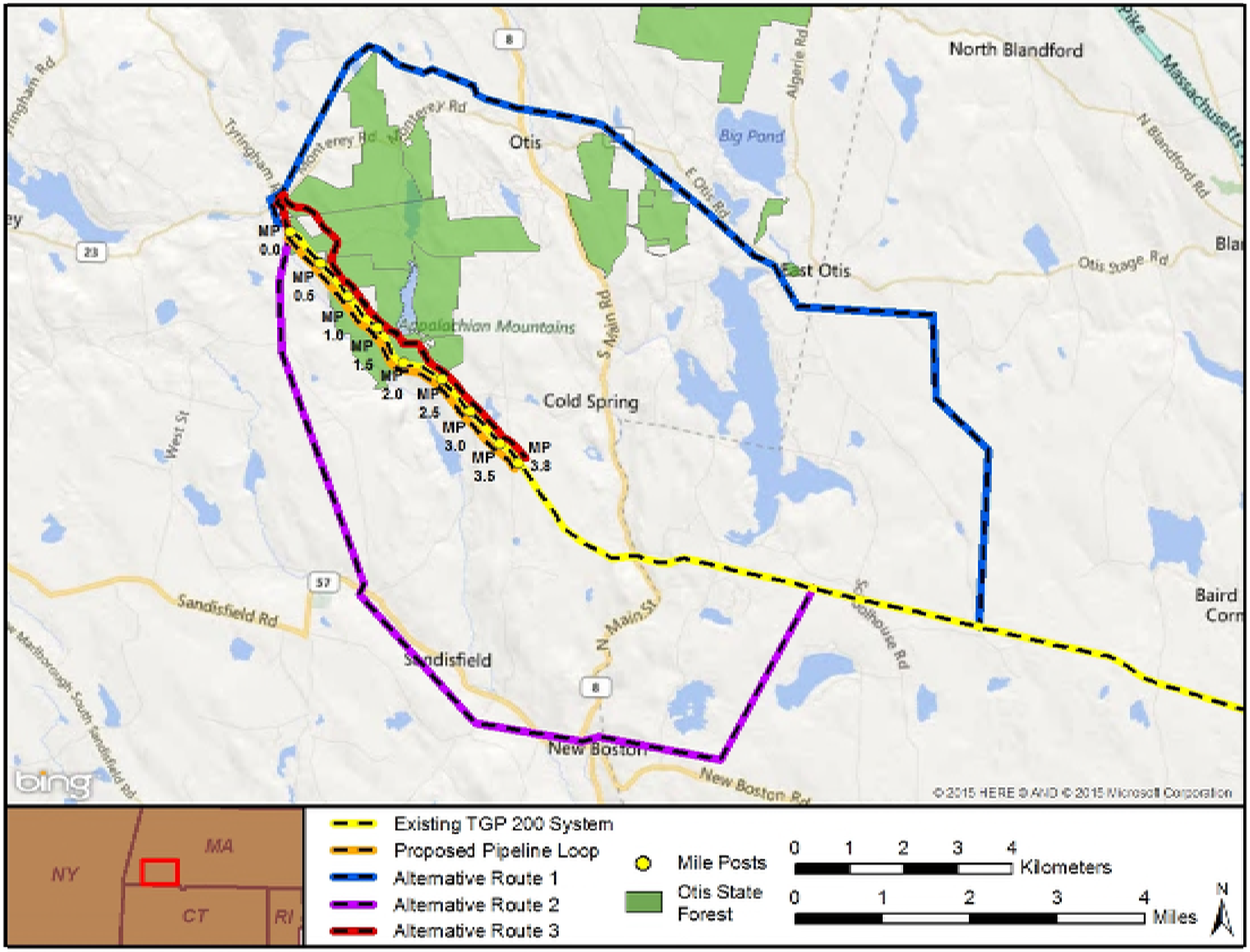


Figure 9: MADCR Alternatives

Table C-1

Comparison of the Massachusetts Loop Proposed Route to the Massachusetts Department of Conservation and Recreation Route Alternatives [a]

Environmental Factor	Potential Construction and Operation Impacts [a] MADCR Alternative 1	MADCR Alternative 2	Proposed Route
Total Length (miles)	14.1	11.4	3.8
Length Collocated (miles)	0.0	0.0	3.8
Total Construction Impacts [b] (acres)	212.6	173.8	58.0
Permanent Right-of-Way (acres)	85.2	69.3	11.6
Steep Slopes (25 to 35 percent) (feet)	15,330	25,058	4,681
Number of Land Owners Affected	152	59	20
Waterbody Crossings (number)	26	14	4
Major Waterbody Crossings	7	3	0
Construction Impact on Forest (acres)	173.6	153.9	39.6
Operational Impact on Forest (acres)	69.0	61.2	7.2
Length Forest Crossed (feet)	60,238	53,379	11,687
Construction Impact on Wetlands [c] (acres)	23.0	15.1	1.9
Operational Impact on Wetlands [c] (acres)	9.5	6.2	0.5
Wetland Crossings (number) [c]	19	17	5
Road Crossings (number)	22	14	4
Access Roads (number)	N/A	N/A	5
Occupied Structures within 50 feet of Right-of-Way (number)	46	16	0
Parks and Recreational Areas (feet)	631	319	10,545
Public Lands Impacted (number / feet)	0 / 0	1 / 319	2 / 10,545

[a] Impact numbers are rounded to the tenths place for presentation purposes.

[b] _Assumes a typical construction right-of-way of 125 feet.

[c] _For comparison between the two route alternatives and the proposed route, all three routes were evaluated using MADEP wetland data and assumed impacts from the full width of the permanent right-of-way. Thus. impacts presented in this table for the proposed Massachusetts Loop do not match the impacts presented in sections and B in this EA.

We also evaluated Alternative 3 to minimize impacts on MADCR property, which is about 4.9 miles long and would be within several local roads between MPs 0.0 and 2.5 of the corresponding segment of the proposed loop. This route would begin at Town Hill Road, turn right onto Route 23, turn right again onto Cold Spring Road, and rejoin the existing right-of-way at the Cold Spring Road crossing (see figure 9). A comparison of the impacts of Alternative 3 and the corresponding segment of the proposed Massachusetts Loop are summarized in table C-2, using available desktop data. The alternative would reduce impacts on wetlands and forested areas on MADCR land, but it would increase impacts on resources, including forested areas on other properties. In addition, the alternative would be within 50 feet of Lower Spectacle Pond while the proposed loop would be more than 700 feet from the Pond. No residences are currently identified within 100 feet of the proposed Massachusetts Loop; however, 11 residences are located within 50 feet of the Alternative 3 route. Locating a pipeline in a roadway can also present additional operational considerations due to the direct weight of vehicular travel over the entire length of the pipeline and increased potential for third-party damage from road and roadside maintenance. Furthermore, pipeline construction within a roadway would have constructability constraints that would affect Tennessee's ability to fully collocate the pipeline within the road (e.g., pipe bending, depth of cover, and regular inspection). Pipeline construction in roadways could also require significant road closures and detours during construction for at least 6 months, which would affect local residences and businesses. Due to the increased effects on resources, increased proximity to residences, traffic disruptions, and additional constructability considerations, we conclude that Alternative 3 does not provide a significant environmental advantage over the proposed route.

Table C-2

Comparison of the Massachusetts Loop Proposed Route to the Massachusetts Department of Conservation and Recreation Route Alternative 3 [a, c]

Environmental Factor	MADCR Alternative 3 [b]	Proposed Route
Total Length (miles)	4.9	3.8
Length Collocated (miles) [d]	4.9	3.8
Total Construction Impacts (acres)	76.2	63.8
Permanent Right-of-Way (acres)	29.6	23.1
Construction Forest Impacts (acres)	35.3	31.6
Construction Wetland Impacts (acres)	1.2	2.4
Roadways Crossed (number)	6.0	4.0
Occupied Structures within 50 feet of Right-of-Way (number)	11.0	0.0

[a] _Impact numbers are rounded to the tenth for presentation purposes.
[b] _Assumes a typical construction right-of-way of 125 feet.
[c] _For comparison between the route variation and the proposed route, the routes were evaluated using MassGIS Land Data (2005). Thus. impacts presented in this table for the proposed Massachusetts Loop do not match the impacts presented in sections and B in this EA.
[d] Alternative 3 would be collocated with roadways and an existing right-of-way.

After the scoping period for the Project, FERC staff identified a route variation to avoid an open water pond near MP 2.7 along the south side of the existing Tennessee 200 Line and the Massachusetts Loop. This alternative crosses over the existing Tennessee 200 Line to the north for a distance of about 1.5 miles and upstream of the pond. The cross over begins near MP 1.4 and continues to MP 2.9 where the route crosses south back over the existing pipeline after crossing Cold Spring Road. The route continues east on the south side of the existing right-of-way and also minimizes impacts on a waterbody. No new landowners or wetlands or waterbodies were affected by this alternative. We reviewed this route variation and determined it avoids and minimizes impacts on wetlands and did not increase impacts on other sensitive resources. Tennessee incorporated this route into its proposed route for the Massachusetts Loop, thus it is further evaluated as part of the Project in section B of this EA.

3.3 Connecticut Loop Route Alternatives and Variations

No route alternatives were identified during or after our scoping period for the Connecticut Loop. After the scoping period for the Project, a minor route variation was evaluated at the request of a tenant and landowner on a property located on the Connecticut Loop near MP 8.2. The route variation and evaluation was provided to the FERC directly by Tennessee in its response to the FERC Environmental

Information Request on June 24, 2015. The route was modified to accommodate future development plans on the property. We reviewed this minor route variation and determined no additional impacts on sensitive resources, including wetlands, would result. Tennessee incorporated this route into its proposed route for the Connecticut Loop, thus it is further evaluated as part of the Project in section B of this EA.

4. Aboveground Facility Alternatives

Because the Project involves minor modifications to an existing compressor station, evaluation of alternative aboveground sites for compressor stations was not warranted. Locations of appurtenant facilities, such as pig launchers and receivers, are determined by the location of the pipeline loops, thus an analysis of alternative sites for these types of facilities was also not warranted.

5. Alternatives Conclusion

We evaluated alternatives for the proposed Project and identified several advantages of the proposed Project which include the use of existing rights-of-way by collocation to reduce disturbance on environmental resources such as waterbodies, wetlands, and residences. The proposed Project also makes use of existing compressor facilities instead of construction of completely new facilities which would reduce air emissions and fugitive dust. For these reasons, we concluded that construction and operation of proposed Project is preferred over the alternatives we evaluated to meet the Project objectives.

D. CONCLUSIONS AND RECOMMENDATIONS

We conclude that approval of the Connecticut Expansion Project would not constitute a major federal action significantly affecting the quality of the human environment. This finding is based on the above environmental analysis, Tennessee's application and supplements, and implementation of Tennessee's *Blasting Plan, Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*, *Invasive Species Management Plan, Site-specific Residential Plans, SPRP* and other plans, the FERC Plan and Procedures, and our recommended mitigation measures. We recommend that the Commission Order contain a finding of no significant impact and that the following mitigation measures be included as conditions of any Certificate the Commission may issue.

1. Tennessee 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. Tennessee 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 the OEP before using that modification.

2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Project. This authority shall allow:

   a. the modification of conditions of the Order; and

   b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from Project construction and operation.

3. **Prior to any construction,** Tennessee shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EIs' authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EA, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction,** Tennessee shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

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

5. Tennessee 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, contractor/pipeyards, additional 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 our Plan, and/or minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

   Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;

   b. implementation of endangered, threatened, or special concern species mitigation measures;

   c. recommendations by state regulatory authorities; and

   d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the Certificate and before construction begins**, Tennessee shall file an Implementation Plan with the Secretary for review and written approval by the Director of OEP. Tennessee must file revisions to the plan as schedules change. The plan shall identify:

   a. how Tennessee will implement the construction procedures and mitigation measures described in its application and supplements (including responses to FERC staff data requests), identified in the EA, and required by the Order;

   b. how Tennessee will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;

c. the number of EIs assigned, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;

d. company personnel, including EIs and contractors, who will receive copies of the appropriate material;

e. the location and dates of the environmental compliance training and instructions Tennessee will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in session(s);

f. the company personnel and specific portion of Tennessee's organization having responsibility for compliance;

g. the procedures (including use of contract penalties) Tennessee will follow if noncompliance occurs; and

h. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:

   (1) the completion of all required surveys and reports;

   (2) the environmental compliance training of onsite personnel;

   (3) the start of construction; and

   (4) the start and completion of restoration.

7. Tennessee shall employ at least one EI per loop (construction spread). The EIs shall be:

   a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;

   b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;

   c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;

   d. a full-time position, separate from all other activity inspectors;

   e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and

   f. responsible for maintaining status reports.

8. Beginning with the filing of its Implementation Plan, Tennessee shall file updated status reports with the Secretary on a **bi-weekly basis until all construction and restoration**

activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on Tennessee's efforts to obtain the necessary federal authorizations;

b. the construction status of the Project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;

c. a listing of all problems encountered and each instance of noncompliance observed by the EI during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);

d. a description of the corrective actions implemented in response to all instances of noncompliance, and their cost;

e. the effectiveness of all corrective actions implemented;

f. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and

g. copies of any correspondence received by Tennessee from other federal, state, or local permitting agencies concerning instances of noncompliance, and Tennessee's response.

9. **Prior to receiving written authorization from the Director of OEP to commence construction of any Project facilities**, Tennessee shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

10. Tennessee 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**, Tennessee shall file an affirmative statement with the Secretary, certified by a senior company official:

    a. that the facilities have been constructed and installed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or

    b. identifying which of the Certificate conditions Tennessee has complied with or will comply with. This statement shall also identify any areas affected by the Project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

12. **Prior to the completion of final Project clean-up**, Tennessee shall remove excess rock in all cultivated or rotated cropland, managed pastures, hayfields, and residential areas affected

during construction. Rock that remains in the restored rights-of-way must be consistent with the size, density, and distribution of rock in adjacent areas not affected by construction.

13. **Prior to construction**, Tennessee shall file a Winter Construction Plan with the Secretary for review and written approval by the Director of OEP. The plan shall address all items included in Section III.I of the FERC Plan.

14. **Prior to construction**, Tennessee shall file with the Secretary the location, by MP, of all private wells within 150 feet of construction workspaces or blasting activities.

    a. Tennessee shall conduct, with the well owner's permission, pre- and post-construction monitoring of well yield and water quality for these wells; and

    b. **within 30 days of placing the facilities in service**, Tennessee shall file a report with the Secretary discussing whether any complaints were received concerning well yield or water quality and how each complaint was resolved.

15. **Prior to construction**, Tennessee shall evaluate the use of the flume crossing method for Muddy Brook and Stony Brook to minimize impacts on the dwarf wedgemussel. Tennessee shall file with the Secretary the evaluation, final proposed construction method, and site-specific drawings for review and written approval by the Director of OEP.

16. **Prior to construction,** Tennessee shall file with the Secretary revised alignment sheets depicting the following workspace modifications, construction considerations, or file justification for why the changes cannot be implemented, for the review and written approval of the Director of OEP:

    a. Along the New York Loop:

        (1) use the open cut method for Meads Lane Road to avoid the need for or reduce the size of ATWS 56 and ATWS 57 at MP 3.4;

        (2) reconfigure ATWS 58 to avoid Wetland W009 at MP 3.7; and

        (3) reconfigure ATWS 62 to avoid Wetland W014 at MP 4.1.

    b. Along the Massachusetts Loop:

        (1) shift ATWS 25 to the east or reconfigure ATWS 24 to avoid Wetland WMA-03 and maintain a 50 foot set back from the tributary to Clam River SMA-03 at MP 0.0;

        (2) reconfigure ATWS 42 or split ATWS 42 into multiple ATWS to avoid Wetlands WMA-14 and WMA-15 at MP 1.9;

        (3) consider the open cut construction method to reduce impacts on Wetland WMA-16 at MP 2.8;

        (4) extend the road bore at Cold Spring Road to avoid Wetland WMA-19 at MP 2.5;

(5) consider the open cut construction method at MP 2.8 for Cold Spring Road to eliminate the need for ATWS 47 and avoid Wetlands WMA-16 and WMA-17; and

(6) revise the footprint for the access road (#5) at MP 3.8 of the Massachusetts Loop to avoid impacts on Wetland WMA-23 on the north side of the access road.

c. Along the Connecticut Loop:

(1) extend the road bore at Hickory Street to avoid Wetland WCT-02 at MP 0.4;

(2) extend the road bore at Hickory Street to avoid Wetland WCT-56 at MP 0.4;

(3) shift ATWS 4 to the east to avoid Wetland WCT-04 at MP 1.2;

(4) consider the open cut construction method at MP 1.6 for Halladay Avenue West to minimize impacts on Wetland WCT-11;

(5) shift ATWS 13 to the west side of the proposed right-of-way to avoid Wetland WCT-37 at MP 5.7;

(6) shift ATWS 14 to the west side of the proposed right-of-way to avoid Wetland WCT-38 at MP 5.7;

(7) shift ATWS 15 to the north to avoid Wetlands WCT-41A and WCT-41B at MP 6.1; and

(8) reconfigure or eliminate ATWS 22 to avoid Wetlands WCT-53A and WCT-53B at MP 7.7.

17. **Prior to construction**, Tennessee shall file with the Secretary documentation of completed consultations with CTDEEP, MADEP, and USACE regarding vernal pools and the mitigation measures it would implement to avoid and minimize potential adverse effects on vernal pools.

18. **Prior to construction**, Tennessee shall file with the Secretary all outstanding wetland and biological survey results.

19. **Prior to construction**, Tennessee shall develop preventive measures, such as setting up wash stations, in coordination with NYSDEC, MADFW, and CTDEEP, to prevent the spread of invasive species and noxious weeds resulting from construction and restoration activities. These measures shall be included in Tennessee's *Invasive Species Management Plan* and filed with the Secretary for review and written approval by the Director of OEP.

20. **Prior to construction**, Tennessee shall consult with MADFW to determine the construction timing window for both coldwater and warmwater fisheries and file the supporting agency correspondence with the Secretary.

21. **Prior to construction**, Tennessee shall consult with USFWS New York and New England field offices to determine whether any bald eagle nests are within the vicinity of the Project

area, according to the USFWS bald and golden eagle nest database, and file that information with the Secretary.

22. Tennessee shall not begin construction activities **until**:

    a. FERC staff receives comments from the USFWS regarding the proposed action;

    b. FERC staff completes formal consultation with the USFWS for the dwarf wedgemussel; and

    c. Tennessee has received written notification from the Director of OEP that construction or use of mitigation may begin.

23. **Prior to construction**, Tennessee shall complete the following and file with the Secretary:

    a. a construction monitoring plan for the 23 Connecticut state-listed species, approved by CTNDDB; and

    b. avoidance, minimization, and/or mitigation measures for the two squarrose sedge populations within the workspace.

24. Tennessee shall develop and implement an environmental complaint resolution procedure. 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 rights-of-way. Prior to construction, Tennessee shall mail the complaint procedures to each landowner whose property would be crossed by the Project.

    a. In its letter to affected landowners, Tennessee shall:

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

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

        (3) instruct the landowners that if they are still not satisfied with the response from Tennessee's Hotline, they can contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

    b. In addition, Tennessee shall include in its bi-weekly status report a copy of a table that contains the following information for each problem/concern:

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

        (2) the location, by MP, 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.

25. **Prior to construction**, Tennessee shall file with the Secretary a plan to minimize visual impacts from the pig receiver site at MP 4.1 on the New York Loop. This plan shall be developed in consultation with the nearby landowner and filed for review and written approval by the Director of OEP.

26. **Prior to construction**, Tennessee shall address the effects of construction traffic on the Josiah Hulet House and file any necessary avoidance and mitigation measures with the Secretary for the review and written approval of the Director of OEP.

27. **Prior to construction or implementation of any treatment plans/measures**, Tennessee shall:

    a. file with the Secretary any outstanding cultural resources surveys and evaluation reports, any necessary treatment plans, and the New York, Massachusetts, and Connecticut SHPOs' comments on any reports and plans;

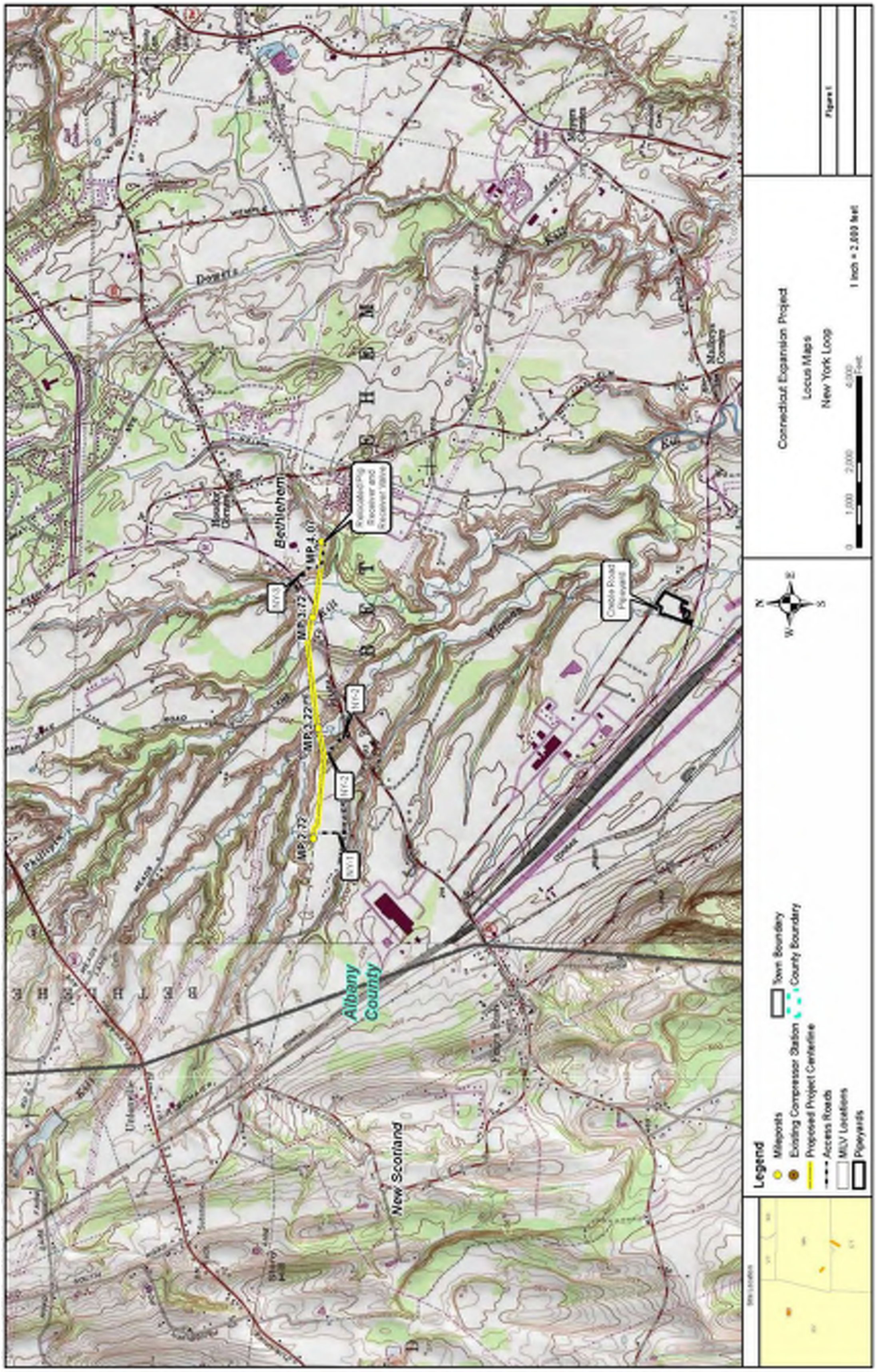
    b. allow ACHP the opportunity to comment if historic properties would be adversely affected; and

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

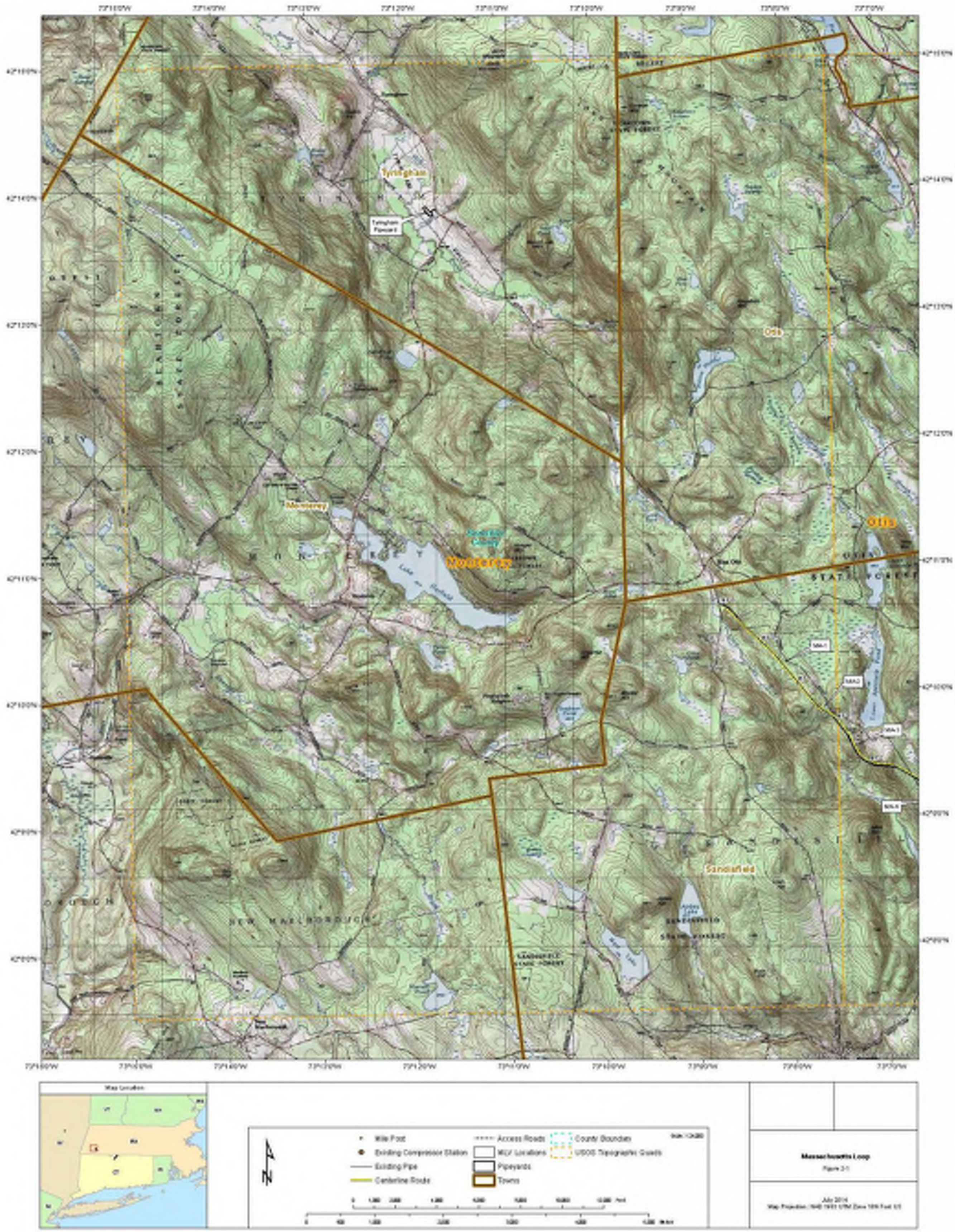
    All materials filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering **"CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE."**

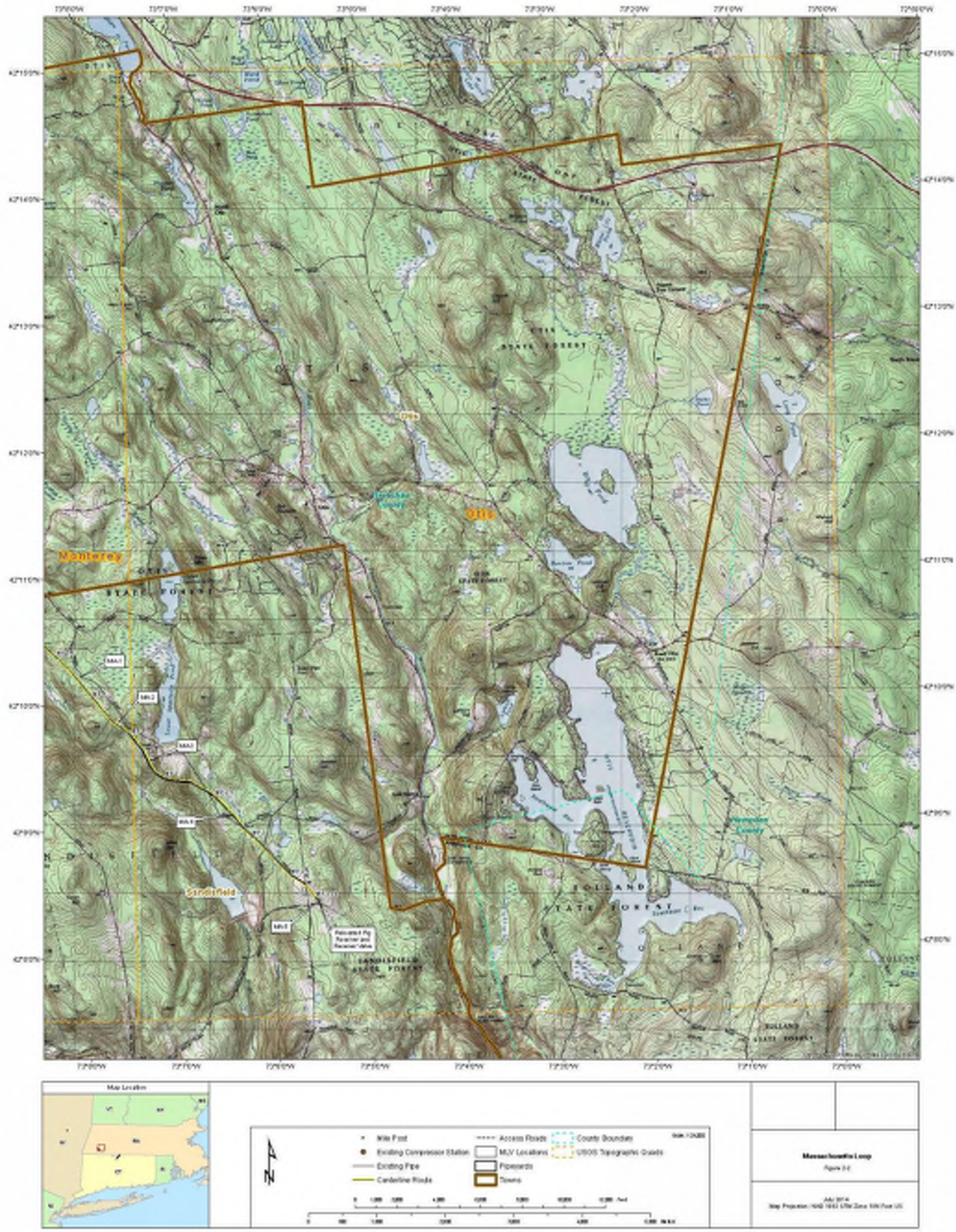
APPENDIX A

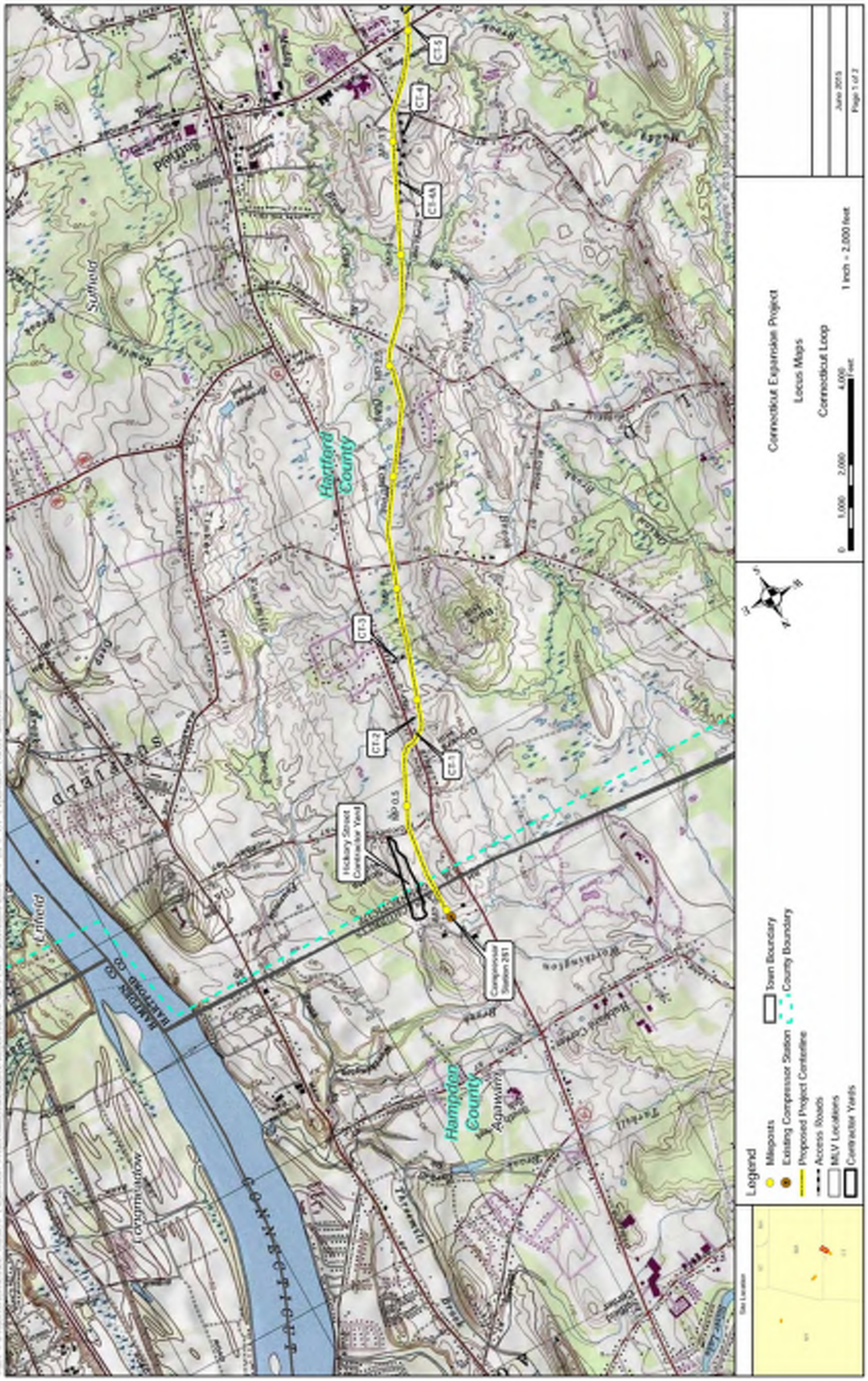
Topographic Maps of the Pipeline Route and Facilities for the Project

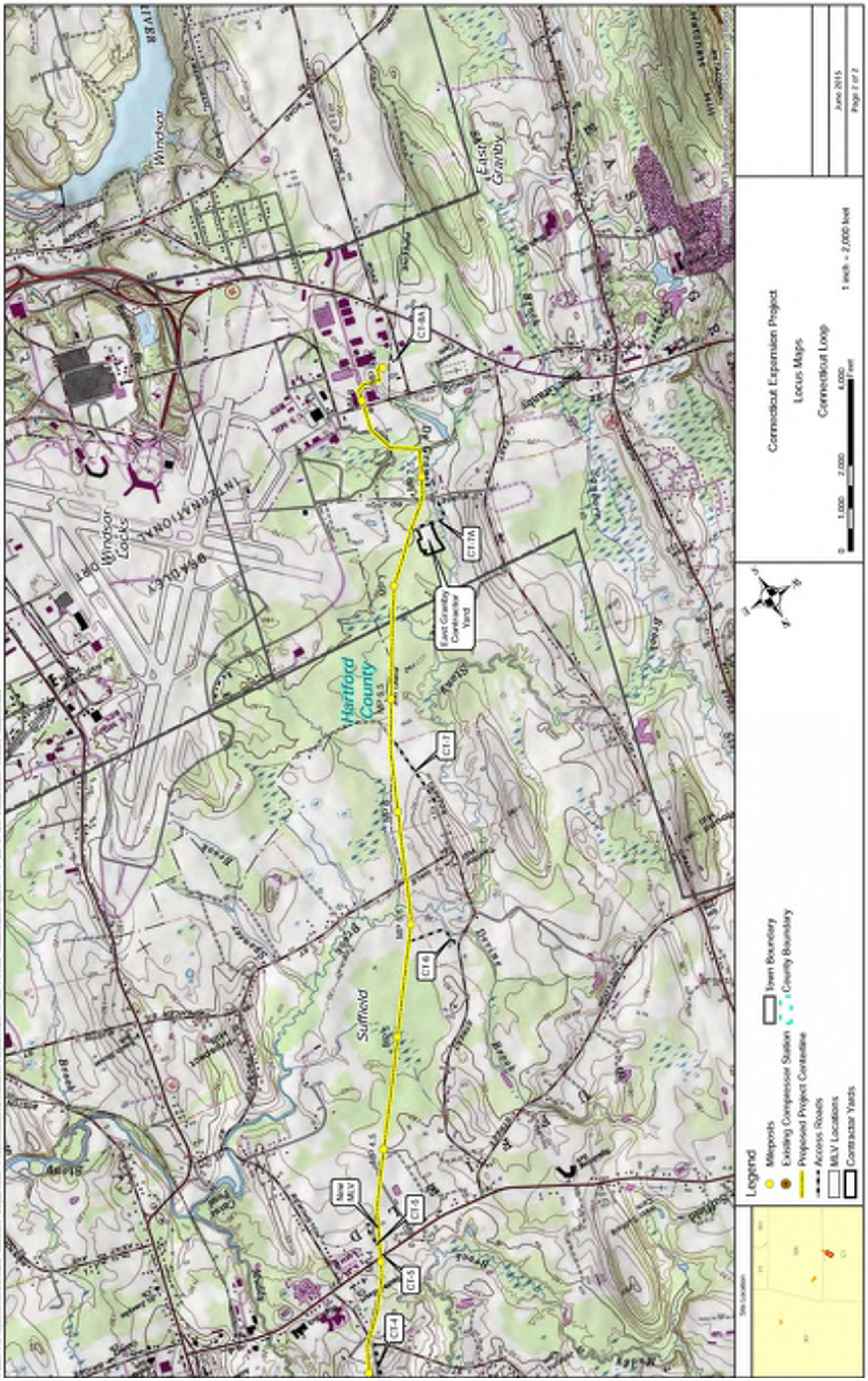


Connecticut Expansion Project
Locus Maps
New York Loop
1 inch = 2,000 feet
0 1,000 2,000 4,000 Feet
Legend
Mileposts
Existing Compressor Station
Proposed Project Centerline
Access Roads
MLV Locations
Pipeyards
Town Boundary
County Boundary
Albany County
Bethlehem
New Scotland
MP 2.72
MP 3.22
MP 3.72
MP 4.07
NY-1
NY-2
NY-3
Relocated Pig Receiver and Receiver Valve
Creble Road Pipeyard
Figure 1


Tyringham
Monterey
Otis
Sandisfield
Mile Post
Existing Compressor Station
Existing Pipe
Centerline Route
Access Roads
MLV Locations
Pipeyards
Towns
County Boundary
USGS Topographic Quads
Massachusetts Loop


Otis
Monterey
Sandisfield
TOLLAND STATE FOREST
Map Location
Mile Post
Existing Compressor Station
Existing Pipe
Centerline Route
Access Roads
MLV Locations
Pipeyards
Towns
County Boundary
USGS Topographic Quads
Massachusetts Loop


Legend
Mileposts
Existing Compressor Station
Proposed Project Centerline
Access Roads
MLV Locations
Contractor Yards
Town Boundary
County Boundary
Connecticut Expansion Project
Locus Maps
Connecticut Loop
1 inch = 2,000 feet
June 2015
Page 1 of 2
Hartford County
Hampden County
Hickory Street Contractor Yard
Compressor Station 261
CT-1
CT-2
CT-3
CT-4
CT-4A
CT-5



Legend
Mileposts
Existing Compressor Station
Proposed Project Centerline
Access Roads
MLV Locations
Contractor Yards
Town Boundary
County Boundary
Connecticut Expansion Project
Locus Maps
Connecticut Loop
1 inch = 2,000 feet
June 2015
Page 2 of 2
Windsor Locks
Suffield
Hartford County
East Granby
East Granby Contractor Yard
CT-4
CT-5
CT-6
CT-7
CT-7A
CT-8A
New MLV

APPENDIX B

Additional Temporary Workspaces for the Project

APPENDIX B

Additional Temporary Workspaces for the Project

Project Milepost [a]	ATWS Length [b] (feet)	ATWS Width [c] (feet)	Acres [d]	Land Use Type	ATWS Justification	Wetland and/or Waterbody within 50 feet Variance Justification [e]	ATWS ID
New York Loop							
2.7	191.3	68.3	0.4	Agricultural	Facility removal/relocate, pipeline crossover location	Wetland W005 Beginning point of Project Change working side	52
2.7	453.8	136.8	1.5	Agricultural	Facility removal/relocate, pipeline crossover location	NA	53
3.0	256.3	131.7	0.5	Industrial/Agricultural/Wetland	Wetland crossing	Wetland W004 Congested area	54
3.1	138.5	50.1	0.3	Industrial/Forest	Wetland crossing, steep slope	NA	55
3.4	201.1	101.4	0.4	Agricultural	Meads Lane Road bore, wetland crossing	Wetlands W001 & W006 Bored road crossing Congested area	56
3.4	551.2	100.7	1.2	Agricultural	Meads Lane Road bore, wetland crossing, steep slope	NA	57
3.7	210.3	153.4	0.4	Agricultural/Wetland	Highway 32 road bore, wetland crossing	Wetland W009 Bored road crossing	58
3.8	111.4	64.1	0.1	Residential/Open Land/Forest/Wetland	Highway 32 road bore, wetland crossing	Wetlands W012 and W013 Bored road crossing	59
3.9	300.7	50.1	0.3	Forest	Wetland crossing, side slope	Wetland W013 Congested area Severe side slope	60
4.0	212.6	115.2	0.8	Agricultural/Forest	End of the line facility installation, tie-in location, construction turnaround	NA	61
4.1	357.6	141.1	0.5	Agricultural/Wetland	End of the line facility installation, tie-in location, construction turnaround	Wetland W014 Beginning point of Project	62

APPENDIX B

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Project Milepost [a]	ATWS Length [b] (feet)	ATWS Width [c] (feet)	Acres [d]	Land Use Type	ATWS Justification	Wetland and/or Waterbody within 50 feet Variance Justification [e]	ATWS ID
Massachusetts Loop							
0.0	326.4	90.1	0.6	Industrial/Open Land/Forest/Wetland	Facility removal/relocate, steep slope	Wetland WMA-03 Beginning point of Project Severe side slope	24
0.0	211.3	21.8	0.1	Industrial/Forest/Wetland	Facility removal/relocate, steep slope	Wetland WMA-03 & Trib. to Clam River SMA-03 Beginning point of Project Severe side slope	25
0.0	1,441.3	10.0	0.4	Forest	Steep slope	NA	26
0.3	503.6	10.0	0.1	Forest	Wetland crossing	NA	27
0.5	93.7	10.0	<0.1	Forest	Wetland crossing	NA	28
0.5	478.3	10.0	0.1	Forest	Wetland crossing	NA	29
0.7	111.0	115.0	0.2	Open Land/Forest	Staging area, access road	Wetland WMA-07 Access road entry Change working side	30
0.9	242.0	50.2	0.2	Forest	Wetland crossing	NA	31
1.1	615.0	10.0	0.1	Forest	Wetland crossing	NA	32
1.2	103.5	25.0	0.1	Forest	Steep slope	NA	33
1.3	449.2	50.4	0.5	Forest	Steep slope, waterbody crossing, pipeline crossover	NA	34
1.3	349.8	60.3	0.4	Open Land/Forest	Steep slope, stream crossing, pipeline crossover, access road	NA	35
1.6	1,165.9	25.0	0.7	Forest	Wetland crossing, side slope	NA	36
1.7	64.3	30.5	0.1	Open Land/Forest	Hydrostatic test water withdrawal location	Spectacle Pond Brook SMA-14 Severe side slope	37
1.7	37.1	25.0	<0.1	Forest	Wetland crossing, side slope	Wetland WMA-31 & Spectacle Pond Brook SMA-14 Severe side slope	38
1.7	154.2	51.1	0.2	Open Land/Forest	Wetland crossing, side slope	NA	39

APPENDIX B

Additional Temporary Workspaces for the Project

Project Milepost [a]	ATWS Length [b] (feet)	ATWS Width [c] (feet)	Acres [d]	Land Use Type	ATWS Justification	Wetland and/or Waterbody within 50 feet Variance Justification [e]	ATWS ID
1.8	264.8	66.0	0.4	Open Land/Forest	Hydrostatic testing/dewatering location, access road	NA	40
1.8	100.0	42.2	0.1	Open Land/Forest	Hydrostatic testing/dewatering location	NA	41
1.9	881.7	27.0	0.5	Open Land/Forest/Wetland	Wetland crossing, side slope	Wetlands WMA-14 & WMA-15 Severe side slope	42
2.0	1,817.9	10.0	0.7	Forest	Steep slope	NA	43
2.2	125.1	43.3	0.1	Open Land/Forest	Steep slope	NA	44
2.4	291.0	10.0	0.1	Forest/Wetland	Cold Spring Road bore, steep slope	Wetland WMA-19 Bored road crossing Severe side slope	45
2.6	139.5	10.0	<0.1	Forest	Wetland crossing	NA	46
2.8	183.1	26.8	0.1	Forest/Wetland	Cold Spring Road bore, wetland crossing, pipeline crossover	Wetlands WMA-16 & WMA-17 Bored road crossing Change working side	47
2.9	215.1	10.0	0.1	Forest	Wetland crossing, waterbody crossing	NA	48
2.9	1,065.5	10.0	0.2	Forest	Wetland crossing	NA	49
3.2	457.9	50.0	0.3	Forest	Wetland crossing	NA	50
3.4	357.9	50.0	0.4	Forest	Wetland crossing, steep slope	NA	51
3.6	1,043.3	25.0	0.6	Residential/Agricultural/Forest/ Wetland	S. Beech Plain Road bore, wetland crossing, steep slope, tie-in location, facility installation	Wetland WMA-23 Beginning point of Project Bored road crossing Severe side slope	51A
3.8	191.5	25.0	0.2	Forest/Wetland	S. Beech Plain Road bore, wetland crossing, steep slope, tie-in location, facility installation	Wetland WMA-23 Beginning point of Project Bored road crossing Severe side slope	51B

APPENDIX B

Additional Temporary Workspaces for the Project

Project Milepost [a]	ATWS Length [b] (feet)	ATWS Width [c] (feet)	Acres [d]	Land Use Type	ATWS Justification	Wetland and/or Waterbody within 50 feet Variance Justification [e]	ATWS ID
Connecticut Loop							
0.4	102.7	25.0	0.1	Agricultural/Wetland	Hickory Street bore	Wetland WCT-02 Bored road crossing	1
0.4	100.0	25.0	0.1	Wetland	Hickory Street bore	Wetland WCT-56 Bored road crossing	2
0.8	85.8	89.3	0.1	Residential/Open Land	North Street bore	NA	3
1.2	79.8	20.0	<0.1	Agricultural	Access road	Wetland WCT-04 Access road entry	4
1.6	99.0	24.9	0.1	Open Land/Wetland	Halladay Avenue bore	Wetlands WCT-11, WCT012, & Clay Brook SCT-11 Bored road crossing	5
2.6	100.0	25.1	0.1	Agricultural/Wetland	Russell Avenue bore	Wetlands WCT-16 & WCT-17 Bored road crossing	6
3.0	277.8	76.2	0.3	Agricultural	Waterbody crossing	NA	7
3.6	352.7	25.0	0.2	Agricultural/Wetland	Hill Street bore	Wetlands WCT-22 & WCT-23 Bored road crossing	8
4.0	100.0	25.0	0.1	Wetland	Mountain Road bore	Wetland WCT-25 Bored road crossing	9
4.3	739.0	25.0	0.4	Agricultural	Wetland crossing	NA	10
4.5	526.9	25.0	0.3	Agricultural	Wetland crossing	Wetland WCT-30 Congested area	11
5.4	476.1	23.9	0.3	Forest	Wetland crossing	Wetlands WCT-36 & WCT-37 Congested area	12
5.7	109.8	25.1	0.1	Agricultural/Wetland	Hale Street bore	Wetland WCT-37 Bored road crossing	13
5.7	113.0	26.7	0.1	Agricultural/Wetland	Hale Street bore	Wetland WCT-38 Bored road crossing	14

APPENDIX B

Additional Temporary Workspaces for the Project

Project Milepost [a]	ATWS Length [b] (feet)	ATWS Width [c] (feet)	Acres [d]	Land Use Type	ATWS Justification	Wetland and/or Waterbody within 50 feet Variance Justification [e]	ATWS ID
6.1	100.0	20.0	0.1	Forest	Access road	Wetlands WCT-41A & WCT-41B Access road entry	15
6.4	177.2	68.3	0.1	Agricultural/Forest	Wetland crossing	Wetland WCT-43 Congested area	16
7.1	157.5	24.9	0.1	Open Land/Forest	Wetland crossing	Wetland WCT-47 & Trib. to DeGrayes Brook SCT-47 Congested area	17
7.2	151.0	132.2	0.3	Open Land	Turnaround for construction	Wetland WCT-49 Congested area	18
7.4	91.3	25.0	0.1	Agricultural	Russell Road bore	NA	19
7.4	99.5	25.0	0.1	Forest	Russell Road bore	Wetland WCT-52 Bored road crossing	20
7.6	179.3	10.0	0.0	Forest/Wetland	In-wetland crossing	Wetland WCT-53 Wetland crossing, point of inflection	21
7.7	124.9	50.0	0.1	Forest	Wetland crossing	Wetlands WCT-53A & WCT-53B Wetland crossing	22
8.0	123.8	58.9	0.2	Commercial/Forest	Airport Park Road bore	NA	63
8.1	801.2	20.1	0.4	Commercial/Residential/Open Land/Forest	Airport Park Road bore, waterbody crossing, tie-in location	NA	64

ATWS = additional temporary workspace
NA = not applicable
Trib = tributary

[a] Proposed Connecticut Expansion Project milepost at which the ATWS first intersects the Project area
[b] Measured at maximum length of ATWS
[c] Measured at maximum width of ATWS

APPENDIX B

Additional Temporary Workspaces for the Project

Project Milepost [a]	ATWS Length [b] (feet)	ATWS Width [c] (feet)	Acres [d]	Land Use Type	ATWS Justification	Wetland and/or Waterbody within 50 feet Variance Justification [e]	ATWS ID

[d] Rounding may cause slight differences in reported versus actual acreages

[e] Justifications are listed below:

- Beginning Point of Project - Assemble construction equipment, remove launcher/receiver barrel, stage hydrostatic testing equipment, and maintain ingress/egress of construction equipment and personnel.
- Access Road Entry - Parking, prefabricate access road crossing pipe segment, spoil storage, and maintain ingress/egress of construction equipment and personnel.
- Bored Road Crossing - Parking, spoil storage, additional equipment to bore road and install pipe joints individually, additional spoil due to excavating bore pit, and maintain ingress/egress of construction equipment and personnel.
- Wetland Crossing - Parking, spoil storage, timber mat storage, prefabricate wetland and stream pipe segment, and maintain ingress/egress of construction equipment and personnel.
- Change Working Side of Pipeline Construction Work Area - Maintain ingress/egress of construction equipment and personnel in transition of side of pipeline from which equipment will operate.
- Congested Area - Parking, spoil storage, maintain ingress/egress of construction equipment and personnel.
- Severe Side Slope - Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain ingress/egress of construction equipment and personnel.

APPENDIX C

Proposed Access Roads along the Project

APPENDIX C

Proposed Access Roads along the Project [a]

Access Road / Milepost (ID) [b]	County	Access Road Type	Description [c, d]	Land Use	Road Width (feet)	Length (feet)	Acres
New York Loop							
2.8 (#1)	Albany	New Temporary	Construction matting to create temporary access for construction activities	Agricultural	20	530	0.4
3.1 (#2)	Albany	Existing Temporary	Existing road used by the county for light duty trucks only. No improvements needed.	Industrial/Open Land	20	914	0.7
3.9 (#3)	Albany	New Permanent	Allow access for operations to the relocated pig receiver. Widened 20 feet wide and addition of gravel. Entrance widened to approximately 40 feet for truck access.	Agricultural/Open Land/Forest	20/40	1,225	0.6
						Subtotal	**1.7**
Massachusetts Loop							
0.8 (#1)	Berkshire	Existing Permanent	Allow access for operations and maintenance. Widened to 20 feet and addition of gravel. Entrance widened to approximately 40 feet for truck access. Gravel would remain in place. Rubber-tired non-tandem vehicles only.	Open Land/Forest	20/40	231	0.2
1.4 (#2)	Berkshire	Existing Temporary	No improvements necessary. Light duty pick-up trucks only.	Forest	20	356	0.3
1.7 (#3)	Berkshire	Existing Temporary	No improvements necessary. Rubber-tired non-tandem vehicles only.	Open Land/Forest	20	901	0.7
2.7 (#4)	Berkshire	Existing Permanent	Allow access for operations and maintenance. Additional gravel for stability. Gravel would remain in place. Rubber-tired non-tandem vehicles only.	Open Land/ Wetland	20	181	0.1
3.8 (#5)	Berkshire	Existing Permanent	Allow access for operations to the relocated pig receiver. Widened 20 feet wide in some areas.	Open Land/Wetland	20	708	0.4
						Subtotal	**1.7**
Connecticut Loop							
0.8 (#1)	Hartford	Existing Temporary	Private drive to residence. No improvements needed. Light duty pick-up trucks only. Access would be maintained at all times.	Residential/Open Land	20	120	0.1
0.9 (#2)	Hartford	Existing Temporary	Widened to 20 feet and install matting. Entrance widened to approximately 40 feet for truck access.	Residential/Open Land	20/40	278	0.2
1.2 (#3)	Hartford	Existing Temporary	No improvements necessary. Light duty pick-up trucks and rubber-tired non-tandem vehicles only.	Agricultural/ Open Land/Wetland	20	580	0.4

APPENDIX C

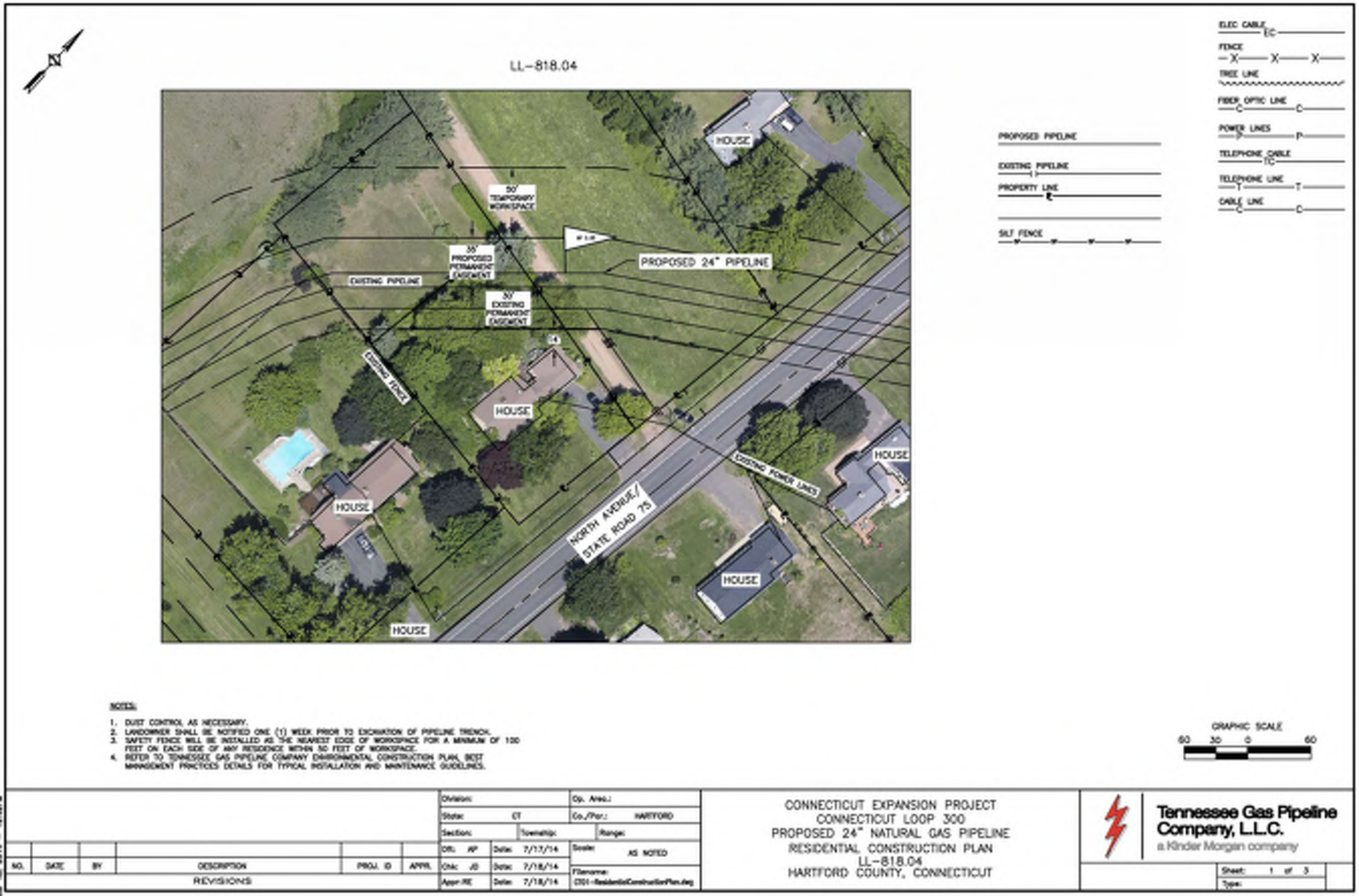
Proposed Access Roads along the Project [a]

Access Road / Milepost (ID) [b]	County	Access Road Type	Description [c, d]	Land Use	Road Width (feet)	Length (feet)	Acres
3.3 (#4A)	Hartford	Existing Temporary	Light duty pick-up trucks and rubber-tired non-tandem vehicles only. Matting may be needed.	Agricultural/Residential/Wetland	20	1,588	0.8
3.5 (#4)	Hartford	Existing Temporary	Light duty pick-up trucks and rubber-tired non-tandem vehicles only. Matting may be needed.	Agricultural/Open Land/Wetland	20	1,099	0.7
4.1 (#5)	Hartford	Existing Permanent	Allow access for operations and maintenance to new MLV. Widened to 20 feet and addition of gravel. Entrance widened to approximately 40 feet for truck access.	Agricultural/ Wetland	20/40	885	0.4
5.5 (#6)	Hartford	Existing Temporary	Widened to 20 feet and addition of either gravel or matting.	Agricultural/Open Land	20	1,338	0.8
6.2 (#7)	Hartford	Existing Temporary	Light duty pick-up trucks and rubber-tired non-tandem vehicles only.	Open Land/ Wetland	20	1,892	0.9
7.3 (#7A)	Hartford	Existing Temporary	No improvements needed. Existing dirt driveway runs through proposed pipeyard to pipeline.	Industrial/Open Land/Forest	20	1,293	0.9
7.9 (#8A)	Hartford	Existing Temporary	No improvements needed. Existing permanent road to Tennessee's meter station.	Open Land/Forest	20	718	0.1
						Subtotal	**5.3**
						Project Total	**8.7**

[a] This table does not include existing public roads because no upgrades or modifications to these roads would be required.
[b] MP indicates the point at which the access road connects with the pipeline right-of-way, or closest MP to right-of-way if there is no direct connection.
[c] Existing roads include farm roads, two track roads, gravel roads, and driveways. New roads do not have an existing travel footprint.
[d] Substrate of new and existing access road includes: grass, soil, gravel, and brick.

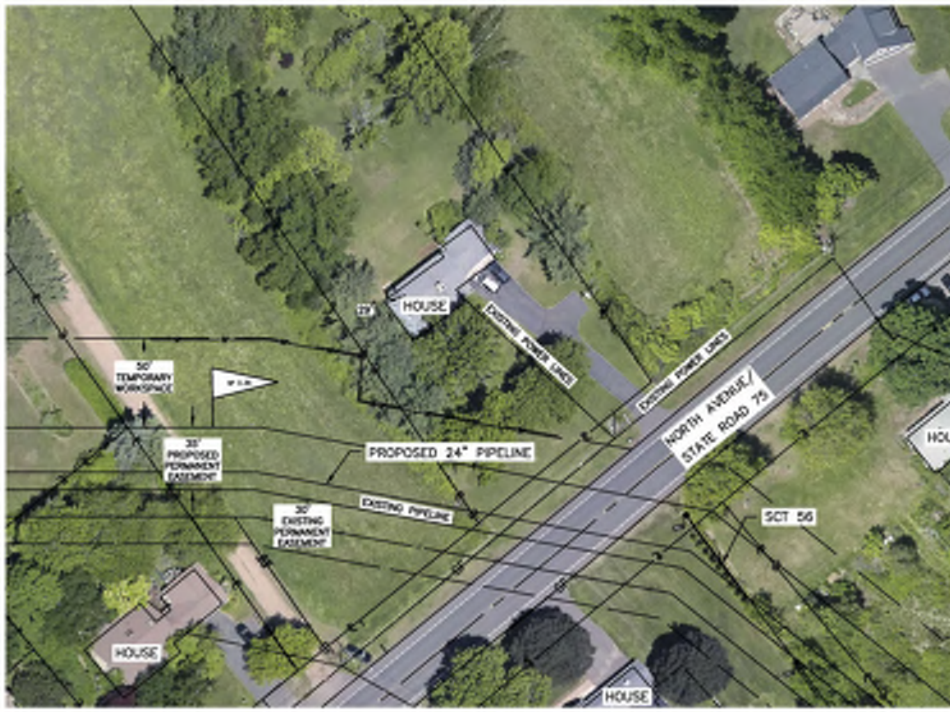
APPENDIX D

Site-Specific Construction Plans for Residences within 50 feet of the Project



LL-818.04
HOUSE
50' TEMPORARY WORKSPACE
35' PROPOSED PERMANENT EASEMENT
PROPOSED 24" PIPELINE
EXISTING PIPELINE
30' EXISTING PERMANENT EASEMENT
HOUSE
EXISTING FENCE
HOUSE
EXISTING POWER LINES
HOUSE
NORTH AVENUE/ STATE ROAD 75
HOUSE
HOUSE
PROPOSED PIPELINE
EXISTING PIPELINE
PROPERTY LINE
SILT FENCE
ELEC CABLE
FENCE
TREE LINE
FIBER OPTIC LINE
POWER LINES
TELEPHONE CABLE
TELEPHONE LINE
CABLE LINE
NOTES:
1. DUST CONTROL AS NECESSARY.
2. LANDOWNER SHALL BE NOTIFIED ONE (1) WEEK PRIOR TO EXCAVATION OF PIPELINE TRENCH.
3. SAFETY FENCE WILL BE INSTALLED AS THE NEAREST EDGE OF WORKSPACE FOR A MINIMUM OF 100 FEET ON EACH SIDE OF ANY RESIDENCE WITHIN 50 FEET OF WORKSPACE.
4. REFER TO TENNESSEE GAS PIPELINE COMPANY ENVIRONMENTAL CONSTRUCTION PLAN, BEST MANAGEMENT PRACTICES DETAILS FOR TYPICAL INSTALLATION AND MAINTENANCE GUIDELINES.
GRAPHIC SCALE
60 30 0 60
NO. DATE BY DESCRIPTION PROJ. ID APPR.
REVISIONS
Division:
Op. Area.:
State: CT
Co./Par.: HARTFORD
Section:
Township:
Range:
Dft: AP
Date: 7/17/14
Scale: AS NOTED
Chk: JD
Date: 7/18/14
Filename:
Appr: RE
Date: 7/18/14
CT01-ResidentialConstructionPlan.dwg
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
RESIDENTIAL CONSTRUCTION PLAN
LL-818.04
HARTFORD COUNTY, CONNECTICUT
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company
Sheet: 1 of 3
Type:

LL–819.01



PROPOSED PIPELINE

EXISTING PIPELINE

PROPERTY LINE

SILT FENCE

ELEC CABLE — EC —

FENCE — X — X — X —

TREE LINE

FIBER OPTIC LINE — C — C —

POWER LINES — P — P —

TELEPHONE CABLE — TC —

TELEPHONE LINE — T — T —

CABLE LINE — C — C —

GRAPHIC SCALE
60 30 0 60

NOTES:

1. DUST CONTROL AS NECESSARY.
2. LANDOWNER SHALL BE NOTIFIED ONE (1) WEEK PRIOR TO EXCAVATION OF PIPELINE TRENCH.
3. SAFETY FENCE WILL BE INSTALLED AS THE NEAREST EDGE OF WORKSPACE FOR A MINIMUM OF 100 FEET ON EACH SIDE OF ANY RESIDENCE WITHIN 50 FEET OF WORKSPACE.
4. REFER TO TENNESSEE GAS PIPELINE COMPANY ENVIRONMENTAL CONSTRUCTION PLAN, BEST MANAGEMENT PRACTICES DETAILS FOR TYPICAL INSTALLATION AND MAINTENANCE GUIDELINES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

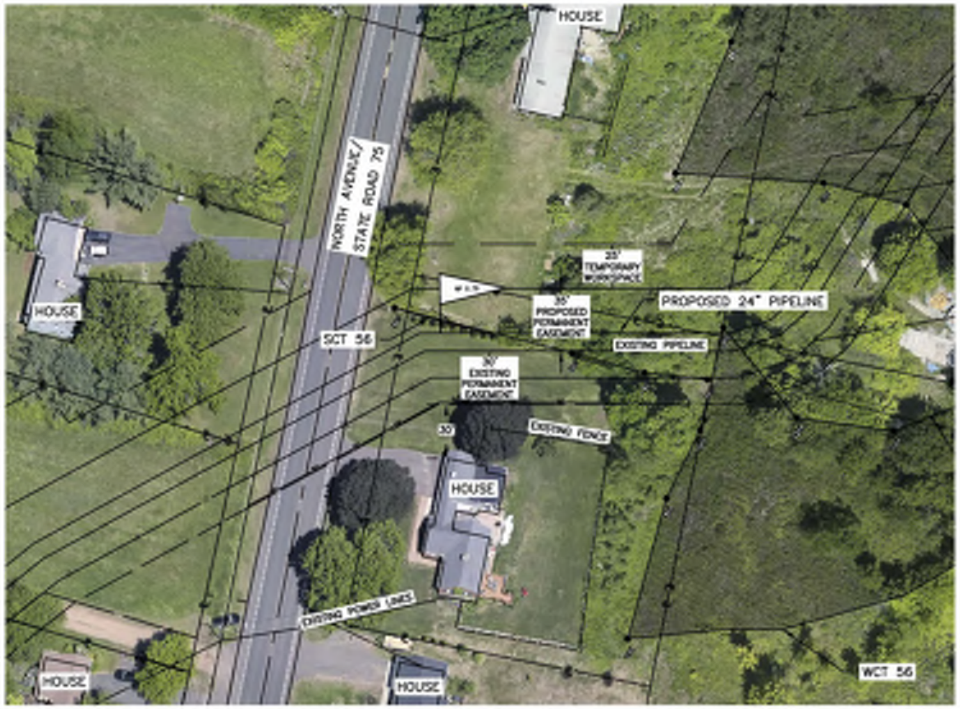
Division:		Op. Area.:	
State: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Dft: AP	Date: 7/17/14	Scale: AS NOTED	
Chk: JO	Date: 7/18/14	Filename: CS01-ResidentialConstructionPlan.dwg	
Appr: RE	Date: 7/18/14		

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
RESIDENTIAL CONSTRUCTION PLAN
LL–819.01
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Sheet: 2 of 3
Type:

LL–821



PROPOSED PIPELINE
EXISTING PIPELINE
PROPERTY LINE
SILT FENCE

ELEC CABLE
FENCE
TREE LINE
FIBER OPTIC LINE
POWER LINES
TELEPHONE CABLE
TELEPHONE LINE
CABLE LINE

NOTES:

1. DUST CONTROL AS NECESSARY.
2. LANDOWNER SHALL BE NOTIFIED ONE (1) WEEK PRIOR TO EXCAVATION OF PIPELINE TRENCH.
3. SAFETY FENCE WILL BE INSTALLED AS THE NEAREST EDGE OF WORKSPACE FOR A MINIMUM OF 100 FEET ON EACH SIDE OF ANY RESIDENCE WITHIN 50 FEET OF WORKSPACE.
4. REFER TO TENNESSEE GAS PIPELINE COMPANY ENVIRONMENTAL CONSTRUCTION PLAN, BEST MANAGEMENT PRACTICES DETAILS FOR TYPICAL INSTALLATION AND MAINTENANCE GUIDELINES.

GRAPHIC SCALE
60 30 0 60

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
			REVISIONS		

Division:		Op. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
DR: AP	Date: 7/17/14	Scale: AS NOTED	
Chk: JD	Date: 7/18/14	Filename: CS01-ResidentialConstructionPlan.dwg	
Appr: RE	Date: 7/18/14		

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
RESIDENTIAL CONSTRUCTION PLAN
LL–821
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Sheet: 3 of 3
Type:

APPENDIX E

Waterbodies Crossed by the Project

APPENDIX E

Waterbodies Crossed by the Project

Facility / Waterbody ID	Waterbody Name [a]	Approximate Milepost [b]	Flow Type [c]	Classification: FERC [d]	Classification: Water Quality Designation [e] / Fishery Classification	Approximate Waterbody Width (feet) [f, g]	Impaired	Proposed Construction Method [h]
Pipeline Facilities								
New York Loop								
S005	Unnamed tributary to Vloman Kill	2.7	I	Minor	C / Not Specified	0	N/A	N/A
S004	Unnamed tributary to Vloman Kill	2.9	I	Intermittent	C / Not Specified	0	N/A	N/A
S006	Unnamed tributary to Vloman Kill	2.9	I	Minor	C / Not Specified	0	N/A	N/A
S002	Vloman Kill	3.2	P	Intermittent	C / Not Specified	32	N/A	Dry crossing
S008	Phillipin Kill	3.7	P	Intermittent	C / Not Specified	33	N/A	Dry crossing
S009	Unnamed tributary to Phillipin Kill	3.9	P	Minor	C / Not Specified	6	N/A	Dry crossing
Massachusetts Loop								
SMA-03	Unnamed tributary to Clam River	0.0	I	Minor	B / Cold Water Fishery	3	N/A	Open cut
SMA-05	Unnamed tributary to Clam River	0.3	I	Minor	B / Cold Water Fishery	0	N/A	N/A
SMA-07	Unnamed tributary to Clam River	0.7	I	Minor	B / Cold Water Fishery	0	N/A	N/A
SMA-08	Unnamed tributary to Clam River	1.3	I	Minor	B / Cold Water Fishery	0	N/A	N/A
SMA-10	Unnamed tributary to Clam River	1.3	I	Minor	B / Cold Water Fishery	6	N/A	Open cut
SMA-30	Lower Spectacle Pond	1.7	P	Minor	B / Warm Water Fishery	0	N/A	N/A
SMA-14	Spectacle Pond Brook	1.9	P	Intermittent	B / Warm Water Fishery	21	N/A	Dry crossing
SMA-16	Unnamed tributary to Clam River	2.8	P	Minor	B / Cold Water Fishery	0	N/A	N/A
SMA-20	Unnamed tributary to Clam River	2.9	P	Intermittent	B / Cold Water Fishery	11	N/A	Dry crossing
SMA-21A	Unnamed tributary to Clam River	3.3	P	Minor	B / Cold Water Fishery	0	N/A	N/A
Connecticut Loop								
SCT-56	Unknown	0.8	P	Intermittent	Unknown	10	N/A	Open cut
SCT-11	Clay Brook	1.6	P	Minor	A / Cool Water Fishery	7	N/A	Dry crossing
SCT-12	Clay Brook	1.7	P	Intermittent	A / Cool Water Fishery	24	N/A	Dry crossing
SCT-19	Muddy Brook	3.0	P	Intermittent	A / Cool Water Fishery	55	Aquatic health	Dry crossing
SCT-37	Stony Brook	5.6	P	Intermittent	A / Warm Water Fishery	29	N/A	Dry crossing
SCT-45	Unnamed tributary to Stony	6.5	I	Minor	A / Warm Water Fishery	2	N/A	Open cut

APPENDIX E

Waterbodies Crossed by the Project

Facility / Waterbody ID	Waterbody Name [a]	Approximate Milepost [b]	Flow Type [c]	Classification: FERC [d]	Classification: Water Quality Designation [e] / Fishery Classification	Approximate Waterbody Width (feet) [f, g]	Impaired	Proposed Construction Method [h]
	Brook							
SCT-46	Unnamed tributary to DeGrayes Brook	6.8	P	Minor	A / Warm Water Fishery	3	N/A	Dry crossing
SCT-46A	Unnamed tributary to DeGrayes Brook	6.9	I	Minor	A / Warm Water Fishery	3	N/A	Open cut
SCT-47	Unnamed tributary to DeGrayes Brook	7.1	I	Minor	A / Warm Water Fishery	1	N/A	Open cut
SCT-50	Unnamed tributary to DeGrayes Brook	7.3	I	Minor	A / Warm Water Fishery	1	N/A	Open cut
SCT-50B	Unnamed tributary to DeGrayes Brook	7.3	I	Minor	A / Warm Water Fishery	2	N/A	Open cut
SCT-53	Unnamed tributary to DeGrayes Brook	7.5	I	Minor	A / Warm Water Fishery	2	N/A	Open cut
SCT-53A	Unnamed tributary to DeGrayes Brook	7.5	I	Minor	A / Warm Water Fishery	2	N/A	Open cut
SCT-55	Unnamed tributary to DeGrayes Brook	8.1	I	Minor	A / Warm Water Fishery	23	N/A	Open cut
Access Road								
New York Loop								
S003a	Unnamed tributary to Vloman Kill	3.1	I	Minor	C / Not Specified	0	N/A	N/A
S003	Unnamed tributary to Vloman Kill	3.2	I	Minor	C / Not Specified	0	N/A	N/A
Massachusetts Loop								
SMA-23	Unnamed tributary to Clam River	3.8	I	Minor	B / Cold Water Fishery	0	N/A	N/A
Connecticut Loop								
SCT-50C	Unnamed tributary to DeGrayes Brook	7.3	P	Minor	A / Warm Water Fishery	0	N/A	N/A
SCT-50D	Unnamed tributary to DeGrayes Brook	7.3	P	Minor	A / Warm Water Fishery	0	N/A	N/A

APPENDIX E

Waterbodies Crossed by the Project

Facility / Waterbody ID	Waterbody Name [a]	Approximate Milepost [b]	Flow Type [c]	Classification: FERC [d]	Classification: Water Quality Designation [e] / Fishery Classification	Approximate Waterbody Width (feet) [f, g]	Impaired	Proposed Construction Method [h]

ID = identification

[a] Unnamed tributary: waterbody is not mapped as a tributary on available GIS data layers; tributary name was identified based on review of USGS topographical mapping.

[b] Nearest MP to the waterbody crossing.

[c] Flow types were identified during field surveys and are based on suggested flow terminology.

P - streams that flow permanently on surface of stream channel.

I - streams having flow for extended periods of time seasonally, but gradually reach a state where there are either isolated pools of water that are not hydrologically connected by sub-surface flow, or a dry channel.

[d] FERC stream classification are based on the FERC Procedures definition of minor, intermediate and major waterbodies.

Minor - waterbodies less than or equal to 10 feet wide

Intermittent - waterbodies greater than 10 feet wide but less than or equal to 100 feet wide

Major - greater than 100 feet wide

[e] Water quality classifications were identified by Tennessee through a desktop review of available GIS data layers and/or published literature.
State Water Quality Designation:

A – Known or presumed to meet water quality criteria that support potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses, including navigation. Surface waters which are not specifically classified shall be considered Class A or Class AA (CTDEEP 2013). None of the waterbodies crossed by the Project are listed in CTDEEP fisheries management activities. Fisheries classifications supplied by CTDEEP (Hagstrom, 2014).

B – The best usages of Class B waters are primary and secondary contact recreation and fishing. These waters are suitable for fish, shellfish, and wildlife propagation and survival.

C – These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation (i.e., fishing, boating)

Waterbodies that were not assigned a water quality classification on the GIS data layer were given the same classification of the waterbody it drains into.

[f] Waterbody widths were estimated based on the average width located within Connecticut Expansion Project study corridor

[g] 0 = waterbody is not crossed but is in workspace. For minor waterbodies less than 3 feet in width delineated in the survey area and shown as a single line feature on the Project alignment sheets, an assumed 3-foot width is shown.

[h] Dry Crossing Method may be either flume or dam-and-pump. All streams containing discernable flow at the time of construction would be crossed using a dry crossing method, regardless of the crossing method indicated in the table. N/A indicates waterbodies that would be located within the proposed Project workspace but would not be crossed by the centerline of the pipeline. These waterbodies may be temporarily bridged during construction.

APPENDIX F

Table 1: Wetland Impact Summary for the Project

Table 2: Vernal Pool Habitat Identified Near the Project

Appendix F

Table 1: Wetland Impact Summary for the Project

Facility / Wetland ID [a]	Cowardin Classification [b]	Crossing Location (Milepost or access road) [c]	Crossing Length (feet)	Total Wetland Impacts [d] (acres)	Total Wetland Impacts due to Operations and Maintenance [e] (acres)	Forested Wetland Impacts due to Operations and Maintenance [e] (acres)
Pipeline Facilities						
New York Loop						
W004	PEM	2.9	625.0	1.96	0.00	0.00
W003	PFO/PSS/PEM	3.2	87.0	0.18	0.00	0.00
W002	PSS/PEM	3.2	3.0	<0.01	0.00	0.00
W001	PFO/PEM	3.4	536.0	1.02	0.04	0.04
W006	PEM	3.4	0.0 [f]	0.00	0.00	0.00
W008	PFO/PEM	3.7	836.0	1.29	0.00	0.00
W009	PEM	3.8	63.0	0.18	0.00	0.00
W012	PFO/PEM	3.8	36.0	0.09	0.00	0.00
W013	PFO/PSS/PEM	3.9	359.0	0.73	0.02	0.02
W014	PEM/PSS	4.0	0.0 [f]	0.02	0.00	0.00
		Subtotal	**2,545.0**	**5.48** [g]	**0.06**	**0.06**
Massachusetts Loop						
WMA-3	PFO/PEM	0.0	15.0	0.18	0.01	0.01
WMA-5	PFO/PEM	0.3	19.0	0.05	0.01	0.01
WMA-6	PFO/PEM	0.5	95.0	0.18	0.06	0.06
WMA-7	PFO/PEM	0.9	1,120.0	1.75	0.77	0.77
WMA-10	PFO/PEM	1.3	28.0	0.06	0.04	0.04
WMA-12	PFO/PEM	1.5	462.0	0.72	0.04	0.04
WMA-13	PEM	1.6	503.0	0.39	0.00	0.00
WMA-14	PFO/PEM	1.9	388.0	0.75	0.09	0.09
WMA-15	PFO/PEM	2.0	242.0	0.43	0.09	0.09
WMA-19	PFO/PEM	2.4	276.0	0.41	0.00	0.00
WMA-18	PFO/PEM	2.5	305.0	0.54	0.10	0.10

Appendix F

Table 1: Wetland Impact Summary for the Project

Facility / Wetland ID [a]	Cowardin Classification [b]	Crossing Location (Milepost or access road) [c]	Crossing Length (feet)	Total Wetland Impacts [d] (acres)	Total Wetland Impacts due to Operations and Maintenance [e] (acres)	Forested Wetland Impacts due to Operations and Maintenance [e] (acres)
WMA-16	PFO/PSS/PEM	2.8	888.0	1.59	0.43	0.40
WMA-20	PFO/PEM	2.9	140.0	0.42	0.04	0.04
WMA-21	PFO/PEM	3.3	561.0	0.90	0.31	0.31
WMA-23	PFO/PSS/PEM	3.8	315.0	1.15	0.16	0.16
WMA-24	PEM	3.8	0.0 [f]	0.04	0.00	0.00
		Subtotal	**5,357.0**	**9.56**	**2.15**	**2.12**
Connecticut Loop						
WMA-01	PFO/PSS/PEM	0.1	337.0	0.59	0.13	0.13
WMA-02	PEM	0.2	66.0	0.11	0.00	0.00
WCT-01	PFO/PEM	0.3	211.0	0.36	0.00	0.00
WCT-02	PFO/PSS/PEM	0.4	25.0	0.13	0.00	0.00
WCT-56	PFO/PSS/PEM	0.6	1,642.0	3.62	0.19	0.19
WCT-03	PSS/PEM	1.1	1,165.0	2.12	0.00	0.00
WCT-04	PFO/PSS	1.2	121.0	0.25	0.08	0.08
WCT-06	PFO/PEM	1.3	325.0	0.50	0.08	0.08
WCT-07	PFO/PEM	1.4	161.0	0.18	0.04	0.04
WCT-08	PFO	1.4	0.0 [f]	0.01	0.00	0.00
WCT-09	PFO	1.4	212.0	0.41	0.01	0.01
WCT-10	PFO	1.5	15.0	0.01	0.01	0.01
WCT-11	PFO/PSS/PEM	1.5	567.0	1.05	0.01	0.00
WCT-12	PFO/PEM	1.8	1,535.0	2.45	0.21	0.21
WCT-13	PFO	2.0	7.0	0.03	0.00	0.00
WCT-14	PEM	2.0	0.0 [f]	0.01	0.00	0.00
WCT-15	PEM	2.1	453.0	0.76	0.00	0.00
WCT-16	PFO/PSS/PEM	2.4	2,338.0	4.22	0.09	0.09

Appendix F

Table 1: Wetland Impact Summary for the Project

Facility / Wetland ID [a]	Cowardin Classification [b]	Crossing Location (Milepost or access road) [c]	Crossing Length (feet)	Total Wetland Impacts [d] (acres)	Total Wetland Impacts due to Operations and Maintenance [e] (acres)	Forested Wetland Impacts due to Operations and Maintenance [e] (acres)
WCT-17	PSS/PEM	2.6	0.0 [f]	0.07	0.00	0.00
WCT-18	PFO/PSS/PEM	2.8	1,731.0	2.84	0.62	0.57
WCT-21	PFO/PEM	3.3	1,065.0	1.90	0.00	0.00
WCT-22	PSS/PEM	3.6	758.0	1.89	0.00	0.00
WCT-24	PFO/PSS/PEM	3.7	538.0	0.93	0.07	0.02
WCT-25	PFO/PEM	3.9	537.0	0.92	0.22	0.22
WCT-26	PFO/PEM	4.0	128.0	0.25	0.03	0.03
WCT-27	PFO/PEM	4.1	337.0	0.52	0.08	0.08
WCT-28	PFO/PEM	4.1	0.0 [f]	0.05	0.00	0.00
WCT-29	PEM	4.2	466.0	0.77	0.00	0.00
WCT-30	PEM	4.4	185.0	0.32	0.00	0.00
WCT-31	PFO/PEM	4.6	380.0	0.68	0.26	0.26
WCT-32	PFO/PEM	4.8	270.0	0.48	0.19	0.19
WCT-33	PFO/PEM	5.0	1,573.0	2.65	1.04	1.04
WCT-34	PSS	5.2	108.0	0.17	0.02	0.00
WCT-36	PFO/PSS/PEM	5.3	928.0	1.62	0.64	0.64
WCT-37	PFO/PSS/PEM	5.6	438.0	0.85	0.04	0.04
WCT-38	PEM/PFO	5.8	473.0	0.99	0.00	0.00
WCT-39	PFO/PEM	5.9	22.0	0.08	0.01	0.01
WCT-40	PFO/PEM	6.0	153.0	0.17	0.09	0.09
WCT-41	PFO/PEM	6.2	1,558.0	2.66	0.74	0.74
WCT-42	PFO/PSS/PEM	6.4	94.0	0.10	0.06	0.06
WCT-43	PFO/PEM	6.4	127.0	0.21	0.01	0.01
WCT-44	PFO/PEM	6.4	39.0	0.08	0.03	0.03
WCT-45	PFO/PEM	6.5	485.0	0.82	0.33	0.33

Appendix F

Table 1: Wetland Impact Summary for the Project

Facility / Wetland ID [a]	Cowardin Classification [b]	Crossing Location (Milepost or access road) [c]	Crossing Length (feet)	Total Wetland Impacts [d] (acres)	Total Wetland Impacts due to Operations and Maintenance [e] (acres)	Forested Wetland Impacts due to Operations and Maintenance [e] (acres)
WCT-46	PFO/PEM	6.8	2,060.0	3.61	1.21	1.21
WCT-47	PFO	7.1	24.0	0.06	0.02	0.02
WCT-48A	PEM/PFO	7.2	65.0	0.17	0.04	0.04
WCT-49	PFO/PSS	7.2	87.0	0.13	0.02	0.00
WCT-50	PFO/PEM	7.3	16.0	0.07	0.01	0.01
WCT-50A	PFO	7.3	43.0	0.07	0.03	0.03
WCT-51	PFO/PEM	7.3	215.0	0.30	0.03	0.03
WCT-52	PFO/PEM	7.4	150.0	0.09	0.00	0.00
WCT-53	PSS/PFO/PEM	7.6	1,136.0	1.90	0.29	0.29
		Subtotal	**25,369.0**	**45.23**	**6.98**	**6.83**
		Pipeline Facilities Total	**33,271.0**	**60.27**	**9.19**	**9.01**
Wetlands Associated with Access Roads						
New York Loop						
W005	PEM	2.8	182.0	0.08	0.00	0.00
W013	PFO/PSS/PEM	3.9	0.0	0.00	0.00	0.00
W015	PEM	3.9	0.0	<0.01	0.00	0.00
		Subtotal	**182.0**	**0.08**	**0.00**	**0.00**
Massachusetts Loop						
WMA-16	PFO/PEM	2.7	0.0	0.00	0.00	0.00
WMA-23	PFO/PSS/PEM	3.8	0.0	0.07	0.07	0.00
WMA-24	PEM	3.8	0.0	0.04	0.04	0.00
		Subtotal	**0.0**	**0.11**	**0.11**	**0.00**
Connecticut Loop						
WCT-4	PFO/PSS	1.2	0.0	0.00	0.00	0.00
WCT-21	PFO/PEM	3.3	0.0	0.00	0.00	0.00

Appendix F

Table 1: Wetland Impact Summary for the Project

Facility / Wetland ID [a]	Cowardin Classification [b]	Crossing Location (Milepost or access road) [c]	Crossing Length (feet)	Total Wetland Impacts [d] (acres)	Total Wetland Impacts due to Operations and Maintenance [e] (acres)	Forested Wetland Impacts due to Operations and Maintenance [e] (acres)
WCT-21B	PEM	3.4	0.0	0.00	0.00	0.00
WCT-22	PFO/PSS/PEM	3.5	0.0	0.00	0.00	0.00
WCT-26	PFO/PEM	4.0	0.0	<0.01	<0.01	<0.01
WCT-27	PFO/PEM	4.0	0.0	<0.01	<0.01	<0.01
WCT-29	PEM	4.2	0.0	0.00	0.00	0.00
WCT-41	PFO/PEM	6.3	0.0	0.00	0.00	0.00
WCT-41A	PFO/PEM	6.2	0.0	0.00	0.00	0.00
WCT-41D	PFO/PEM	6.3	0.0	0.00	0.00	0.00
		Subtotal	**0.0**	**<0.01**	**<0.01** [g]	**<0.01** [g]
		Access Roads Total	**182.0**	**0.19**	**0.11** [g]	**<0.01** [g]
		Project Total	**33,453.0**	**60.46**	**9.30**	**9.01**

[a] Wetlands associated with MLV and pig launcher/receiver facilities included in the corresponding pipeline segment. Wetlands were given unique identification numbers based on their location along the proposed Project alignment.
[b] Cowardin Classifications: PEM - Palustrine emergent wetland; PSS - Palustrine scrub-shrub wetland; PFO - Palustrine forested wetland.
[c] Milepost refers to location where the construction workspace first intersects the wetland.
[d] Total wetland acreage impacted within the construction workspace limits (including additional temporary workspace and access roads).
[e] Total wetland acreage impacted by vegetation maintenance.
[f] Wetland in workspace only.
[g] Minor discrepancies in totals are due to rounding.

Appendix F

Table 2: Vernal Pool Habitat Identified Near the Project

Facility/ Vernal Pool ID	Associated Wetland	Milepost	Existing Cover Type [a]
Massachusetts Loop			
VP WMA-3-1	WMA-3	0.0	PFO/PEM
VP WMA-3-2	WMA-3	0.0	PFO/PEM
VP WMA-5-1	WMA-5	0.0-0.5	PFO/PEM
VP WMA-6-1	WMA-6	0.5	PFO/PEM
VP WMA-7-1	WMA-7	0.5-1.0	PFO/PEM
VP WMA-7-2	WMA-7	0.5-1.0	PFO/PEM
VP WMA-7-3	WMA-7	0.5-1.0	PFO/PEM
VP WMA-7-4	WMA-7	1.0	PFO/PEM
VP WMA-7-5	WMA-7	1.0-1.5	PFO/PEM
VP WMA-7-6	WMA-7	1.0-1.5	PFO/PEM
VP WMA-12- 1	WMA-12	1.5	PFO/PEM
VP WMA-13- 1	WMA-13	1.5-2.0	PEM
VP WMA-18- 1	WMA-18	2.5	PFO/PEM
VP WMA-16- 1	WMA-16	2.5-3.0	PFO/PSS/PEM
VP WMA-23	WMA-23	3.5-3.8	PFO/PSS/PEM
VP WMA-24	WMA-24	3.8	PEM
Connecticut Loop			
VP WCT6-1	WCT-06	1.0-1.5	PFO/PEM
VP WCT6-2	WCT-06	1.0-1.5	PFO/PEM
VP WCT7	WCT-07	1.0-1.5	PFO/PEM
VP WCT9	WCT-09	1.0-1.5	PFO/PEM
VP WCT11	WCT-11	1.5	PFO/PSS/PEM
WCT13-VP1	WCT-13	2.0	PFO
WCT18-VP1	WCT-18	2.5-3.0	PFO/PSS/PEM
WCT32-VP1	WCT-32	4.5-5.0	PFO/PEM
WCT32-VP2	WCT-32	4.5-5.0	PFO/PEM
WCT33-VP1	WCT-33	5.0-5.5	PFO/PEM
WCT33-VP2	WCT-33	5.0-5.5	PFO/PEM
WCT33-VP3	WCT-33	5.0	PFO/PEM
WCT33-VP4	WCT-33	5.0	PFO/PEM
WCT33-VP5	WCT-33	5.0	PFO/PEM
WCT33-VP6	WCT-33	5.0	PFO/PEM
WCT34-VP1	WCT-34	5.0-5.5	PSS
WCT34-VP2	WCT-34	5.0-5.5	PSS
WCT36-VP1	WCT-36	5.0-5.5	PFO/PSS/PEM
WCT39-VP1	WCT-39	6.0	PFO/PEM
WCT41-VP1	WCT-41	6.0-6.5	PFO/PEM
WCT41-VP2	WCT-41	6.0-6.5	PFO/PEM
WCT45-VP1	WCT-45	6.5	PFO/PEM

Appendix F

Table 2: Vernal Pool Habitat Identified Near the Project

Facility/ Vernal Pool ID	Associated Wetland	Milepost	Existing Cover Type [a]
WCT45-VP2	WCT-45	6.5	PFO/PEM
WCT46-VP1	WCT-46	6.5-7.0	PFO/PEM
WCT46-VP2	WCT-46	7.0	PFO/PEM
WCT49-VP1	WCT-49	7.0-7.5	PFO/PSS
WCT51-VP1	WCT-51	7.0-7.5	PFO/PEM

ID = identification

National Wetland Inventory Classifications: PEM - Palustrine emergent wetland; PSS - Palustrine scrub-shrub wetland; PFO - Palustrine forested wetland.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	State Status [a] MA	State Status [a] NY	Habitat Description	Effect Determination
Mammals						
Indiana bat *(Myotis sodalis)*	E	E	E	E	Indiana bats hibernate during winter in cool humid caves or abandoned mines with stable temperatures. When active, Indiana bats roost in dead trees, dying trees, or live trees with exfoliating bark. Roost trees are generally found within canopy gaps in a forest, fence lines, or along a wooded edge. Maternity roosts are found in riparian zones, bottomland and floodplain habitats, wooded wetlands, as well as upland communities. Indiana bats forage in semi-open to closed forested habitats, forest edges, and riparian areas (USFWS, 2007).	*May effect, but not likely to adversely affect.* Tennessee would avoid impacts by restricting tree clearing to the late fall and winter months (October 1 through March 31) when the bats would be in their hibernacula and not utilizing roosting trees associated with summer habitats. As Tennessee proposes to clear trees outside of the restriction period, USFWS stated surveys would not be required (Rayman, 2014).
Northern long-eared bat *(Myotis septentrionalis)*	T	—	E	—	Northern long-eared bats hibernate during winter in cool humid caves or abandoned mines with stable temperatures. Summer habitat includes wooded areas where they usually roost under loose tree bark on dead or dying trees or crevices and cavities in large trees. Northern long-eared bats also forage in or along the edges of forested areas including edge habitats created by linear infrastructure corridors (USFWS, 2013b).	*May effect, but not likely to adversely affect*. Tennessee would avoid impacts by restricting tree clearing to the late fall and winter months (October 1 through March 31) when the bats would be in their hibernacula and not utilizing roosting trees associated with summer habitats.
New England cottontail rabbit *(Sylvilagus transitionalis)*	C	—	—	SSC	Early successional forests with thick and tangled vegetation, generally less than 25 years old. Once large trees grow, the shrub layer tends to thin creating habitat no longer suitable for the New England cottontail.	*No effect*. Tennessee conducted surveys for the New England cottontail rabbit along the Massachusetts Loop between January and March 2015. No evidence of New England cottontail rabbit populations were detected and preferred habitat is lacking from the Project area. Tennessee filed a complete survey report with FERC in June 2015.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a]			Habitat Description	Effect Determination
		CT	MA	NY		
Birds						
Horned lark *(Eremophila alpestris)*	—	E	—	SSC	Grassland, tundra, sandy regions, areas with scattered low shrubs, desert playas, grazed pastures, stubble fields, open cultivated areas, and rarely open areas in forest. Nests in hollow on ground often next to grass tuft or clod of earth or manure (NatureServe, 2015). The horned lark is known to be an early nesting species; early clutches are occasionally destroyed by snowstorms (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.
Grasshopper sparrow *(Ammodramus savannarum)*	—	E	T	SSC	Grasslands, pastures and old fields (CTDEEP, 1999). Prefer grasslands of intermediate height with clumped vegetation interspersed with patches of bare ground. Other habitat requirements include moderately deep litter and sparse coverage of woody vegetation (NatureServe, 2015). With few exceptions, nests are built on the ground, near a clump of grass or base of a shrub, "domed" with overhanging vegetation (Vickery, 1996).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.
Vesper sparrow *(Pooecetes gramineus)*	—	E	T	SSC	Habitats include old fields, meadows, pastures, woodland clearings, dry shrublands, savannas, sagebrush, arid scrub, and hayfields. Sometimes found in beach grass in coastal areas (CTDEEP, 1999; NatureServe, 2015). Nest sites are typically located in or at the base of grass tussock in depression in ground (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
Savannah sparrow *(Passerculus sandwichensis)*	—	SSC	—	—	Preferred habitats cover a wide range of vegetation types, including alpine and arctic tundra, coastal salt marshes, sedge bogs, grassy meadows, and native prairie. Prefers habitat with short to intermediate vegetation height, intermediate vegetation density, and a well developed litter layer. (NatureServe, 2015). Nest sites are located in a hollow on the ground, typically hidden by a canopy of surrounding vegetation, often in grass tufts (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.
Bobolink *(Dolichonyx oryzivorus)*	—	SSC	—	—	Typically found in native and tame grasslands, haylands, lightly to moderately grazed pastures, no-till cropland, small-grain fields, oldfields, and wet meadows. Prefers habitat with moderate to tall vegetation, moderate to dense vegetation, and moderately deep litter (NatureServe, 2015). Nests in dense stands of vegetation such as hay, clover, or weeds such as dandelions. Often nests in wet habitats, transitional between areas with drier soils and those with poor drainage (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.
Upland sandpiper *(Bartramia longicauda)*	—	E	E	T	Prefers dry, open, pastures, upland meadows, fallow fields and similar grassy areas. Unlike other sandpipers, does not prefer wetlands (CTDEEP, 1999). Nest sites are typically well hidden in a depression in grass covered by nearby vegetation. Usually nests in loosely spaced colonies (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.
Northern harrier *(Circus cyaneus)*	—	E	T	T	Northern harriers inhabit open marshland, meadows, pastures, cropland, grasslands, and riparian woodlands (CTDEEP, 2008a).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
American kestrel *(Falco sparverius)*	—	T	—	—	Typically found in agricultural areas (hay fields, orchards, pastures), airports, large parks, and power line rights-of-way. Meadows, grassy fields, and old fields also may be inhabited. Require natural tree cavities or nest boxes for nesting, along with perches in the form of trees, shrubs, or telephone poles (CTDEEP, 2015a).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.
Eastern meadowlark *(Sturnella magna)*	—	SSC	—	—	Large grassy fields of intermediate height and density but also uses grassy meadows, hay fields, tall grass prairies, agricultural fields of alfalfa, and clover, and open weedy orchards. Typically requires extensive open grasslands with elevated song perches. Nest sites are located on the ground in a natural depression or one scraped by the female, partially or entirely domed with nest materials and adjacent vegetation and opening on the side. Prefers to nest in cover 10 to 20 inches (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.
Brown thrasher *(Toxostoma rufum)*	—	SSC	—	—	Thickets and bushy areas in deciduous forest clearings and forest edge, shrubby areas and gardens; in migration and winter also in scrub. Nests on ground under small bush or near ground in small trees, shrubs, or vines (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the nesting season.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
Sedge wren *(Cistothorus plantensis)*	—	E	E	T	Sedge wrens inhabit wet meadows dominated by tall grasses and sedges, generally at the drier margins of wetlands and avoid flooded areas or areas of short, sparse, or open vegetation (MADFW, 2010). Sedge wrens build nests over land or water in dense vegetation; usually places nest, interwoven with live grasses, less than 3 feet (1 meter) above the substrate. Males build multiple domed nests in their territory that are used for nesting, as dormitories, and possibly as decoys for predators. Sedge wrens are nomadic breeders; breeding areas shift from year-to-year. The sedge wren is among the rarest nesting passerines in Massachusetts (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Potential suitable habitat occurs within the Project area. Consultations with the MA NHESP identified habitat for this species within or near the Project area in Massachusetts at the Tyringham pipeyard. Tennessee would place construction matting over the Tyringham, Massachusetts pipeyard in early spring to prevent utilization by this species.
American bittern *(Botaurus lentiginosus)*	—	E	E	SSC	The American bittern inhabits freshwater marshes, meadows fens and bogs dominated by emergent vegetation such as cattails, bulrushes, sedges and grasses. It may also occur in brackish wetlands (MADFW, 2015). The American bittern is a very shy, solitary, and elusive heron. Nests almost exclusively in large cattail marshes in New England. Occasionally nests in wet fields or upland fields adjacent to water. Prefers impoundments and beaver-created wetlands to those created by glacial activity. Inhabits wetlands <2.5 to 62.5 acres, but are more abundant in larger wetlands. Typically nests on flimsy platform of cattails, reeds, or sedges placed in dense emergent vegetation just above the water (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Potential suitable habitat occurs within the Project area. Consultations with the MA NHESP identified habitat for this species within or near the Project area in Massachusetts at the Tyringham pipeyard. Tennessee would place construction matting over the Tyringham, Massachusetts pipeyard in early spring to prevent utilization by this species.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
Reptiles						
Bog turtle *(Glyptemys muhlenbergii)*	T	E	E	E	Bog turtles inhabit open, generally spring-fed wet meadows and sphagnum bogs with standing or slow moving, shallow water over a mucky substrate. Bog turtles prefer areas with good sunlight, high evaporation rates, high humidity in the near-ground microclimate, and perennial saturation of portions of the ground (Bourg, 1992).	*No effect.* Surveys were conducted in 2014 and no bog turtle habitat was found in the Project area during surveys completed June 5, 2014.
Eastern box turtle *(Terrapene carolina carolina)*	—	SSC	SSC	—	Eastern box turtles are typically found in well-drained forest bottomlands and open deciduous forests. They will use wetland areas at various times during the season. For shelter, they find springs and seepages where they can burrow into the moist soil (CTDEEP, 2008b). Eastern box turtle young are semiaquatic. Eastern box turtles have been observed swimming in slow-moving streams and ponds. Found chiefly in open deciduous forests. When not active, rests in brush piles and thickets. Hibernates on land from depths of several inches to two feet below surface in loose soil, decaying vegetation, mud, or in streambanks from late fall to April (DeGraaf and Yamasaki, 2001).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the active period.
Eastern hognose snake *(Heterodon platirhinos)*	—	SSC	—	—	Habitats include openly wooded upland hills, forest edges, fields, woodland meadows, prairies, forest-grassland ecotones, sand plains, barrier islands, fire-managed pinelands, river valleys, riparian zones, and various other habitats with loose soils and amphibian prey (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the active period.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
Wood turtle *(Glyptemys insculpta)*	—	SSC	SSC	—	Wood turtles use aquatic and terrestrial habitats at different times of the year. Their habitats include rivers and large streams, riparian forests (adjacent to rivers), wetlands, hayfields, and other early successional habitats. Terrestrial habitat that is usually within 1,000 feet of a suitable stream or river is most likely used (CTDEEP, 2011).	Not likely to cause a trend toward federal listing. Tennessee would provide construction monitoring in habitat during the active period. Exclusion fencing would be placed around the Tyringham, Massachusetts pipeyard.
Invertebrates						
Dwarf wedgemussel *(Alasmidonta heterodon)*	E	E	E	E	Relatively shallow portions of clear rivers, creeks, streams, or ponds with slow to moderate current and having a muddy sand to sand and gravel bottom.	*May affect, likely to adversely affect*. Tennessee performed presence/absence surveys within Muddy Brook and Stony Brook within and adjacent to the Project's footprint. Dwarf wedgemussels were found in both waterbodies; therefore, FERC entered into formal consultation with the USFWS New England field office on October 6, 2015 to determine appropriate mitigation to minimize impacts on dwarf wedgemussels.
Brook floater *(Alasmidonta varicosa)*	—	—	E	T	The brook floater inhabits creeks and small rivers with flowing water, where it is found among rocks in gravel substrates and in sandy shoals (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee performed presence/absence surveys within Muddy Brook and Stony Brook within and adjacent to the Project's footprint. No brook floaters were found.
Karner blue butterfly *(Lycaeides Melissa samuelis)*	E	—	—	E	The Karner blue's habitat is a patchwork of pine and scrub oak scattered among open grassy areas.	*No effect.* Suitable habitat for this species is not present within the Project area. As such, the New York USFWS field office has stated that surveys would not be required and has concurred with the "*No Effect*" determination (Rayman, 2014).
Noctuid moth/Burgess' cutworm *(Apamea burgessi)*	—	SSC	—	—	Sandy, pine savannas or grassy openings in pine barrens (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
Brown-bordered geometer *(Eumacaria latiferrugata)*	—	SSC	—	—	Large dry or mesic jack or pitch pine barrens and bogs (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Jointweed flower moth/Noctuid moth *(Schinia spinosae)*	—	SSC	—	—	Prairie, savanna, woodland (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Shrub euchlaena moth *(Euchlaena madusaria)*	—	SSC	SSC	—	Occupies a variety of forest and woodland habitats and often adjacent shrublands and thickets (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Violet dart moth *(Euxoa violaris)*	—	T	—	—	Xeric, usually sandy, pine savannas or grassy openings in pine barrens (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Phyllira tiger moth *(Grammia phyllira)*	—	E	E	—	Xeric, usually sandy, pine savannas or grassy openings in pine barrens (NatureServe, 2015)	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
Bombardier beetle *(Brachinus cyanipennis)*	—	SSC	—	—	Usually found under stones or debris on sandy clay on the primary or secondary floodplain of fairly large rivers (Erwin, 1981).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Pine barrens tiger beetle *(Cicindela formosa generosa)*	—	SSC	—	—	Dry upland sandy areas, sand pits, blowouts, dry forest clearings, edges of sand dunes (MADFW, 2007).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Ground beetle 1 *(Harpalus eraticus)*	—	SSC	—	—	Open places: vacant fields, sand and gravel pits, dunes, usually on sandy, mostly dry soils (Bousquet, 2010).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Ground beetle 2 *(Tetragonoderus fasciatus)*	—	SSC	—	—	Found on commonly dry sand where there is sparse vegetation; they are attracted to lights (Erwin, 1981).	Not likely to cause a trend toward federal listing. Tennessee conducted habitat-based suitability surveys for this species along the Connecticut Loop in late September and early October in 2014. Preferred suitable habitat for this species is not present along the Connecticut Loop.
Umber shadowdragon *(Neurocordulia obsolete)*	—	—	SSC	—	Habitat preference includes rocky rivers in most parts of its range (Paulson, 2009). This species is typically found on lakes of various sizes, and on medium to large rivers that are relatively unvegetated. This species has also been documented to inhabit artificially created habitats, such as reservoirs and dammed sections of rivers, where they have been found in Massachusetts.	Not likely to cause a trend toward federal listing. Potential suitable habitat occurs within the Project area. Consultations with the MA NHESP indicated that Lower Spectacle Pond on the Massachusetts Loop contains Priority Habitat for this species. To prevent entrainment of aquatic wildlife, Tennessee would screen the hydrostatic test water intakes.
Plants						

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination
Bush's sedge *(Carex bushii)*	—	SSC	E	—	Man-made or disturbed habitats, floodplains, meadows and fields (New England Wildflower Society, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted surveys for this species along the Connecticut Loop on June 17, June 18, July 8, and September 3, 2014. No populations of bush's sedge were recorded.
Squarrose sedge *(Carex squarrosa)*	—	SSC	—	—	Swamps, wetland margins (New England Wildflower Society, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted surveys for this species along the Connecticut Loop on June 18, July 8, and September 3, 2014. Nine populations of squarrose sedge were recorded on or near the western edge of the right-of-way in the vicinity of MP 1.8 through MP 1.9. Two of these populations would be within the proposed workspace. Direct effects on these individual populations would not likely cause population-level impacts; however, additional information is requested from Tennessee (section B.4.2).
Low frost weed *(Helianthemum propinquum)*	—	T	—	—	Dry, sandy, open ground; barrens; upland woods at high elevations (NatureServe, 2015).	Not likely to cause a trend toward federal listing. Tennessee conducted surveys for this species along the Connecticut Loop on June 17, June 18, July 8, and September 3, 2014. No populations of low frost weed were recorded.
New England grape *(Vitis x novae-angliae)*	—	SSC	—	—	Facultative wetland species. Alluvial or rich thickets.	Not likely to cause a trend toward federal listing. Tennessee conducted surveys for this species along the Connecticut Loop on June 17, June 18, July 8, and September 3, 2014. No populations of New England grape were recorded.

APPENDIX G

Federal- and State-Listed Species Potentially Occurring in the Project Area

Species	Federal Status [a]	State Status [a] CT	MA	NY	Habitat Description	Effect Determination

[a] T = threatened; E = endangered; C = candidate; SSC = species of special concern

Sources:
Bourg, 1992
Bousquet, 2010
CTDEEP, 1999
CTDEEP, 2008a
CTDEEP, 2008b
CTDEEP, 2011
CTDEEP, 2015a
DeGraaf and Yamasaki, 2001
Erwin, 1981
MADFW, 2007
MADFW, 2010
MADFW, 2015
NatureServe, 2015
New England Wildflower Society, 2015
Rayman, 2014
USFWS, 2007
USFWS, 2013b
Vickery, 1996

APPENDIX H

Land Uses Affected by the Project

APPENDIX H

Land Uses Affected by the Project

Facility	Agricultural Land Const	Agricultural Land Oper [f]	Forested Uplands Const	Forested Uplands Oper [f]	Wetlands [a] Const	Wetlands [a] Oper [f, g]	Residential Const	Residential Oper [f]	Developed [b] Const	Developed [b] Oper [f]	Open Uplands [c] Const	Open Uplands [c] Oper [f]	Open Water [d] Const	Open Water [d] Oper [f]	Total [e] Const	Total [e] Oper [f]
Pipeline Facilities																
New York Loop																
Pipeline	11.0	1.5	2.2	0.2	6.6	1.5	0.0	0.0	0.4	0.2	0.7	0.2	0.2	0.0	21.1	3.6
ATWS	5.3	0.0	0.9	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	6.4	0.0
Access Roads	0.7	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.1	0.0	0.0	1.7	0.4
Pipeyard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.0	0.0	0.0	0.0	0.0	6.9	0.0
Subtotal	**16.9**	**1.7**	**3.3**	**0.4**	**6.7**	**1.5**	**0.0**	**0.0**	**8.1**	**0.2**	**0.8**	**0.3**	**0.2**	**0.0**	**36.1**	**4.0**
Massachusetts Loop																
Pipeline	2.3	0.8	28.2	8.9	8.7	2.3	0.0	0.0	0.5	0.1	4.7	0.4	0.1	0.0	44.5	12.5
ATWS	0.5	0.0	5.1	0.0	0.8	0.0	0.0	0.0	0.1	0.0	1.0	0.0	0.0	0.0	7.5	0.0
Access Roads	0.0	0.0	0.8	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.0	1.7	0.7
Pipeyard	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	17.9 [h]	0.0
Subtotal	**20.6**	**0.8**	**34.1**	**9.2**	**9.6**	**2.4**	**0.0**	**0.0**	**0.6**	**0.1**	**6.6**	**0.8**	**0.1**	**0.0**	**71.6**	**13.3**
Connecticut Loop																
Pipeline	15.0	5.7	12.2	6.3	44.7	19.9	1.4	0.5	3.6	1.1	3.1	1.4	0.3	0.1	80.3	35.0
ATWS	1.3	0.0	0.9	0.0	0.6	0.0	0.0	0.0	0.4	0.0	0.6	0.0	0.0	0.0	3.8	0.0
Access Roads	1.0	0.2	0.5	0.3	0.0	0.0	0.1	0.0	2.5	0.0	1.2	0.0	0.0	0.0	5.3	0.4
Pipeyard	10.5	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	17.4	0.0
Subtotal	**27.8**	**5.9**	**14.7**	**6.6**	**45.3**	**19.9**	**1.5**	**0.5**	**6.5**	**1.1**	**10.7**	**1.4**	**0.3**	**0.1**	**106.8**	**35.4**
Pipeline Total	**65.3**	**8.4**	**52.1**	**16.2**	**61.6**	**23.8**	**1.5**	**0.5**	**15.3**	**1.4**	**18.1**	**2.5**	**0.6**	**0.1**	**214.5**	**52.7**
Aboveground Facilities																
Connecticut Loop																
Station 261	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.6	0.1	0.0	0.0	0.0	0.0	1.7	0.1
Aboveground Total	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.6**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**1.7**	**0.1**
Project Total	**65.3**	**8.4**	**52.3**	**16.2**	**61.6**	**23.8**	**1.5**	**0.5**	**16.8**	**1.5**	**18.1**	**2.5**	**0.6**	**0.1**	**216.2**	**52.8**

APPENDIX H

Land Uses Affected by the Project

Facility	Agricultural Land		Forested Uplands		Wetlands [a]		Residential		Developed [b]		Open Uplands [c]		Open Water [d]		Total [e]	
	Const	Oper [f]	Const	Oper [f]	Const	Oper [f, g]	Const	Oper [f]	Const	Oper [f]	Const	Oper [f]	Const	Oper [f]	Const	Oper [f]

Const = Construction(includes land needed for both construction and operation)

Oper = Operation (includes land permanently impacted from Project operation)

[a] Includes forested wetlands (PFO), palustrine scrub-shrub wetlands (PSS), and palustrine emergent wetlands (PEM).

[b] Includes roadways (federal, state, and local regardless of width) and commercial/industrial land (including electric power or gas utility stations, manufacturing or industrial plants, landfills, mines, quarries, and commercial or retail facilities).

[c] Includes maintained utility easement (pipeline, electric transmission, etc.) crossings and other open lands.

[d] Includes all waterbodies crossed by the Project.

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

[f] Land affected during operation includes only new permanent rights-of-way outside of the existing maintained rights-of-way associated with Tennessee's existing 200 Line and 300 Line systems.

[g] Wetlands affected during operation include the extent of the new permanent easements. Refer to table B.6 for maintenance impacts in wetlands.

[h] Tennessee continues to evaluate potential pipeyard sites in Massachusetts and would use one or two of these options after surveys and negotiations with landowners are complete. Impacts are included are for reference, but the actual total area affected by construction would be less that the acreage reflected in this table.

APPENDIX I

Biological Assessment for the Dwarf Wedgemussel

THE CONNECTICUT EXPANSION PROJECT
FERC Docket No. CP14-529-000

BIOLOGICAL ASSESSMENT
Formal Section 7 Consultation, Dwarf Wedgemussel
Muddy Brook and Stony Brook Crossings, Suffield Connecticut

Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426

October 2015

CONNECTICUT EXPANSION PROJECT
BIOLOGICAL ASSESSMENT

TABLE OF CONTENTS

LIST OF FIGURES

Figure	Title	Page No.

FIGURES CONTAIN PRIVILEGED INFORMATION – FILED UNDER SEPARATE COVER

CONNECTICUT EXPANSION PROJECT
BIOLOGICAL ASSESSMENT

LIST OF TABLES

Table	Title	Page No.

CONNECTICUT EXPANSION PROJECT
BIOLOGICAL ASSESSMENT

LIST OF ATTACHMENTS

Attachment	Title
ATTACHMENT A:	USGS SITE LOCUS, MUDDY BROOK AND STONY BROOK
ATTACHMENT B:	BIODRAWVERSITY, FRESHWATER MUSSEL SURVEY IN MUDDY BROOK AND STONY BROOK AT TWO GAS PIPELINE CROSSINGS, SUFFIELD, CT **(CONTAINS PRIVILEGED INFORMATION – FILED UNDER SEPARATE COVER)**
ATTACHMENT C:	DWARF WEDGEMUSSEL RELOCATION AND MONITORING PLAN **(CONTAINS PRIVILEGED INFORMATION – FILED UNDER SEPARATE COVER)**
ATTACHMENT D:	MUDDY BROOK PROPOSED CROSSING, FIGURE 2
ATTACHMENT E:	STONY BROOK PROPOSED CROSSING, FIGURE 3
ATTACHMENT F:	TYPICAL CONSTRUCTION DRAWINGS ASSOCIATED WITH DRY STREAM CROSSING AND RESTORATION METHODS
ATTACHMENT G:	CURRENT, PROPOSED, AND REASONABLY FORESEEABLE FUTURE PROJECTS

List of Acronyms

BA	Biological Assessment
BMP	Best Management Practice
CFR	Code of Federal Regulations
CTDEEP	Connecticut Department of Energy and Environmental Protection
CTNDDB	Connecticut Natural Diversity Database
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
HDD	horizontal directional drill(ing)
MADFW	Massachusetts Department of Fish and Wildlife
mm	millimeter
MP	milepost
m/s	meters per second
NYSDEC	New York State Department of Environmental Conservation
Plan	FERC Upland Erosion, Revegetation, and Maintenance Plan
Procedures	FERC Wetland and Waterbody Construction and Mitigation Procedures
Project	Connecticut Expansion Project
Tennessee	Tennessee Gas Pipeline Company, LLC
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

1.0 Introduction

This Biological Assessment (BA) is being submitted by the Federal Energy Regulatory Commission (FERC) to the New England office of the United States Fish and Wildlife Service (USFWS) for its review of the proposed Connecticut Expansion Project (Project). The Project is proposed by Tennessee Gas Pipeline Company, LLC (Tennessee) and would include about 13.3 miles of pipeline looping adjacent to its existing infrastructure in New York, Massachusetts, and Connecticut. Tennessee is seeking a Certificate of Public Convenience and Necessity from the FERC for construction and operation of the Project. To fulfill requirements of the Endangered Species Act (ESA) for the Project, Tennessee initiated informal consultations with the USFWS, New York State Department of Environmental Conservation (NYSDEC), Massachusetts Department of Fisheries and Wildlife (MADFW), and the Connecticut Department of Energy and Environmental Protection, Natural Diversity Database (CTDEEP, NDDB), as discussed in detail in Section 2.0 of this BA. Tennessee's informal consultations with the USFWS and CTNDDB indicated the potential presence of the state and federally endangered dwarf wedgemussel (*Alasmidonta heterodon*) in Muddy Brook and Stony Brook (Chapman 2014, McKay 2013, McKay 2014). Both streams are located within Suffield, Connecticut and each is proposed to be crossed by the Project.

Following initial consultations, Tennessee's environmental consultant (Biodrawversity) conducted mussel surveys within both streams, and dwarf wedgemussels were documented at both proposed stream crossings on June 3, 2014. A United States Geologic Survey quadrangle map showing the location for each stream crossing is included as Attachment A. The detailed Biodrawversity survey report is located in Attachment B. Tennessee provided confirmation of the presence of this species to the USFWS via e-mail and phone conversations (Tur 2014a, Tur 2014b), resulting in the requirement of formal consultation under Section 7 of the ESA.

The FERC has prepared this BA, which is also part of the FERC National Environmental Policy Act Environmental Assessment being prepared for the Project. As such, FERC is seeking USFWS review and concurrence that the Dwarf Wedgemussel Relocation Plan and Post Relocation and Monitoring Plan (Attachment C) is sufficient to minimize adverse effects to this species and its associated habitat prior to pipeline construction and, therefore, would not result in a conclusion that the species population would be jeopardized by the proposed Project.

2.0 Consultation

As part of the ESA process, Tennessee, as the FERC non-federal representative, conducted informal consultations with the New York and New England USFWS field offices, NYSDEC, MADFW, and CTNDDB to determine if any federally or state-listed threatened and endangered species (including federal and state species of concern) or their designated critical habitats are known to occur within the Project area. Tennessee also conducted habitat assessment surveys, in coordination with the USFWS, NYSDEC, MADFW, and CTNDDB to identify potential habitats for threatened and endangered species within the proposed Project area.

Based on coordination with the USFWS and the CTNDDB and the surveys completed by Tennessee in June 2014, it was determined that the federally and state-listed endangered dwarf wedgemussel is present in the Project area along the Connecticut Loop at the Muddy Brook and Stony Brook crossings. Based on this information, Tennessee conducted additional informal consultation with the New England USFWS field office and provided a draft BA on August 27, 2014 for their review. Tennessee discussed the draft BA with the USFWS on December 22, 2014 (Tur 2014c). The USFWS indicated that since the endangered dwarf wedgemussel is present in the Muddy and Stony Brook stream crossings, it would be adversely affected by Tennessee's proposed dry crossing construction methods (i.e., dam-and-pump or flume). As such, formal consultation with FERC as the lead federal agency for the Project would be required, which would include development of an incidental take statement and an approved Dwarf Wedgemussel Relocation and Monitoring Plan. Alternatively, based on additional conversations with USFWS, if Tennessee committed to a trenchless construction crossing method that would result in a "no effect" or "may affect, but is not likely to adversely affect" determination, such as the horizontal directional drill (HDD) method, then consultation could be completed informally and an incidental take statement would not be required.

Based on the recommendation by USFWS that formal consultation be initiated, the FERC consulted with the New England USFWS field office on July 30, 2015 regarding the preparation of a BA and additional information needs. FERC formally submitted an Environmental Information Request to Tennessee on August 5, 2015 requesting additional information regarding the dwarf wedgemussel and the surveys performed by Biodrawversity. Tennessee responded on August 14, 2015 and those responses have been incorporated into this BA. In addition, FERC formally submitted an Environmental Information Request to Tennessee on August 31, 2015, requesting the Dwarf Wedgemussel Relocation and Monitoring Plan. Tennessee responded on September 4, 2015, and the plan has been incorporated into this BA. By submission of this BA, FERC is requesting to enter formal consultation with USFWS for the dwarf wedgemussel. It is expected that USFWS will complete its review of the BA and development of a Biological Opinion for the Project within 135 days of the submittal of this BA; however, as noted in the cover letter, we are requesting expedited treatment, in consideration of Tennessee's targeted construction dates.

3.0 Project Description

The proposed Project includes the construction, installation, and operation of three pipeline looping segments, one mainline valve, minor tie-in piping, and relocation of certain pigging facilities in Connecticut, Massachusetts and New York. The Connecticut Loop commences in Agawam, Massachusetts, in the yard of existing Compressor Station 261, and extends southward approximately 8.1 miles to the terminus in East Granby, Connecticut. As proposed, the Connecticut Loop would be collocated with Tennessee's existing pipeline, referred to as the "300 Line". Tennessee would construct, own, and operate the proposed Project facilities.

As part of the Project, Tennessee proposes to cross Muddy Brook and Stony Brook in Suffield, Connecticut, adjacent to the existing 300 Line. Each stream crossing is anticipated to take approximately one week to complete. Anticipated construction procedures are outlined below.

3.1 Action Area

The Muddy Brook stream crossing is located at approximate milepost (MP) 3.0 (Attachment D) and the Stony Brook crossing is located at approximate MP 5.6 along the Connecticut Loop (Attachment E). For the purposes of this BA, the Action Area for the proposed waterbody crossing activities where direct and indirect effects may occur, is defined as the pipeline crossing site in Muddy Brook and Stony Brook with a 50-meter (approximately 164-foot) upstream buffer area and a 100-meter (approximately 328-foot) downstream buffer area from the upstream and downstream limits of disturbance, per USFWS and CTNDDB survey protocols, bounded by the stream width at each crossing. The construction workspace for Muddy Brook is 75 feet in stream length and the construction workspace for Stony Brook is 60 feet in stream length, resulting in a total stream length of 567 linear stream feet (173 meters) for Muddy Brook and 552 linear stream feet (168 meters) for Stony Brook. The total Action Area for Muddy Brook is 31,185 square feet and the total Action Area for Stony Brook is 16,008 square feet. Temporary, direct effects would be expected within the crossing areas where sediment disturbance could occur during stream crossing activities.

3.2 Construction Methods and Procedures

The proposed Project facilities would be designed, constructed, tested, operated, and maintained to conform with applicable federal, state, and local requirements, including U.S. Department of Transportation (USDOT) regulations at 49 Code of Federal Regulations (CFR) Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards" and FERC regulations at 18 CFR Section 380.15, "Siting and Maintenance Requirements." In addition, unless otherwise authorized through a variance granted by the FERC, Tennessee would comply with the FERC Upland Erosion Control, Revegetation and Maintenance Plan (FERC Plan) and the FERC Wetland and Waterbody Construction and Mitigation Procedures (FERC Procedures), and would also follow Tennessee's Spill Prevention and Response Procedures, Unanticipated Discovery Plan for cultural resources, Waste Management Plan, and typical construction workspace layout drawings. All of these documents were submitted as part of Tennessee's 7(c) application to the FERC on July 31, 2014 and can be found on the FERC website at http://www.ferc.gov/docs-filing/elibrary.asp under docket number CP14-529.

Tennessee would generally use conventional techniques for buried pipeline construction to ensure safe, stable, and reliable transmission facilities consistent with FERC and USDOT specifications. For the Project as a whole, Tennessee would implement the general sequence of construction procedures as follows:

- Marking the corridor;
- Clearing, grading and sediment and erosion controls;
- Trenching;
- Pipe stringing;
- Pipe preparation (bending, welding, X-ray, weld coating and coating repair) and lowering in;
- Backfilling and grade restoration;
- Hydrostatic testing and tie-ins; and
- Clean-up and restoration.

With respect to the proposed crossings of Muddy Brook and Stony Brook, Tennessee would first implement the Dwarf Wedgemussel Relocation and Monitoring Plan prior to any disturbance to the streams and following construction.

Tennessee proposes to use a dry crossing construction method at the streams, which would be either the flume crossing method or the dam-and-pump crossing method to divert or isolate flow during pipe installation. The proposed construction footprint for each crossing is depicted in Attachments D and E. Typical construction layouts associated with each crossing method are included in Attachment F, which also includes typical details for bank restoration and stream bed restoration. Tennessee would use construction bridges at these streams at the time of crossing, and would adhere to any requirements in federal and state waterbody crossing permits.

3.2.1 Horizontal Directional Drill Crossing Method

Tennessee evaluated alternative stream crossing methods to minimize potential impacts on the dwarf wedgemussel, including the use of the HDD method for the two stream crossings. Based on a desktop analysis of geological information, the subsurface conditions in the area of Muddy Brook and Stony Brook were found to be similar to those of the DeGrayes Creek, located approximately 4.35 miles and 1.76 miles, respectively, further south. A geotechnical investigation was conducted for DeGrayes Creek early in the Project development process when the HDD method was being considered to avoid impacts on a wetland complex adjacent to the Creek. The soils in this area of Connecticut are characterized as a mix of Deltaic, Glacial till, and Glaciolacustrine soils, and are composed mostly of sand, sand with clay, and a strata of fine sands, gravel and cobble. Tennessee determined these soil conditions are not suitable for a successful HDD crossing of either Muddy Brook or Stony Brook because of the high likelihood of drill path failure with unconfined soils, which could lead to the inadvertent return of drilling mud within the streams. An inadvertent return of drilling mud to the ground surface would likely result in environmental impacts on the sensitive environmental resources in the area, including the dwarf wedgemussel. Given the nature of the soils in the area of these two streams and the high risk of inadvertent returns and HDD failure, Tennessee did not further explore using the HDD methodology for the crossing of these two streams, as it was determined that such a crossing methodology was not technically feasible.

3.2.2 Dam-and-Pump Crossing Method

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

3.2.3 Flume Crossing Method

A flume crossing temporarily directs the flow of water through one or more flume pipes placed over the area to be excavated. The number, length, and diameter of the pipes would be dependent on estimated stream flow at the time of crossing. Trenching would then occur across the waterbody and underneath the flume pipes without reducing downstream water flow. After pipeline installation, backfilling of the trench, and restoration of the stream banks, the flume pipes would be removed. This method would allow for drier trenching, pipe installation, and restoration, while maintaining continuous downstream flow and passage for aquatic organisms. It also generally minimizes downstream turbidity during trenching, as excavation is conducted under relatively dry conditions. For this method to be used successfully and safely, soil types must have characteristics that allow stable stream bank conditions and stream flow must be low enough. The flume pipe(s) must also be long enough to account for the potential for the ditch width to increase during excavation due to sloughing and large enough to accommodate the possibility of high flow conditions. An effective seal must be created around the flume(s) at both the inlet and outlet ends so water does not penetrate and potentially compromise the dam. Based on discussions with the USFWS regarding the dwarf wedgemussel, we intend to include a recommended condition in the EA requiring the use of the flume crossing method for Muddy Brook and Stony Brook to minimize impacts on the dwarf wedgemussel.

3.2.4 Erosion and Sediment Control

Tennessee proposes to install temporary soil erosion and sediment control measures at the stream crossings, as applicable, in accordance with the FERC Procedures. Typical stabilization techniques for stream crossings are included in Attachment F. To ensure that appropriate erosion and sediment control measures are maintained until the construction workspace is fully stabilized, a full time Environmental Inspector would be assigned to the Project and would inspect the proposed Muddy Brook and Stony Brook crossing operations daily, while active construction is taking place, on a weekly basis while stabilization is in progress, and within 24 hours of the end of a storm event that is 0.5 inch or greater.

3.2.5 Operation and Maintenance

Tennessee would operate and maintain the new pipeline loop in accordance with all applicable federal and state requirements, including the USDOT's safety standards in 49 CFR 192. Following pipe installation, Tennessee would allow for regrowth of a 25-foot-wide riparian strip for the full width (25 feet) of the permanent right-of-way, including plantings of native woody species to restore the shade conditions adjacent to the stream, and would limit vegetative maintenance immediately adjacent to waterbodies to a 10-foot-wide-strip centered over the pipeline that could be maintained in an herbaceous state to allow for periodic corrosion and leak surveys.

4.0 Affected Environment and Species Account

4.1 Description of Dwarf Wedgemussel (*Alasmidonta heterodon*)

The dwarf wedgemussel is an Atlantic slope species that was listed as federally endangered on March 4, 1990 (55 FR 9447 9451). A species recovery plan was developed in 1993 (USFWS 1993) and the most recent status review was completed in 2007 (USFWS 2007).

4.1.1 Distribution

Historically, the dwarf wedgemussel has been widely distributed in Atlantic slope rivers from New Brunswick Canada in the north to the Neuse River basin, North Carolina, in the south, with sporadic distribution in the river basins in between. The species recovery plan notes this species was known to occur at 70 locations, but had declined to only 25 to 30 (USFWS 1993). More intensive survey efforts since 1993 found 40 new locations where the species had been presumed extirpated or where the dwarf wedgemussel had not been found previously, bringing the total number of locales to 70 to 80 (NatureServe 2015). However, only 16 of these locales were believed to support reproducing populations, including the Ashuelot River in New Hampshire, Connecticut River main stem in Massachusetts, Farmington River and lower Connecticut River tributaries in Connecticut, and Neversink River in New York (USFWS 2007, Nedeau 2008).

Muddy Brook and Stony Brook are smaller tributaries to the lower Connecticut River. Detailed survey data for these brooks were not readily available, though Nedeau (2008) describes conducting at least 10 surveys in Stony Brook which resulted in locating a single live dwarf wedgemussel. The exact location of those surveys was not described. Muddy Brook in Hartford County, Connecticut is listed as supporting dwarf wedgemussels in the recovery plan (USFWS 1993); however the population status was described as poor, indicating no evidence of recent reproduction.

The Biodrawversity survey locations in Muddy and Stony Brooks reflect the proposed pipeline route and were not selected based on preferred mussel habitat; therefore, additional populations of dwarf wedgemussel may occur at other locations within these two brooks. This is further supported by the presence of live dwarf wedgemussels a short distance upstream of each survey area where suitable relocation sites with live dwarf wedgemussels were identified.

4.1.2 Habitat Association and Life History

Freshwater mussels spend their lives partially or completely buried within substrate. They are primarily suspension-feeders and siphon water to feed on suspended algae, bacteria, detritus, microscopic animals, dissolved organic matter, and particles in the sediment (Raikow and Hamilton 2001, Nichols and Garling 2000). Juvenile mussels also employ foot feeding to consume bacteria, algae, and detritus (Yeager et al. 1994).

Little is known of the basic life history requirements of the dwarf wedgemussel, but it is believed that it most likely follows the general habits of other freshwater mussels. Males produce sperm, which are discharged into the surrounding water and dispersed by water currents. The females draw in sperm through their incurrent siphon during feeding and respiration activities. The eggs in the outer gills of the females are fertilized internally and develop into larval forms referred to as glochidia. The dwarf wedgemussel is known to be a long-term brooder, spawning in the summer and brooding glochidia over winter, releasing the mature glochidia the following spring. In Massachusetts, dwarf wedgemussel glochidia are released primarily in April and May (McLain and Ross 2005).

The glochidia need to attach to a suitable host fish so that metamorphosis to the juvenile stage can occur. Some mussel species are host specific while others can use a wide variety of fish as hosts. These encysted larvae are essentially parasites, which grow and develop into juvenile mussels while on the host fish. After metamorphosis, juvenile mussels drop from the host, and settle to the stream or lake bottom and bury themselves in the substrate to continue their life cycle. A number of suitable host fish have been identified for the dwarf wedgemussel, including: the slimy sculpin (*Cottus cognatus*), mottled sculpin (*Cottus bairdi*), Atlantic salmon (*Salmo salar*), tessellated darter (*Etheostoma olmstedi*), shield darter (*Percina peltata*), striped bass (*Morone saxitilis*), banded killifish (*Fundulus diaphanus*) and brown trout (*Salmo trutta*) (Michaelson and Neves 1995, USFWS 2007, White 2008). However, the tessellated darter is considered the primary host fish species (McLain and Ross 2005). The use of small benthic fish species such as darters and sculpins as host fish may serve to limit dispersal opportunities (NatureServe 2015).

The dwarf wedgemussel is a habitat generalist regarding stream size, flow rates and substrate preferences (USFWS 2007, Nedeau 2008). It inhabits all sizes of lotic habitats, from small streams to larger rivers and can be found in a variety of substrate types from clay and silt to sand and gravel. This species utilizes various depths of water and has the ability to move along the bottom in response to water level fluctuations (Nedeau 2008). It is also reported to require areas of slow to moderate current, good water quality, and little silt deposits (NatureServe 2015). This species has an estimated life span of 10 years (Michaelson and Neves 1995).

4.1.3 Critical Habitat

No critical habitat has been designated for the dwarf wedgemussel.

4.1.4 Population Status and Trends

No historical population estimates exist, but findings by Strayer et al. (1996) indicate the species forms sparse populations and was never numerous. However, the species has experienced significant declines including regional extirpations (e.g., the last remaining population in Canada) and there are only a small number of extant occurrences remaining (NatureServe 2015). The USFWS (2007) status review for this species summarized the population trends as follows:

> "*…it appears that the population in North Carolina, Virginia, and Maryland are declining as evidenced by low densities, lack of reproduction, or inability to relocate any DWM in follow-up surveys. Populations in New Hampshire,*

> *Massachusetts, and Connecticut appear to be stable, while the status of populations in the Delaware River watershed affected by the recent floods of 2005 is uncertain at this time*."

Population viability is questionable at most sites. Strayer et al. (1996) studied 13 streams throughout the species' range and concluded that all populations had low densities, although five to six of the populations were large (1,000 to 100,000 animals). These findings are consistent with historical observations that this species forms sparse populations and is rarely abundant (Strayer et al. 1996). Three linked patch sites on the Connecticut River on the Vermont/New Hampshire border were found to have decent viability and these are likely to present the largest population of this species (perhaps a few hundred thousand in a 75 km stretch in three patches) (USFWS 2007). It is also important to note that because a portion of the population is always found below the substrate, population estimates must take into account undetected mussels (USFWS 2007), and thus, population estimates may be conservative. Additional viable populations occur in the Ashuelot River in New Hampshire, where density estimates of two location samples in 2004 and 2006 ranged from 0.31 to 1.257 per square meter.

BioDrawversity surveyed approximately 173 meters of stream length in Muddy Brook (75-foot crossing area plus 150 meters additional survey area) and 168 meters of stream length in Stony Brook (60-foot crossing area plus 150 meters of additional survey area). The entire survey area within each brook was considered suitable habitat for the dwarf wedgemussel. For Muddy Brook, a total of 23 live dwarf wedgemussels were observed on the sediment surface, and two were found buried in the substrate. Conservatively estimating that 50 percent of the population found on the sediment surface may be buried in the substrate, the population size within the survey area is roughly estimated to be 35 mussels. A total of nine live dwarf wedgemussels were observed on the sediment surface in Stony Brook. Considering the proportion of mussels that may be buried, the population size within the survey area of Stony Brook is roughly estimated to be 14 mussels. The size ranges measured for live dwarf wedgemussels suggest multiple age classes were present and recent recruitment has occurred.

4.1.5 Resource Protection Plan

A recovery plan for the dwarf wedgemussel has been completed (USFWS 1993). The USFWS (1993) list the causes of decline, and continued threats to its recovery, as habitat alterations associated with agricultural, industrial, commercial, domestic pollution and runoff, stream channelization, removal of shoreline vegetation, shoreline development, and road and dam construction.

Recovery Objectives and Criteria

The ultimate goal of the USFWS (1993) recovery plan for the dwarf wedgemussel is to maintain and restore viable populations of this species to a significant portion in its historic range and to remove this species from the ESA list. Specific recovery objectives as listed by USFWS are as follows.

Objective 1. Reclassify *Alasmidonta heterodon* from endangered to threatened status when the likelihood of extinction in the foreseeable future has been eliminated according to the following criterion:

> Populations of *A. heterodon* in the main stem Connecticut River, Ashuelot River, Neversink River, upper Tar River, Little River, Swift Creek (Neuse system), and Turkey Creek, as well as populations in at least six other rivers (or creeks) representative of the species' range, must be shown to be viable[1]. This will require monitoring the occupied river reach over a 10 to 15 year period during which adequate population numbers, population stability, and evidence of recent recruitment (specimens age five or younger) are demonstrated.

Objective 2. Remove *Alasmidonta heterodon* from the Federal list of endangered and threatened species when the following additional criteria have been met:

A. At least 10 of the rivers or creeks referred to in criterion A must support a viable population widely enough dispersed within its habitat such that a single adverse event in a given river would be unlikely to result in the total loss of that river's population. Meeting this criterion will require significant expansion of population in most of the rivers. These rivers/populations should be distributed throughout the current range of the species, with at least two in New England, one in New York, and four to the south of Pennsylvania.

B. All populations referred to in criteria A and B must be protected from present and foreseeable anthropogenic and natural threats that could interfere with their survival.

4.2 Environmental Baseline

The two stream crossings addressed in this BA, Muddy Brook and Stony Brook, are small perennial tributaries in the lower Connecticut River watershed. Muddy Brook is classified by the state as a Class A waterbody with assigned designated uses of potential drinking water supply, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. In the reach of the proposed stream crossing, Muddy Brook is currently listed on the Connecticut List of Waterbodies Not Meeting Water Quality Standards and as a U.S. Environmental Protection Agency impaired stream due to elevated bacteria levels (USEPA 2014). The elevated bacteria levels impair recreational uses. There are no designated beaches in the impaired segment of Muddy Brook and this segment is not designated for swimming or other water contact related activities (CTDEEP 2012). Dwarf wedgemussels were found primarily in silt, sand, and gravel substrates within Muddy Brook in light to moderate flow velocities typically less than 0.2 meters per second (m/s). The habitat where dwarf wedgemussels were found within Stony Brook was similar in substrate and flow as Muddy Brook. Table 4-1 presents environmental data for the stream crossings.

[1] Viable population – a population containing a sufficient number of reproducing adults to maintain genetic variability and which annual recruitment is adequate to maintain a stable population.

TABLE 4-1: MUDDY BROOK AND STONY BROOK STREAM CROSSING ENVIRONMENTAL DATA

Waterbody Name	Approximate Milepost	Stream Width (Feet)	Water Quality / Fishery Classification[a]
Muddy Brook	2.98	55	A
Stony Brook	5.56	29	B/A

a: Connecticut Water Quality Designation (CTDEEP 2013):
A = Known or presumed to meet water quality criteria that support potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses, including navigation.
B/A = May not meet criteria for one or more designated uses of Class A. The water quality goal is achievement of Class A criteria and attainment of Class A designated uses.
Neither Stony nor Muddy Brook is listed in association with CTDEEP fisheries management activities.
CTDEEP has not imposed any timing restrictions for the proposed crossings.

Neither stream is listed as protected or indicated as special status on the Nationwide Rivers Inventory (list of river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values and are of local or regional significance), National Wild and Scenic Rivers, or on the Connecticut Greenways Program, which protects natural resources, preserves scenic landscapes and historical resources, or offers opportunities for recreation or public access, including waterways, trails, and unused rights-of-way.

Based on information provided in the mussel survey report (Attachment B), Muddy Brook is surrounded by a forested riparian buffer zone, then agricultural land. The riparian area of Stony Brook is a mix of forest and shorter shrubs or agricultural land. Both streams have relatively steep banks with some evidence of erosion.

As part of the environmental planning and permitting process for the proposed Project, Biodrawversity performed a freshwater mussel survey at the two proposed stream crossings on June 3, 2014 (Attachment B). Surveys were conducted within the footprint of the proposed crossings (75 feet wide for Muddy Brook and 60 feet wide for Stony Brook), as well as 50 meters upstream and 100 meters downstream from the footprints.

In Muddy Brook, 25 live dwarf wedgemussels were confirmed within the immediate crossing area and in the upstream and downstream buffer zones (Figure 4-1). Dwarf wedgemussels were found in preferred habitat characterized as silt, sand, and gravel substrates in water depths ranging from 1.0 to 2.5 feet, in light to moderate flow velocities (typically less than 0.2 m/s). The dwarf wedgemussels ranged in size from 23.0 to 44.0 millimeters (mm), with a mean of 32.7 mm. Of the 25 dwarf wedgemussels found, 23 were found via snorkel surveys and two were collected via quadrat samples buried in the substrate. A suitable relocation site was found upstream of the survey area (Figure 4-1) where habitat and mussel species composition were similar, and additional live dwarf wedgemussels were found. No brook floaters were found in Muddy Brook.

FIGURE 4-1: MUDDY BROOK SURVEY AREA, DWARF WEDGEMUSSELS LOCATIONS, AND POTENTIAL RELOCATION SITE

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In Stony Brook, nine live dwarf wedgemussels were confirmed within the immediate crossing area and in the upstream and downstream buffer zones (Figure 4-2). Mussels were found in preferred habitat similar to Muddy Brook - silt, sand, and gravel substrates in water depths ranging from 1.0 to 2.5 feet, in flow velocities typically less than 0.2 m/s. The dwarf wedgemussel ranged in size from 24.0 to 38.0 mm, with a mean of 33.0 mm. All nine dwarf wedgemussels were found via snorkel survey; no dwarf wedgemussels were collected within the quadrat samples. Similar to Muddy Brook, a suitable relocation site was found upstream of the survey area where habitat and mussel species composition were similar, and live dwarf wedgemussels were present (Figure 4-2). No brook floaters were found in Stony Brook.

FIGURE 4-2: STONY BROOK SURVEY AREA, DWARF WEDGEMUSSELS, AND POTENTIAL RELOCATION SITE

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5.0 Project Effects

5.1 Direct and Indirect Effects to the Dwarf Wedgemussel

The proposed Project may have direct adverse impacts on dwarf wedgemussels. The in-water construction activities could directly affect individual mussels within the construction workspace through physical disturbance during excavation of the trench, resulting in crushing or burial by equipment. Indirect impacts could occur on mussels downstream of the proposed crossing site due to sedimentation. In addition, mussels may be indirectly affected (i.e., feeding inhibition) due to sedimentation and/or petroleum spills associated with construction activities. However, these impacts could be reduced through implementation of the BMPs for construction and restoration, as outlined in the FERC Plan and Procedures and Tennessee's construction BMPs (Attachment E), which are intended to be used to avoid, minimize, and/or mitigate impacts from the Project. Tennessee would cross both waterbodies using a dry crossing method; therefore, in-stream construction activities would be completed within approximately one week. As in-stream work would be over a short time period, construction impacts would be expected to dissipate quickly in the vicinity of the crossing area.

Implementation of the Dwarf Wedgemussel Relocation and Monitoring Plan (Attachment C) by removing live dwarf wedgemussels from within the Action Area would minimize the potential for direct adverse impact from construction activities. However, some number of mussels may be buried within the substrate and not recovered during the relocation effort. Prior to construction, quadrat sampling with substrate removal and sieving would also be conducted in areas where live dwarf wedgemussels are found to maximize the potential to recover buried mussels. The mussels may suffer direct mortality or stress associated with the Dwarf Wedgemussel Relocation and Monitoring Plan - stress could be associated with the collecting, tagging, and relocation of the individual mussels. Tennessee has committed to using USFWS-approved consultants that are experienced mussel biologists who have conducted multiple relocations and studies for the dwarf wedgemussel. This experience handling mussels, and the use of appropriate precautions and protection measures during the relocation effort, would minimize handling and relocation stress. According to the Dwarf Wedgemussel Relocation and Monitoring Plan, relocated mussels would be checked one month and one year following relocation to monitor mortality, movement, and growth.

5.2 Potential Impacts on Dwarf Wedgemussel Habitat

Impacts on the habitats associated with Muddy Brook and Stony Brook would be temporary, as each crossing is expected to take one week or less to complete. Removal of streamside trees and vegetation at the pipeline crossings may reduce shading of the streams temporarily, and potentially result in locally elevated water temperatures. Once the pipe is installed and the trench backfilled, disturbed areas would be restored to pre-construction contours and stabilized to prevent erosion of exposed soils and sedimentation to on- and off-site resources. Table 5-1 presents information on potential in-stream impact areas for the two stream crossings.

TABLE 5-1: MUDDY BROOK AND STONY BROOK STREAM CROSSINGS

Waterbody Name	Approximate Milepost	Stream Width (Feet)	Square footage of streambed impacts (Square Feet) [a]	FERC Class [b]
Muddy Brook	2.98	55	4,125	I
Stony Brook	5.56	29	1,740	I

a: Based on 75-foot-wide proposed construction workspace for Muddy Brook and 60-foot-wide proposed construction workspace for Stony Brook.
b: I = Intermediate (10 - 100 feet in width)

For construction and restoration in the Project area, Tennessee would implement its BMPs as outlined in the FERC Plan and Procedures and Tennessee's Construction BMPs (Attachment F) to avoid, minimize, and/or mitigate impacts on the dwarf wedgemussel. BMPs would comply with Connecticut standards for erosion and sediment control, including specifications for flooding frequency and volume. Additionally, the amount of vegetation cleared during construction would be limited to the removal of the minimum amount necessary for safe construction. Following pipe installation, Tennessee would allow for regrowth of a 25-foot-wide riparian strip for the full width of the permanent right-of-way and would limit vegetative maintenance immediately adjacent to waterbodies to a 10-foot-wide-strip centered over the pipeline that could be maintained in an herbaceous state to allow for periodic corrosion and leak surveys. It is anticipated that once restoration is complete, with the use of these BMPs, areas that were disturbed during construction would return to providing habitat for freshwater mussels and host fish species, as impacts on the in-stream habitat would be temporary.

Based on the construction and restoration methods outlined in the FERC Procedures and Tennessee's BMPs (Attachment F), impacts on in-stream dwarf wedgemussel habitat would be temporary and the habitat would be allowed to revert to pre-construction conditions.

5.3 Conservation Measures

In addition to implementing applicable BMPs and restoration for the stream crossings, Tennessee would implement a Dwarf Wedgemussel Relocation and Monitoring Plan (Attachment C), which would be implemented in both Muddy and Stony Brooks prior to any disturbance to the stream beds. Within 2 weeks of the start of construction, biologists from the same consultant that conducted the initial mussel survey, Biodrawversity, would conduct a pre-construction mussel survey, collect, and relocate dwarf wedgemussels. The survey area would include the entire footprint of the Project, as well as 50 meters upstream of the upstream limits of disturbance to 100 meters downstream from the downstream limits of disturbance (approximately 173 meters in length (567 feet) of Muddy Brook and 168 meters in length (552 feet) of Stony Brook for the full width of the stream). Grids would be established with weighted lines to facilitate a thorough search of the entire survey area.

Biologists would use snorkel and/or SCUBA gear to search for mussels on the surface of the substrate. In areas where dwarf wedgemussels are encountered and interstitial habitat appears promising, biologists would excavate and sieve substrate within 0.25-square-meter quadrats, using a 6-mm screen to attempt to locate subsurface juveniles or adults. All dwarf wedgemussels encountered would be gathered and held underwater in a mesh bag. Each individual would be measured photographed and tagged using a numeric 3-mm by 5-mm pennant tag affixed with superglue.

A suitable relocation site in each brook was identified by Biodrawversity during the presence/absence survey and habitat assessment conducted on June 3, 2014 (refer to Section 4 and Attachment B). After the dwarf wedgemussels are tagged, they would be taken to these relocation sites and placed within the stream substrate. The location of each individual would be recorded using a GPS unit and permanent markers would be established on the stream bottoms and banks to facilitate finding the animals at a later date. Relocated mussels would be checked 1 month and 1 year following relocation to monitor mortality, movement, and growth. An interim report would be submitted to the USFWS by Tennessee following the relocation effort and would describe the number of mussels found on the sediment surface, the number found buried (based on quadrat samples), sizes, and a detailed map of all dwarf wedgemussels relocation points. A final report would be submitted to the USFWS following completion of the 1 year monitoring survey.

Prior to the implementation of the Dwarf Wedgemussel Relocation and Monitoring Plan, Tennessee would obtain appropriate state and federal scientific collection permits. Protocols for the Dwarf Wedgemussel Relocation and Monitoring Plan would be included with both submittals for review and approval prior to issuance of the permits. Tennessee would comply with any applicable incidental take statement and collector's permit conditions.

5.4 Cumulative Effects

Cumulative effects consider public or private actions which may affect the dwarf wedgemussel and which have a reasonable expectation to occur proximal to the Action Area. Any future federal actions, or actions authorized by a federal agency, which may occur are not considered in this section because they are unknown at this time and would require a separate consultation under Section 7 of the ESA. The USFWS would be made aware of any future proposed public actions, which could occur within this action area and would initiate a separate Section 7 consultation, as required.

The greatest potential for cumulative impacts would come from an increase in sediment loading from construction runoff into waterbodies and an increase in internal sediment loading due to channel/floodplain instability as a result of in-water work that changes erosion/deposition patterns. The level of impact that other projects would have on the quality of surface waters depends on a variety of factors, including precipitation levels, soil types and construction methods. It is anticipated that other projects would comply with all applicable federal, state and local permit requirements; therefore, these impacts would be minimized or avoided.

In addition, impacts could result from current land use practices, such as agriculture and existing developments. The areas surrounding both Muddy Brook and Stony Brook contain a large amount of agricultural land and residential properties, which could contribute to sedimentation and nutrient loading in the nearby waterbodies. However, given the short timeframe of construction for the crossings of both Muddy Brook and Stony Brook, the cumulative impacts from the proposed Project would be minor compared to impacts on the waterbodies from existing land use practices.

The Lower Connecticut watershed covers an area of about 894,185 acres. According to 2010 land use data from UConn CLEAR, there are about 25,181 acres of open water within the watershed. Past, present, or reasonably foreseeable future actions that could result in cumulative impacts with the proposed Project within the Lower Connecticut watershed include oil and gas projects, electric utility projects, water and sewer utility projects, transportation projects, alternative energy projects, residential projects, and other miscellaneous projects, such as bike path development (Attachment G). Approximately 30 projects have been identified that would be within the Lower Connecticut watershed; however, only one of the 16 waterbodies that would either be crossed or within the workspace of the Connecticut Loop would also be crossed by another project. The Northeast Energy Direct Project proposes to cross DeGrayes Brook, which would also be crossed by the proposed Project. The Northeast Energy Direct Project is expected to commence construction in fourth quarter 2016, which is when the proposed Project construction is expected to be completed; therefore, cumulative impacts on surface water quality within Muddy Brook or Stony Brook are expected to be minimal.

There are no other projects that are anticipated to directly affect the same footprint as the proposed Project; therefore, direct effects to dwarf wedgemussels from other projects are unlikely.

5.6 Recovery Plan

The proposed Project and Dwarf Wedgemussel Relocation and Monitoring Plan, are consistent with resource recovery plans by relocating live dwarf wedgemussels present within the Action Area to suitable habitat upstream and out of the impact area, and protecting aquatic habitat and water quality in the Project area through the described crossing methods and BMPs.

6.0 Determination of Effect

The mussel survey conducted in June 2014 by Biodrawversity confirmed the presence of the dwarf wedgemussel at both the Muddy and Stony Brook proposed crossings. The Project has the potential to affect the mussels during construction, as they were found within and immediately surrounding the proposed in-stream construction area. However, Tennessee has committed to the Dwarf Wedgemussel Relocation and Monitoring Plan (Attachment C) prior to in-water construction work, and would use appropriate erosion and sedimentation control measures during construction and until final stabilization, as necessary, to minimize potential effects to mussels located downstream due to sedimentation, turbidity, and water quality downstream. In addition, in-stream construction methods would temporarily disturb stream sediment, but maintain downstream flow for individuals residing downstream. Tennessee would restore the stream bed to pre-construction contours following completion of the crossing method, thus allowing mussels to recolonize the affected habitat once the stream crossing activities are completed.

Based on the information presented above regarding potential effects and the proposed protection measures, we conclude the construction and operation *may affect and is likely to adversely affect* the dwarf wedgemussel.

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Attachment A

U.S.G.S. Site Locus, Muddy Brook and Stony Brook

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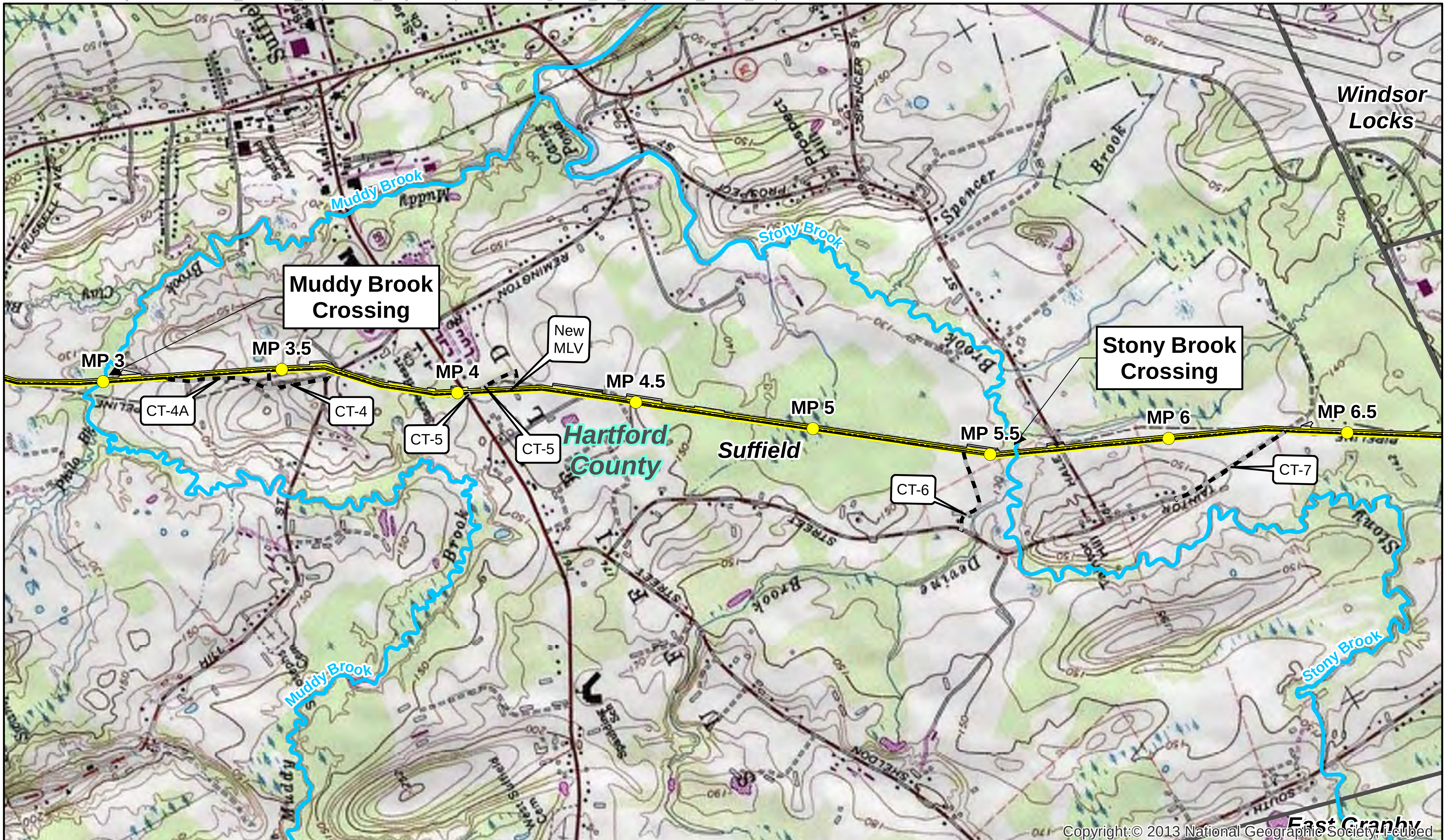

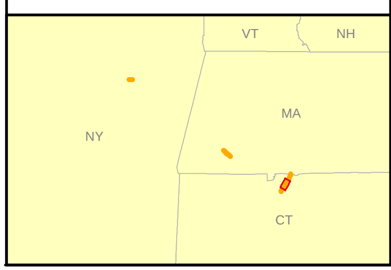

Legend

- Mileposts
- Proposed Project Centerline
- Access Roads
- Rivers and Streams
- Proposed Workspace

Tennessee Gas Pipeline Company, L.L.C.
Connecticut Expansion Project
Muddy Brook and Stony Brook Crossings
USGS Site Locus Map
Connecticut

0 1,000 2,000 4,000 Feet

1 inch = 2,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 1

July 30, 2014

Attachment B

Biodrawversity, Freshwater Mussel Survey in Muddy Brook and Stony Brook at Two Gas Pipeline Crossings, Suffield, CT

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Attachment C

Dwarf Wedgemussel Relocation and Monitoring Plan

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Attachment D

Muddy Brook Proposed Crossing

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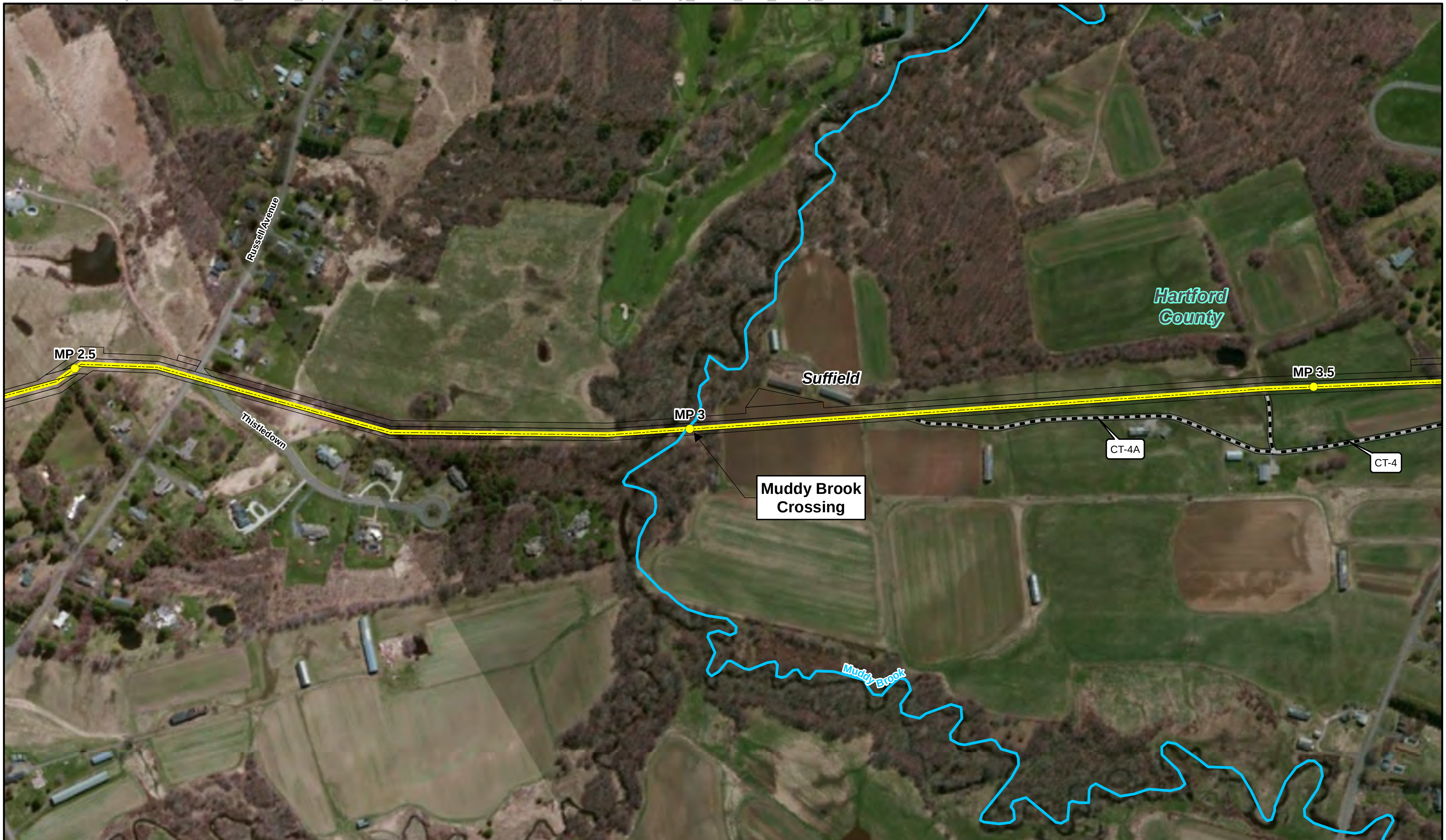
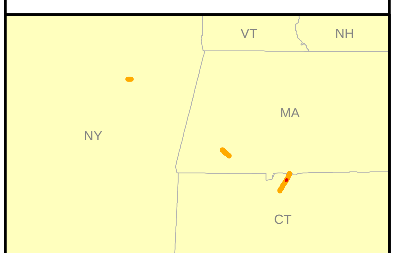


Site Location



Legend

- Mileposts
- Proposed Project Centerline
- Access Roads
- Rivers and Streams
- Proposed Workspace

Tennessee Gas Pipeline Company, L.L.C.

Connecticut Expansion Project

Muddy Brook Crossing

Suffield, Connecticut

0 200 400 800 Feet

1 inch = 573 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 2

July 30, 2014

Attachment E

Stony Brook Proposed Crossing

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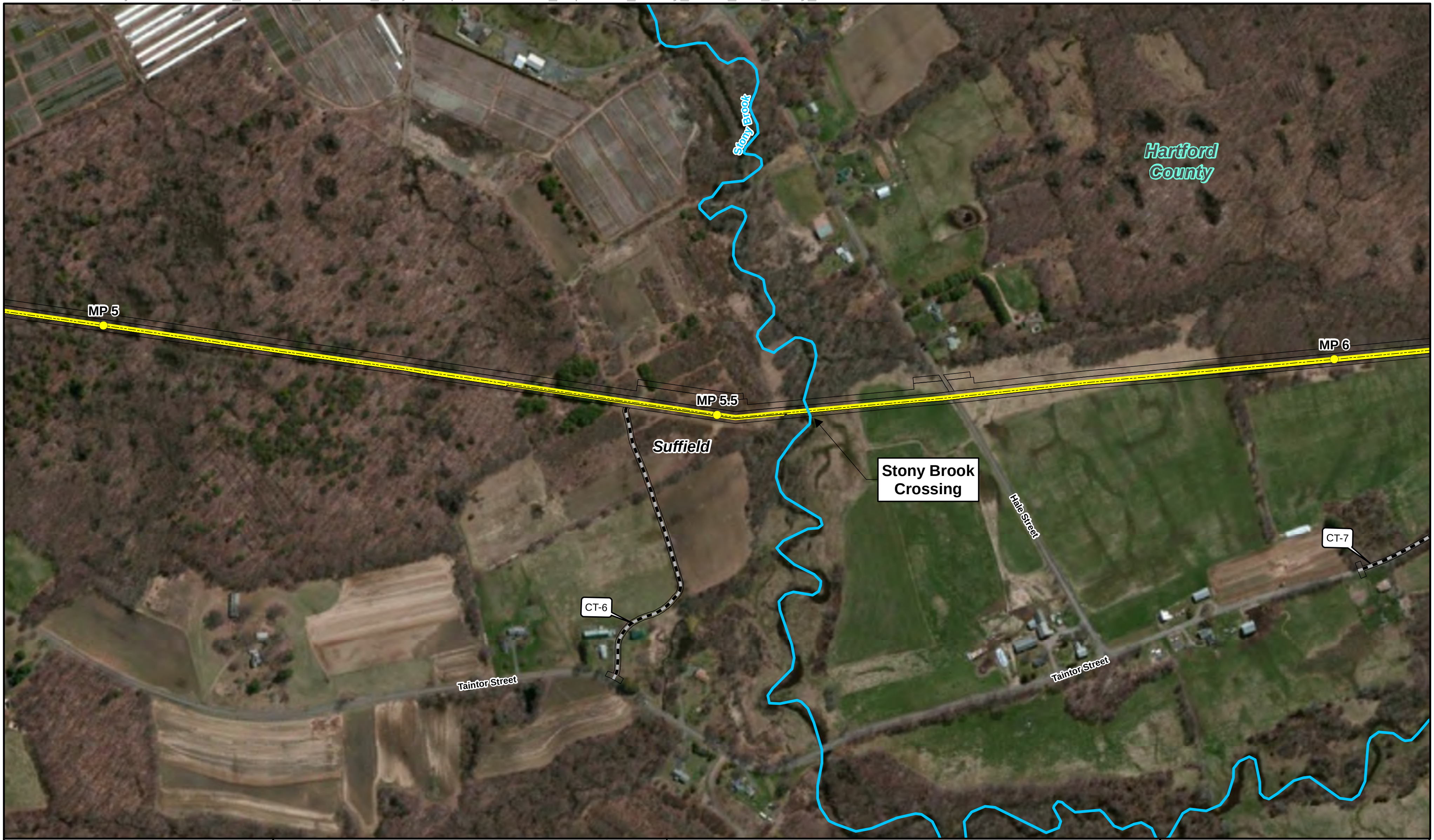
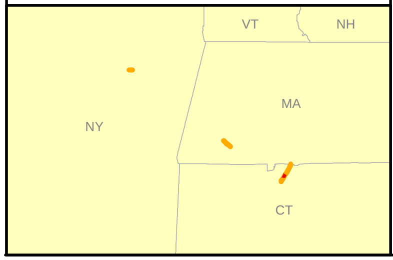


Site Location



Legend

- Mileposts
- Proposed Project Centerline
- Access Roads
- Rivers and Streams
- Proposed Workspace

Tennessee Gas Pipeline Company, L.L.C.

Connecticut Expansion Project

Stony Brook Crossing

Suffield, Connecticut

0 200 400 800 Feet

1 inch = 573 feet

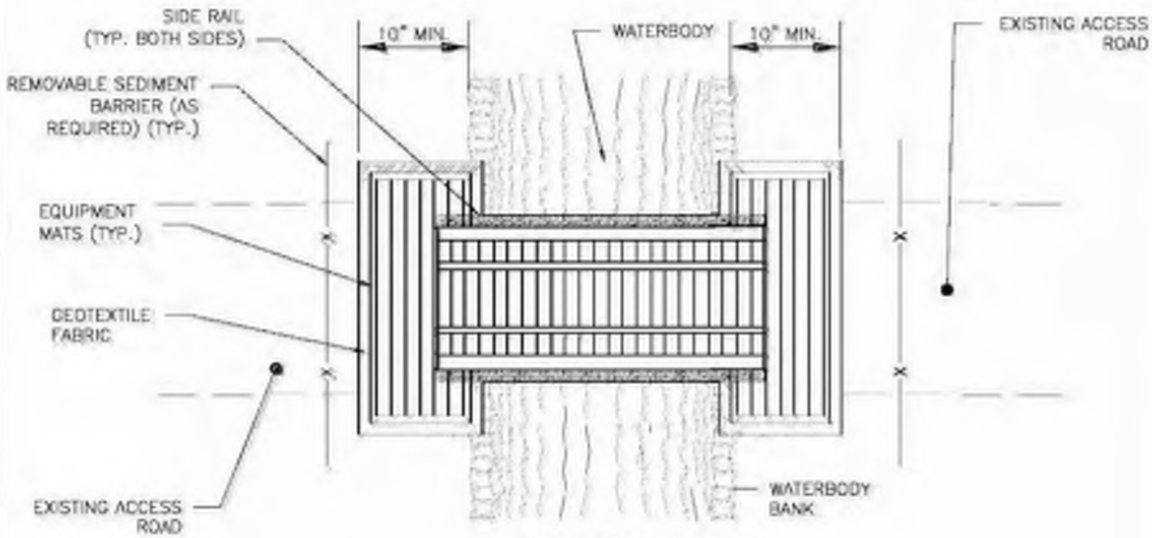
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 3

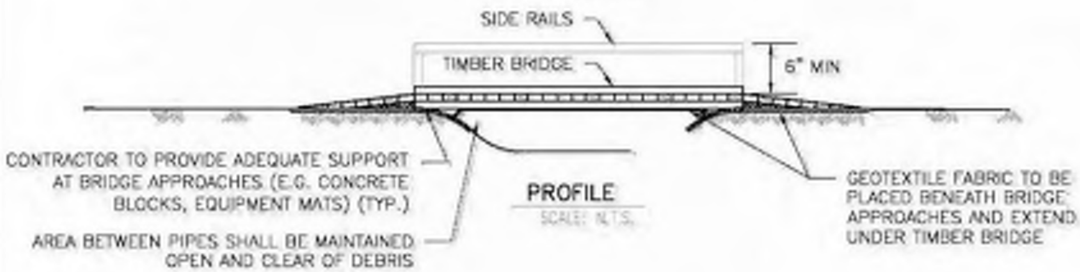
July 30, 2014

Attachment F

Typical Dry Stream Crossing Methods



PLAN VIEW
SCALE: N.T.S.



PROFILE
SCALE: N.T.S.

NOTES:

1. TIMBER BRIDGES SHALL BE ADEQUATELY ANCHORED AT BOTH ENDS.
2. TEMPORARY STREAM CROSSINGS SHALL BE INSPECTED ON A DAILY BASIS AND BUILD UP OF SEDIMENT OR DEBRIS SHALL BE REMOVED.
3. BRIDGE APPROACHES SHALL BE SUPPORTED WITH EQUIPMENT MATS OR APPROVED EQUAL.
4. SIDE RAILS SHALL BE INSTALLED ON BOTH SIDES OF THE BRIDGE EQUIPMENT CROSSING IN ORDER TO PREVENT SEDIMENT FROM ENTERING THE WATERBODY. SIDE RAILS ARE TO BE CONSTRUCTED OF PLYWOOD NAILED TO THE OUTER EDGES OF THE EQUIPMENT MATS.
5. EQUIPMENT MATS SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE OF THE WATERBODY OR WETLAND BOUNDARIES.
6. UNLESS OTHERWISE INDICATED ON PLAN, CROSSING SHALL BE REMOVED IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL LOAD CALCULATIONS REQUIRED TO ENSURE THE INSTALLED MATS/EQUIPMENT BRIDGE CAN STRUCTURALLY SUPPORT THE CONSTRUCTION EQUIPMENT TO BE UTILIZED.

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TENNESSEE GAS PIPELINE, L.L.C.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
BRIDGE EQUIPMENT CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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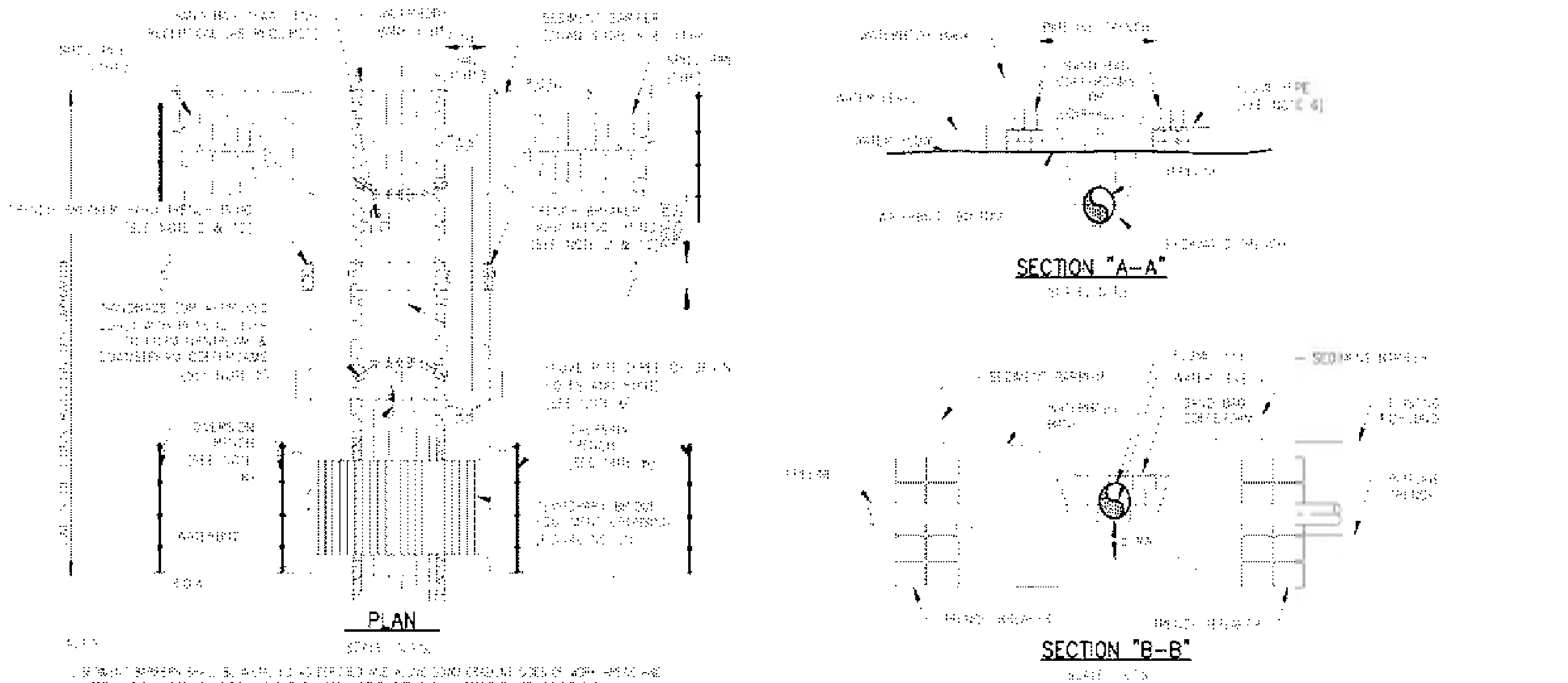

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TENNESSEE GAS PIPELINE, LLC
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
FLUME CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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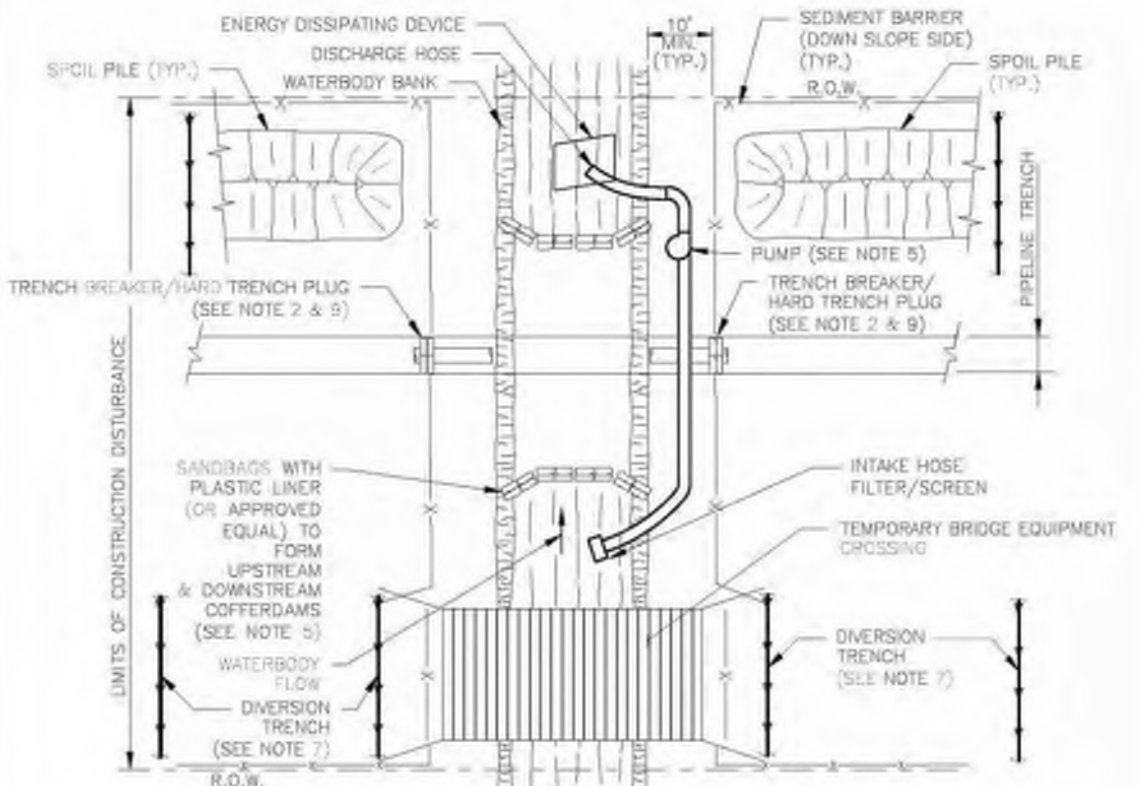

PLAN

SCALE: N.T.S.

NOTES:

1. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT-OF-WAY.
2. HARD TRENCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE THE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATERBODY CROSSING IS INSTALLED AND BACKFILLED.
3. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, THE CONTRACTOR SHALL PROVIDE AND USE A TEMPORARY BRIDGE EQUIPMENT CROSSING.
4. STAGING AREA(S) FOR WATERBODY CROSSING(S), WHEN REQUIRED, SHALL BE LOCATED AT LEAST 50 FEET FROM WATER'S EDGE AND SHALL BE OF A MINIMUM SIZE NEEDED FOR PREPARATION TO SAFELY AND EFFICIENTLY CONSTRUCT THE CROSSING.
5. IMPLEMENTATION OF THE DAM-AND-PUMP CROSSING METHOD MUST MEET THE FOLLOWING PERFORMANCE CRITERIA:
   (A) USE SUFFICIENT PUMPS, INCLUDING ON-SITE BACKUP PUMPS, TO MAINTAIN DOWNSTREAM FLOWS.
   (B) CONSTRUCT DAMS WITH MATERIALS THAT PREVENT SEDIMENT AND OTHER POLLUTANTS FROM ENTERING THE WATERBODY (E.G., SANDBAGS OR CLEAN GRAVEL WITH PLASTIC LINER).
   (C) SCREEN PUMP INTAKES.
   (D) PREVENT STREAM BED SCOUR AT PUMP DISCHARGE WITH AN ENERGY DISSIPATING DEVICE.
   (E) MONITOR THE DAM AND PUMPS TO ENSURE PROPER OPERATION THROUGHOUT THE WATERBODY CROSSING. INTAKE SHALL BE MAINTAINED A SUFFICIENT DISTANCE FROM THE BOTTOM TO PREVENT PUMPING OF SUBSTRATE MATERIALS.
   (F) INTAKE SHALL BE MAINTAINED AT A SUFFICIENT DISTANCE FROM THE CHANNEL BOTTOM TO PREVENT PUMPING OF SUBSTRATE MATERIALS.
6. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPAIRED IF NECESSARY.
7. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY AND AT MINIMUM 50' FROM WATERBODY BANK.
8. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF THE WATERBODY, UNLESS OTHERWISE APPROVED BY THE ENVIRONMENTAL INSPECTOR. ANY WATER ACCUMULATING IN THE WORK SPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE TO WATERBODY.
9. INSTALL TRENCH BREAKERS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.
10. THE CONTRACTOR SHALL POSTPONE GRUBBING AND ROUGH GRADING OF THE RIGHT-OF-WAY WITHIN 50' OF TOP OF BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE, THE STAGING AREA IS PREPARED, AND WORK IN THE WATERBODY IS READY TO COMMENCE. ALL DISTURBED AREAS WITHIN 50' OF TOP OF BANK SHALL BE STABILIZED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED. APPROPRIATE STREAMBANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
11. ANY WATER ACCUMULATING IN THE WORKSPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE.

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TENNESSEE GAS PIPELINE, L.L.C.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
DAM AND PUMP CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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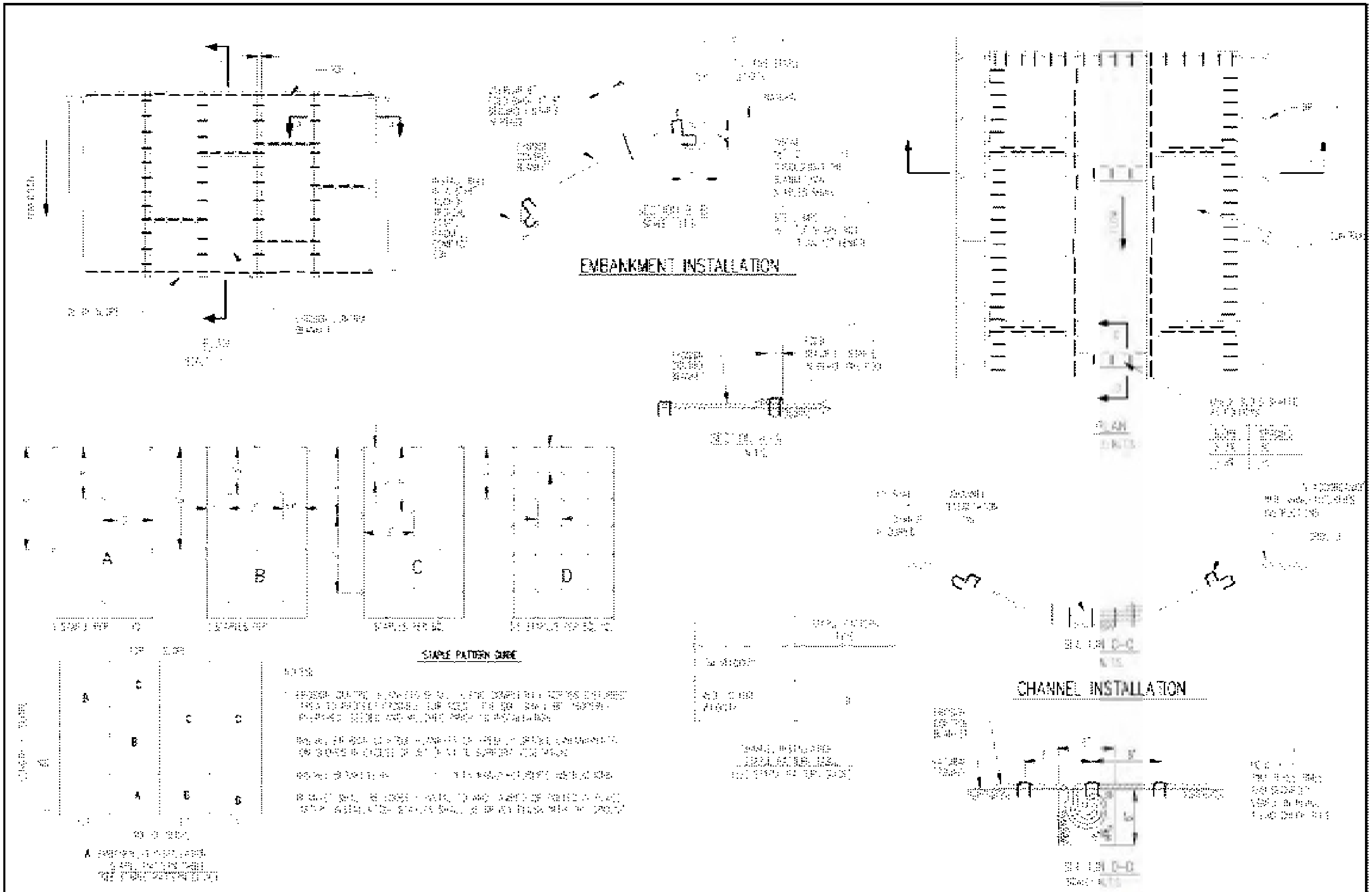
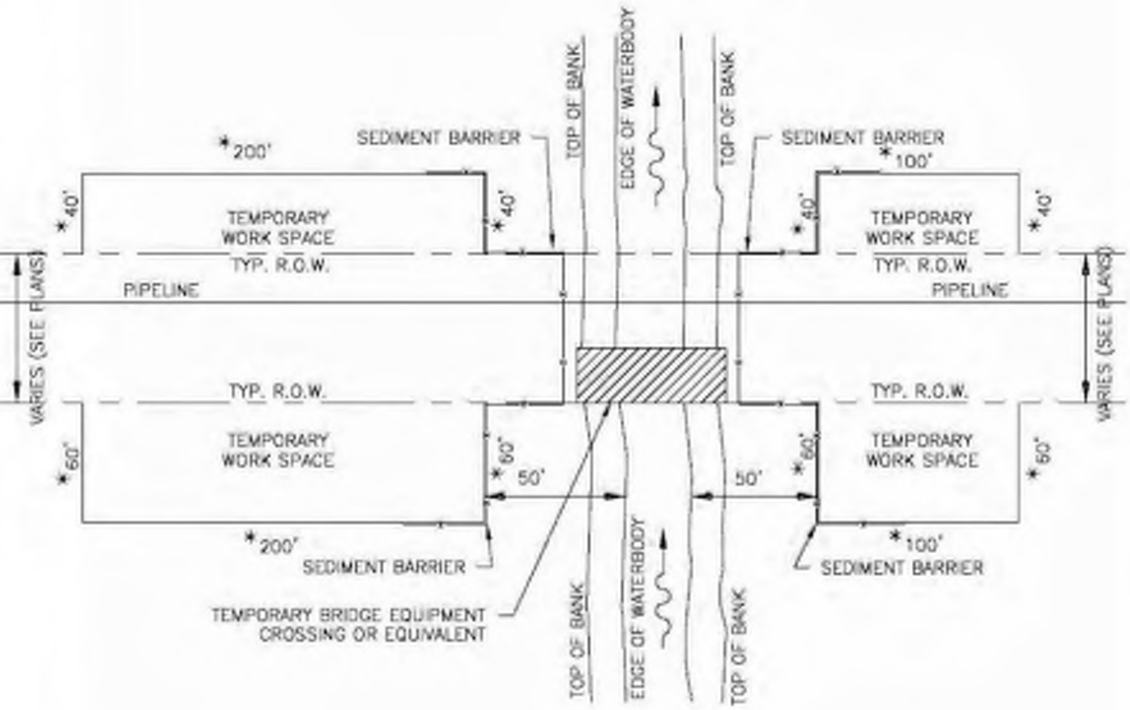


REVISIONS

TENNESSEE GAS PIPELINE, LLC
STANDARD ENVIRONMENTAL DETAIL
CONNECT CUT
EROSION CONTROL BLANKET

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company



* FOOTAGES SHOWN ARE FOR EXAMPLE PURPOSES ONLY. ACTUAL EXTRA WORK SPACE AREAS WILL VARY DEPENDING ON INDIVIDUAL PROJECTS.

NOTES:

1) ALL EXTRA WORK SPACES SHALL BE LOCATED AT LEAST 50 FEET FROM THE WATERS EDGE, EXCEPT WHERE THE ADJACENT UPLAND CONSISTS OF ACTIVELY CULTIVATED OR ROTATED CROPLAND OR OTHER DISTURBED LAND.
2) THE CONSTRUCTION ROW SHALL BE LIMITED TO 75 FT WIDE WITHIN 50 FT FROM THE WATERS EDGE UNLESS APPROVED OTHERWISE ON THE CERTIFICATE.

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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
TYPICAL EXTRA WORK SPACES AT WATERBODY CROSSINGS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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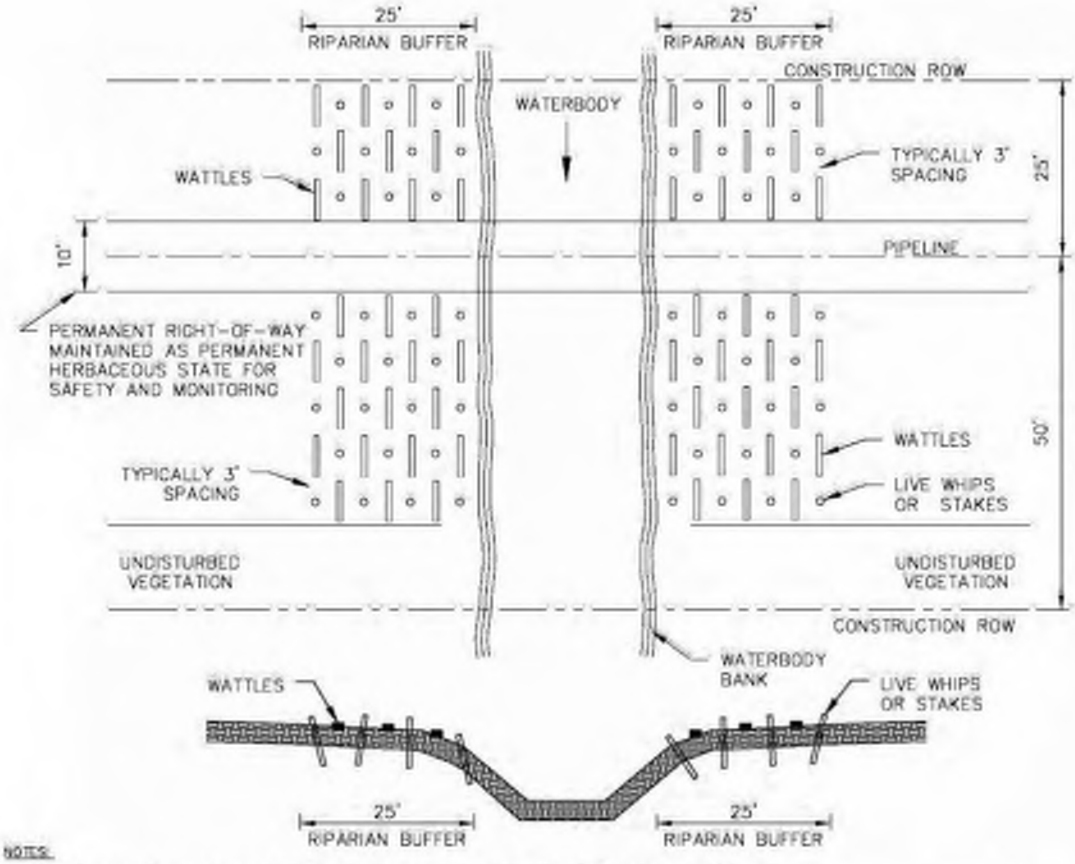

NOTES:

1. RESTORATION OF THE ROW SHALL INCLUDE PLANTING 25-FOOT RIPARIAN BUFFERS ALONG WATERBODIES WITH NATIVE PLANT SPECIES. RESTORATION OF CROSSINGS OF STATE DESIGNATED FISHERY WATERBODIES SHALL INCLUDE PLANTINGS OF NATIVE WOODY SPECIES TO RESTORE THE STREAM-SHADING CONDITIONS WITHIN A 25-FOOT RIPARIAN BUFFER.

2. SPACING OF WATTLE AND LIVE WHIP PLANTINGS ASSUMED TO BE APPROXIMATELY 3' IN A TRIANGLE PATTERN BASED ON NURSERY GUIDANCE AND VENDOR RECOMMENDATIONS. SPACING TO BE MODIFIED AS NEEDED BASED ON EACH SPECIFIC LOCATION CONDITION.

3. PLANTINGS SHALL BE PLACED WITHIN THE 25-FOOT RIPARIAN BUFFER AND OUTSIDE OF THE 10-FOOT MAINTAINED PERMANENT RIGHT-OF-WAY AS NEEDED. RIPARIAN BUFFER RESTORATION PLANTINGS SHALL NOT CONFLICT WITH EXISTING LAND USE OUTSIDE OF THE RIGHT-OF-WAY (E.G., AGRICULTURAL FIELDS).

4. PLANTINGS TO RESTORE THE STREAM-SHADING CONDITIONS SHALL INCLUDE NATIVE WOODY SPECIES, SUCH AS WILLOW (SALIX SPECIES) AND DOGWOOD (CORNUS SPECIES).

5. LIVE WHIPS ARE SLENDER, LIVE WOODY MATERIAL. THEY ARE GENERALLY 3/8"-1" DIAMETER. THEY ARE PUSHED INTO THE GROUND AS FAR AS THEY WILL GO, WITH AT LEAST TWO-THIRDS OF THE WHIP COVERED WITH SOIL. THEY CAN BE INSTALLED EITHER LAYING ON AN ANGLE OR ERECT IN THE SOIL. LIVE STAKES SHALL BE 1"-2" IN DIAMETER AND 2'-6' LONG DEPENDING ON THE APPLICATION. A MINIMUM OF 2"-4" OF LIVE STAKE SHALL BE EXPOSED AND SHALL INCLUDE TWO LIVE BUDS.

6. WATTLES ARE LIVING BRANCHES BOUND TOGETHER IN LONG, TUBULAR BUNDLES. THEY ARE PLACED IN SHALLOW TRENCHES ACROSS THE SLOPE AND SECURED WITH LIVE OR DEAD STAKES AT 2' OR 3' INTERVALS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:	Op. Area:	
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TENNESSEE GAS PIPELINE, L.L.C.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
STREAM PLANTINGS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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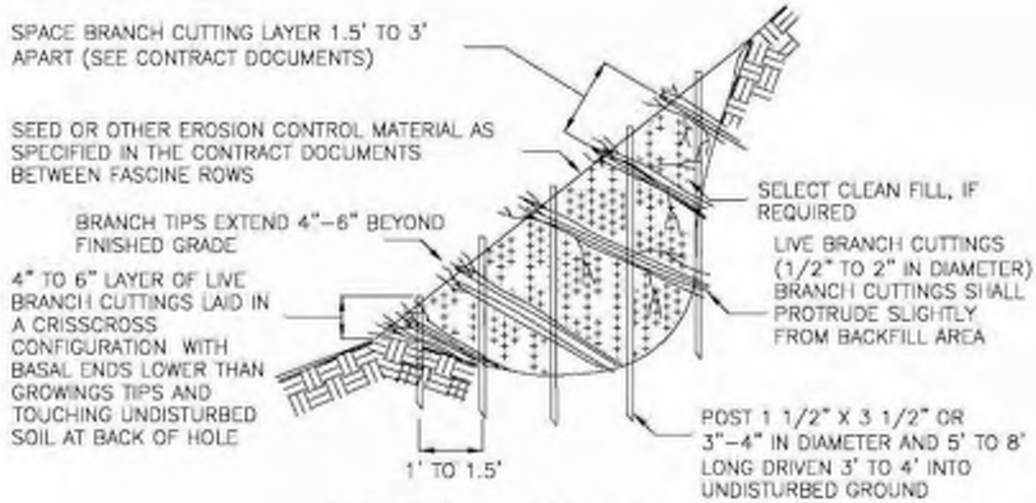

CROSS SECTION – NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. STARTING AT THE LOWEST POINT DRIVE THE WOODEN POSTS VERTICALLY 3' TO 4' INTO THE GROUND. SET THEM 1' TO 1.5' APART.
2. A LAYER OF LIVING BRANCHES 4" TO 6" THICK IS PLACED IN THE BOTTOM OF THE HOLE, BETWEEN THE VERTICAL POSTS. THEY SHALL BE PLACED IN A CRISSCROSS CONFIGURATION WITH THE GROWING TIPS GENERALLY ORIENTED TOWARD THE SLOPE FACE. SOME OF THE BASAL ENDS OF THE BRANCHES FROM EACH LAYER SHALL TOUCH THE BACK OF THE HOLE OR SLOPE.
3. EACH LAYER OF BRANCHES SHALL BE INSTALLED WITH THE BASAL ENDS LOWER THAN THE GROWING TIPS OF THE BRANCHES.
4. THE FINAL INSTALLATION SHALL MATCH THE EXISTING SLOPE. BRANCHES SHOULD PROTRUDE ONLY SLIGHTLY FROM THE FILLED FACE.
5. EACH LAYER OF BRANCHES SHALL BE FOLLOWED BY A 1' LAYER OF SOIL HAND TAMPED TO ENSURE CONTACT WITH THE BRANCH CUTTINGS.
6. THE SOIL SHALL BE MOIST OR MOISTENED TO ENSURE THAT LIVE BRANCHES DO NOT DRY OUT.
7. WHERE SPECIFIED, LIVE STAKES SHALL BE USED IN PLACE OF POSTS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
BRANCH PACKING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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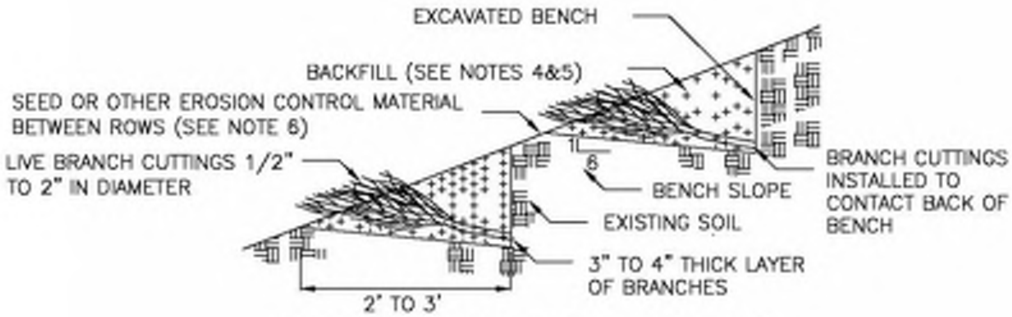
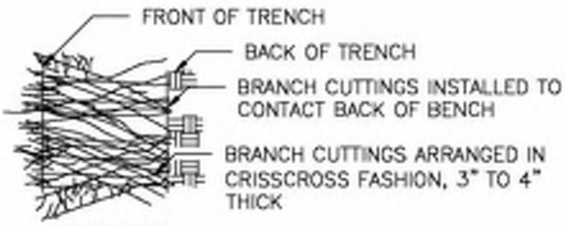


CROSS SECTION OF BRUSHLAYER ON CUT SLOPE
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. BENCH SHALL BE ANGLED SO OUTSIDE EDGE IS HIGHER THAN BACK OF BENCH.
2. LIVE BRANCH CUTTINGS SHALL BE PLACED ON THE BENCH IN A CRISSCROSS OR OVERLAP CONFIGURATION, 3" TO 4" THICK.
3. GROWING TIPS SHALL BE ALIGNED OUT OF THE SLOPE FACE AND SHALL EXTEND SLIGHTLY BEYOND THE FILL AREA.
4. FILL EACH LOWER BENCH WITH SOIL EXCAVATED FROM THE BENCH ABOVE. TOP BENCH TO BE BACKFILLED WITH INITIAL EXCAVATION.
5. PLACE BACKFILL ON TOP OF BRANCHES AND HAND TAMP IN 6" LIFTS TO REDUCE AIR POCKETS.
6. SEED OR OTHER EROSION CONTROL MATERIAL SHALL BE USED BETWEEN THE ROWS AS STATED IN THE CONTRACT DOCUMENTS.
7. BRUSHLAYER BENCHES SHALL BE FROM 3' TO 5' VERTICAL APART, DEPENDING ON SLOPE, AS SHOWN ON THE PLANS MEASURED BETWEEN FRONT EDGE OF BENCHES.
7. RECOMMENDED ON SLOPES IUP TO 2:1 IN STEEPNESS AND TWENTY FEET IN HEIGHT.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
BRUSH LAYER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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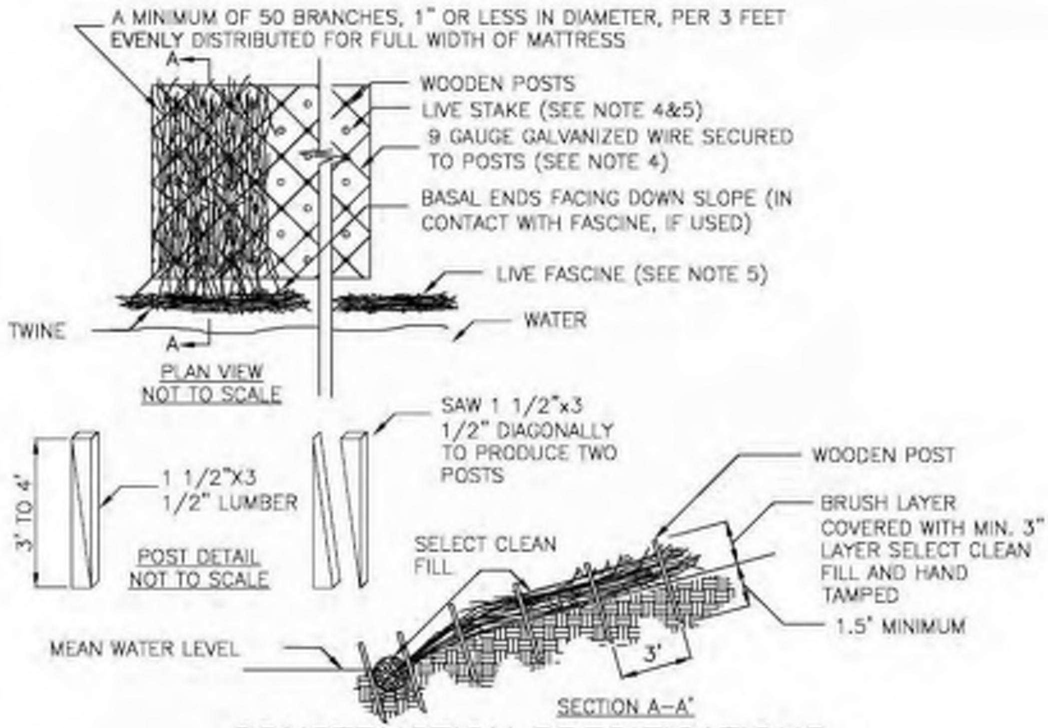

CONSTRUCTION SPECIFICATIONS

1. LAYERS SHALL BE COMPRISED OF LIVE QUICK-ROOTING SPECIES. SEE CONTRACT DOCUMENTS.
2. FILL MATTRESS WITH SOIL AND EVENLY DISTRIBUTE TO APPROXIMATELY 4" IN DEPTH AND HAND TAMP.
3. PLACE POSTS EVENLY OVER THE GRADED FACE USING 3' SQUARE SPACING. IF LIVE STAKES ARE SPECIFIED, ALTERNATE EVERY OTHER ON WITH THE POSTS.
4. STRETCH 9 GAUGE GALVANIZED WIRE DIAGONALLY FROM ONE POST TO ANOTHER BY TIGHTLY WRAPPING WIRE AROUND POSTS, NO CLOSER THAN 6" FROM THE TOP OF POST. WIRE SHALL NOT BE ATTACHED TO LIVE STAKES, IF THEY ARE SPECIFIED. POUND STAKES TO COMPRESS MATTRESS.
5. LIVE FASCINES AND LIVE STAKES ARE INSTALLED WHEN AND WHERE DIRECTED ON THE PLAN SHEET.
6. RECOMMENDED FOR STREAMBANKS WHERE VELOCITY IS <6 FT/SEC MAX SLOPE 1.5:1

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Division:		Op. Area:	
St.:		Co./Par.:	
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
BRUSH MATTRESS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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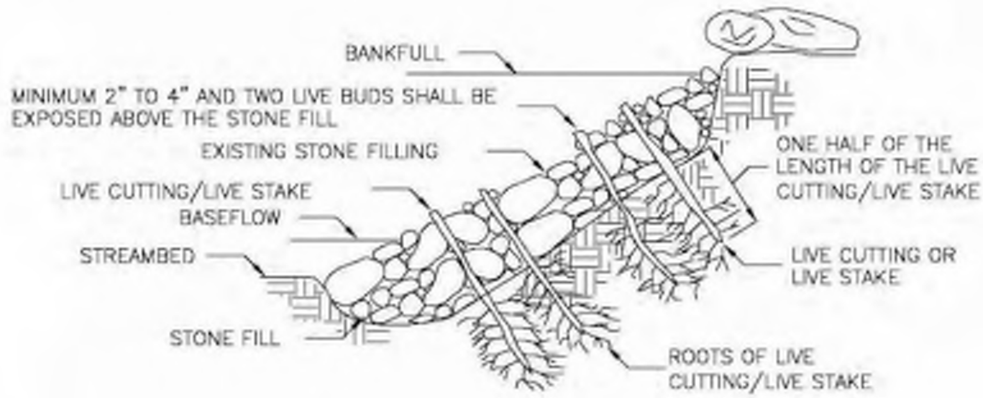
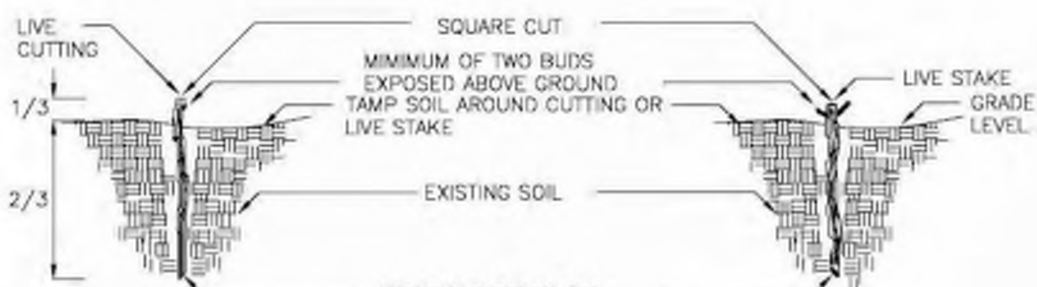


LIVE CUTTING/LIVE STAKE JOINT PLANTING CROSS SECTION



LIVE CUTTING CROSS SECTION
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LIVE STAKE CROSS SECTION
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NOTE:
1. NOT INTENDED FOR STRUCTURAL INTEGRITY NOR TO RESIST LARGE LATERAL EARTH PRESSURES.

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REVISIONS

Division:		Op. Area:	
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Section:	Township:	Range:	
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
LIVE CUTTINGS LIVE STAKINGS
PLANTINGS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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LIVE STAKES SPECIFICATIONS

1. CARE SHALL BE TAKEN NOT TO DAMAGE THE LIVE CUTTINGS/LIVE STAKES DURING INSTALLATION. THOSE DAMAGED SHALL BE LEFT IN PLACE AND SUPPLEMENTED WITH AN INTACT LIVE CUTTING/LIVE STAKE.
2. THE LENGTHS OF LIVE CUTTINGS/LIVE STAKES DEPENDS UPON THE APPLICATION. THE LENGTH SHALL EXTEND THROUGH THE SURFACE OF THE STONE FILL. AT LEAST HALF THE LENGTH SHALL BE INSERTED IN TO THE SOIL, BELOW THE STONE FILL.
3. A PILOT HOLE IS REQUIRED TO ENSURE THAT THE LIVE CUTTING/LIVE STAKE IS NOT DAMAGED WHEN DRIVEN THROUGH THE STONE FILLING. ACCESS SHALL BE MADE THROUGH THE USE OF A DIBBLE BAR, OR SIMILAR TOOL TO WORK AN OPENING THROUGH THE ROCK LAYER.
4. MINIMUM 2" TO 4" AND TWO LIVE BUDS OF THE LIVE CUTTING/LIVE STAKE SHALL BE EXPOSED ABOVE THE STONE FILLING.

LIVE CUTTINGS SPECIFICATIONS

1. LIVE CUTTINGS SHALL RANGE FROM 1/2" TO 1" IN DIAMETER AND BE FROM 1' TO 4' IN LENGTH.
2. LIVE STAKES SHALL RANGE FROM 1" TO 4" IN DIAMETER AND BE FROM 5' TO 6' IN LENGTH.
3. SEE CONTRACT DOCUMENTS FOR SPECIES, SIZE, SPACING, LOCATION, AND FINAL DETERMINATION ON USE OF CUTTINGS OR STAKES.
4. LIVE CUTTINGS/LIVE STAKES SHALL BE CUT TO A POINT ON THE BASAL END FOR INSERTION IN THE GROUND.
5. USE A DEAD BLOW HAMMER TO DRIVE STAKES INTO THE GROUND. (HAMMER HEAD FILLED WITH SHOT OR SAND.) A DIBBLE, IRON BAR, OR SIMILAR TOOL SHALL BE USED TO MAKE A PILOT HOLE TO PREVENT DAMAGING THE MATERIAL DURING INSTALLATION.
6. LIVE CUTTINGS SHALL BE INSERTED BY HAND INTO PILOT HOLES.
7. WHEN POSSIBLE, TAMP SOIL AROUND LIVE CUTTING/LIVE STAKES.
8. ANY LIVE CUTTING/LIVE STAKE THAT IS DAMAGED SHALL BE LEFT IN PLACE AND SUPPLEMENTED WITH AN INTACT LIVE CUTTING/LIVE STAKE.
9. NO LEAF BUDS SHALL HAVE INITIATED GROWTH BEYOND ¼" AND CAMBIUM LAYER SHALL BE MOIST, GREEN AND HEALTHY.

GENERAL SPECIFICATION

1. FREQUENT INSPECTION IS RECOMMENDED DURING FIRST 1–2 YEARS DUE TO PHYSICAL CONSTRAINTS, CLIMATE CONDITIONS AND ANIMAL POPULATION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:		Op. Area:	
St.:		Co./Par.:	
Section:	Township:		Range:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
LIVE CUTTINGS LIVE STAKINGS
PLANTINGS SPECFICACTIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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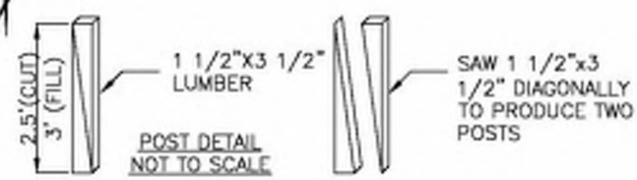
FASCINE BUNDLE DETAIL
NOT TO SCALE

CROSS SECTION
NOT TO SCALE



POST DETAIL
NOT TO SCALE

LIVE FACINE SPECIFICATIONS

1. LIVE FASCINES SHALL BE PREPARED FROM FRESHLY CUT DORMANT PLANTS AND INSTALLED WITHIN 8 HOURS OF THE TIME THE MATERIAL IS HARVESTED, UNLESS PROPERLY STORED.
2. LIVE FASCINE SHALL BE OBTAINED FROM SOURCES APPROVED BY THE ENGINEER.
3. LIVE FASCINES SHALL BE 4" TO 8" IN DIAMETER. LENGTHS MAY VARY TO SUIT CONDITIONS. A MINIMUM LENGTH OF 8' IS REQUIRED.
4. THE TIPS OF THE BRANCHES WITHIN THE LIVE FASCINE SHALL BE STAGGERED.
5. LIVE FASCINES SHALL BE PLACED AS INDICATED IN THE CONTRACT DOCUMENTS.
6. BEGINNING AT THE BASE OF THE SLOPE, A TRENCH SHALL BE DUG LARGE ENOUGH TO CONTAIN THE LIVE FASCINES. THE LIVE FASCINES SHALL BE PLACED IN THE TRENCH. WHERE ENDS MEET IN THE TRENCH, THE FASCINES SHALL OVERLAP BY 18".
7. WOOD POSTS SHALL BE INSTALLED FLUSH TO THE TOP OF THE FASCINE EVERY 18" ALONG THE LENGTH OF THE BUNDLES AS SHOWN ON THE CROSS SECTION. WHERE SPECIFIED LIVE STAKES MAY BE USED IN PLACE OF POSTS.
8. THE TRENCH SHALL BE BACKFILLED WITH MOIST SOIL AND HAND TAMPED. THE TOP OF THE FASCINE SHALL BE SLIGHTLY EXPOSED WHEN THE INSTALLATION IS COMPLETE AS SHOWN ON THE CROSS SECTION.
9. SEED OR OTHER EROSION CONTROL MATERIAL SHALL BE USED BETWEEN THE FASCINE ROWS, AS SPECIFIED IN THE CONTRACT DOCUMENTS.
10. LIVE FASCINE TRENCHES SHALL BE FROM 3' TO 8' APART, ACCORDING TO SLOPE AND/OR THE CONTRACT DOCUMENTS.
11. SLOPES MUST BE 1:1 OR FLATTER.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
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TENNESSEE GAS PIPELINE, L.L.C.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
LIVE FASCINE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

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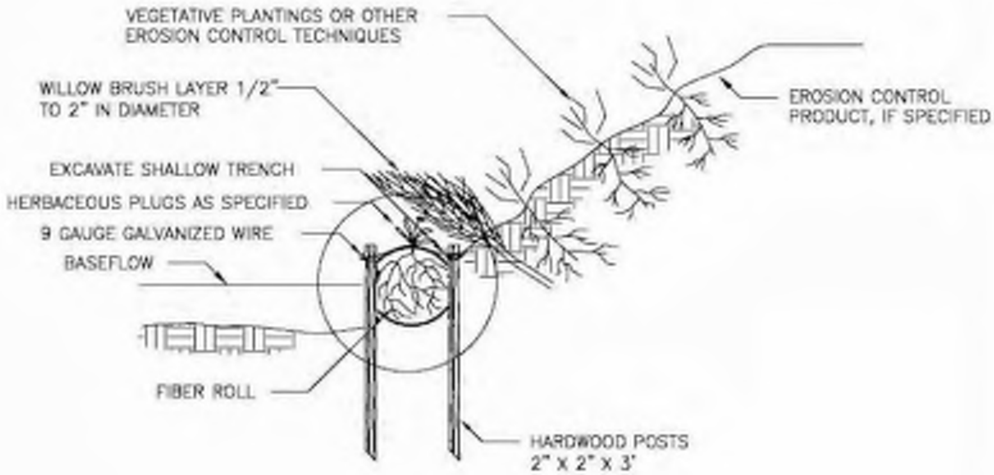


CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" x 3' POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

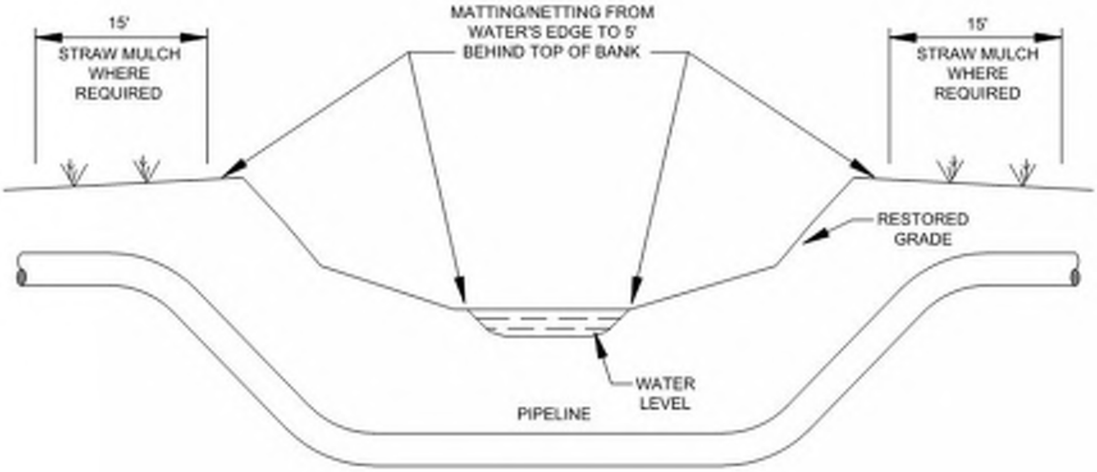
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, L.L.C.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
FIBER ROLL

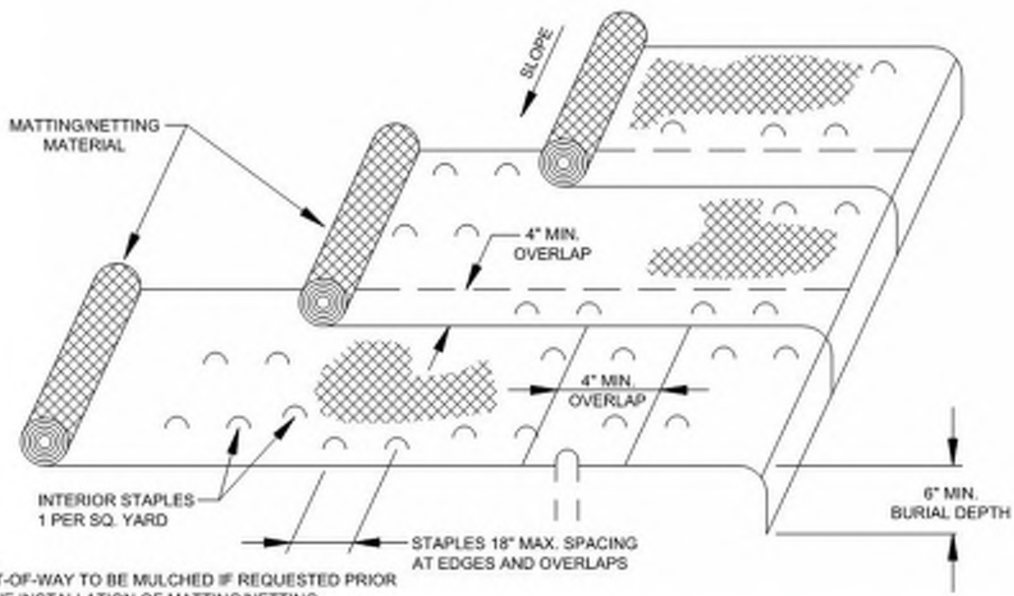
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

Sheet:
Type:



PROFILE
(NOT TO SCALE)



NOTES:

1. RIGHT-OF-WAY TO BE MULCHED IF REQUESTED PRIOR TO THE INSTALLATION OF MATTING/NETTING.
2. MATTING/NETTING SHALL BE RUN HORIZONTAL AND PARALLEL TO THE GROUND CONTOUR.
3. STAPLES SHALL BE 10"-LONG, STANDARD MATTING/NETTING STAPLES.
4. **EROSION CONTROL MATTING WILL BE INSTALLED WITHIN 50' OF BANK FOR ALL HQ/EV WATERSHEDS.**

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
REVISIONS					

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
TYPICAL MATTING/NETTING
INSTALLATION FOR WATER CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

Sheet:
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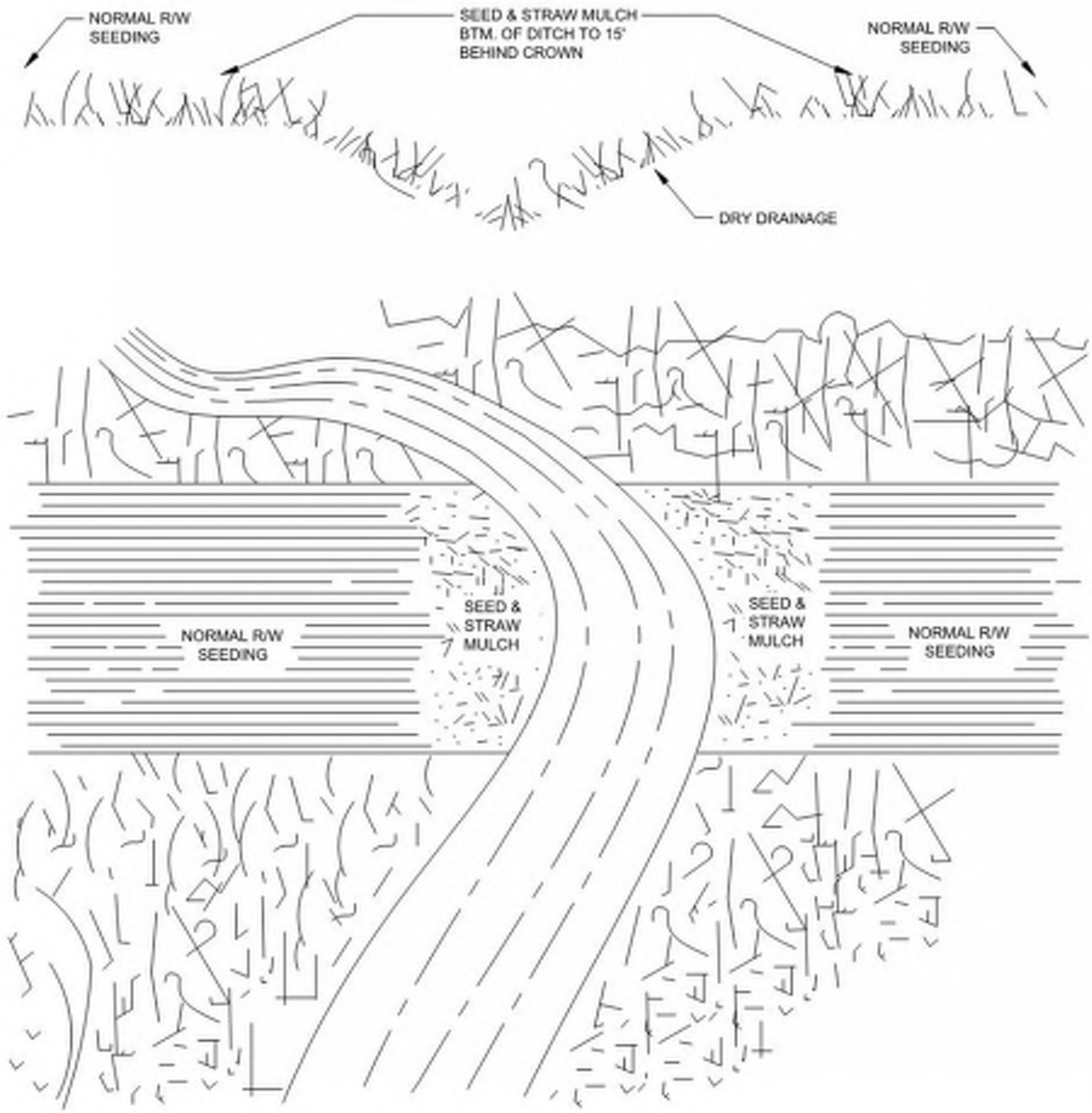

NOTES:

EROSION CONTROL MATTING WILL BE INSTALLED WITHIN 50' OF BANK FOR ALL HQ/EV WATERSHEDS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:	
St.:		Co./Par.:	
Section:	Township:		Range:
Dft:	Date:	Project ID:	
Chk:	Date:	Scale:	
Appr:	Date:	Filename:	

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
FINAL STREAM
BANK STABILIZATION (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

Sheet:
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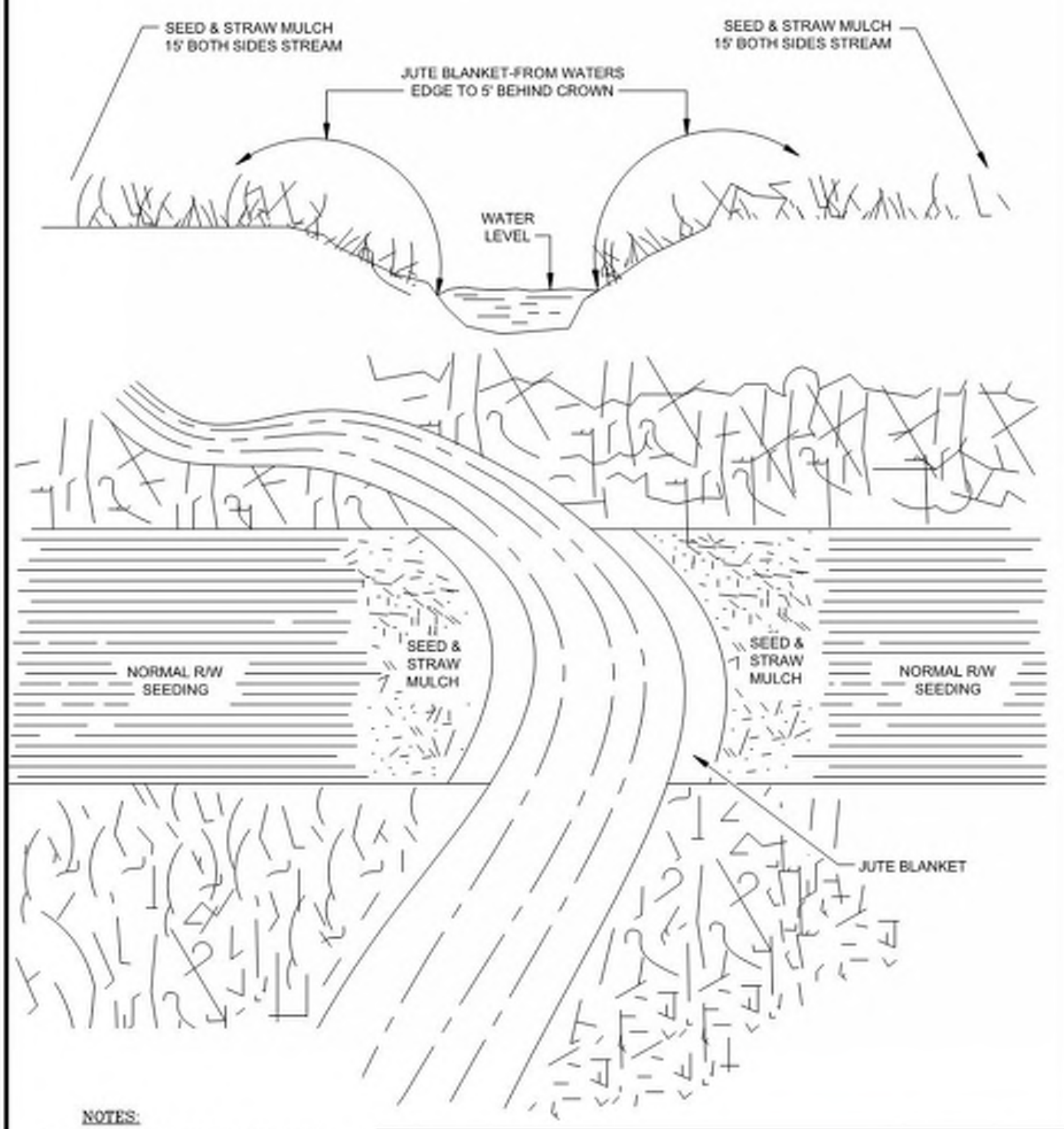

NOTES:

EROSION CONTROL MATTING WILL BE INSTALLED WITHIN 50' OF BANK FOR ALL HQ/EV WATERSHEDS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:	
St.:		Co./Par.:	
Section:	Township:	Range:	
Dft:	Date:	Project ID:	
Chk:	Date:	Scale:	
Appr:	Date:	Filename:	

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT
FINAL STREAM BANK
STABILIZATION (2)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

Sheet:

Type:

Attachment G

Current, Proposed, and Reasonably Foreseeable Future Projects

SEE APPENDIX J OF THE ENVIRONMENTAL ASSESSMENT
(Existing or Proposed Projects Evaluated for Potential Cumulative Effects)

APPENDIX J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
OIL & GAS							
Northeast Energy Direct Project (NED) - *Tennessee Gas Pipeline Company, LLC* FERC Docket No. PF14- 22-000	Expansion of Tennessee's existing pipeline system in Pennsylvania, New York, Massachusetts, New Hampshire, and Connecticut.	New York Loop, Massachusetts Loop, Connecticut Loop	>0.1	Middle Hudson, Lower Connecticut and Farmington Watersheds/Albany, Berkshire and Hartford County/ 0.25 miles (New York, Connecticut)	Geology & Soils; Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics; Cultural Resources; Air Quality & Noise	4th quarter 2018	Kinder Morgan Inc., 2015 Northeast Gas Association, 2015
E. Greenbush to Schodack Pipeline Project – *Empire Generating Company, LLC*	4.6 miles of 16-inch natural gas pipeline in E. Greenbush, New York and Schodack, New York, Rensselear County.	New York Loop	4.8	Middle Hudson Watershed/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources	Unknown	NYSPSC, 2015a
Pittsfield Pipeline Project – *Berkshire Gas Company*	6.2 miles of 12-inch natural gas pipeline and meter station in Pittsfield, Berkshire County, Massachusetts.	Massachusetts Loop	Unknown	Berkshire County	Socioeconomics	Unknown	MAEEA, 2015b
Algonquin Incremental Market (AIM) - *Algonquin Gas Transmission, LLC* FERC Docket No. CP14-96-000	37 miles of new and replacement natural gas pipeline, modifications to compressor stations and meter stations, and a new meter station. Located in New York, Connecticut, Massachusetts, and Rhode Island.	Connecticut Loop	20.2	Lower Connecticut Watershed/Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	2nd and 3rd quarters 2016	Spectra Energy Corporation, 2015a Northeast Gas Association, 2015

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Atlantic Bridge Project - *Spectra Energy - Algonquin Gas Transmission, LLC and Maritimes & Northeast Pipeline Limited Partnership*	Evaluating modification of the Algonquin system, including about 34 miles of natural gas pipeline replacement, loops, a new compressor station, and compression station modifications. Located in New York, Connecticut, Massachusetts, and Rhode Island.	Connecticut Loop	20.6	Lower Connecticut Watershed/ Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	2017	Spectra Energy Corporation, 2015b Northeast Gas Association, 2015
Access Northeast: New England Energy Reliability Solution - *Spectra Energy and Northeast Utilities*	Evaluating expansion of the Algonquin system. Potential locations in New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, Maine.	Connecticut Loop	Unknown	Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	4th quarter 2018	Spectra Energy Corporation, 2015c Northeast Gas Association, 2015
Joint Natural Gas Infrastructure Expansion Plan - *Yankee Gas Services Company, Southern Connecticut Gas Company, Connecticut Natural Gas Company*	Provide avenue for customers to switch to natural gas.	Connecticut Loop	Statewide	Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	CTDEEP, 2015b

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Hampden to Stonybrook Pipeline Project- *Massachusetts Municipal Wholesale Electric Co*.	5.6 miles of 20-inch natural gas pipeline from Stony Brook Energy Center to Bay State Gas Company's existing Monson-Palmer line, Ludlow, Hampden County, Massachusetts.	Connecticut Loop	3.9	Hampden County	Socioeconomics	Unknown	MAEEA, 2015b
Pioneer Valley Energy Center Electric Generation Facility- *Pioneer Valley Energy Center and Westfield Gas & Electric Co.*	400 MW combined-cycle, duel fuel electric generating facility and 2.5 miles of 12-inch natural gas pipeline connecting Westfield Gas & Electric's gas transmission pipeline system to the proposed generating facility, located in Westfield, Hampden.	Connecticut Loop	8.7	Hampden County/10 miles	Land Use & Visual Resources; Socioeconomics	Unknown	MAEEA, 2015b
Valley Oil Bulk Terminal	Petroleum Bulk Station & Terminal facility, in the Town of Claverack, Colombia County, New York.	New York Loop	26.1	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e
Kingston Point Terminal	Petroleum Bulk Station & Terminal facility, in the City of Kingston, Ulster County, New York.	New York Loop	45.4	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e
Kingston Maintenance Facility	Petroleum Bulk Station & Terminal facility, in the Town of Ulster, Ulster County, New York.	New York Loop	45.4	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
UTILITIES & ELECTRIC							
Champlain Hudson Power Express- *Transmission Developers, Inc.*	Proposed 333 miles of buried and submarine high voltage direct current electric transmission line from the Canadian Province of Quebec to New York City. Located in multiple counties, New York.	New York Loop	0.7	Middle Hudson Watershed/Albany County/1 mile	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species;Land Use & Visual Resources, Socioeconomics	2015	United States Department of Energy, 2014
Edic to New Scotland, Knickerbocker to Pleasant Valley, Oakdale to Fraser Projects- *New York Transmission Owners*	Proposed 91.4 miles of 345 kV electric transmission line in Town of Marcy, Oneida County, to the new substation, in town of New Scotland, Albany County; 54.2 miles of new 345 kV electric transmission line from a new substation in town of Schodack, Rensselaer County, to the Pleasant Valley substation, in town of Pleasant Valley, Dutchess County; and 57.7 miles of new 345 kV transmission line from the substation in town of Union, Broome County, to the Fraser stubstation in town of Delhi, Delaware County, New York.	New York Loop	2.5	Middle Hudson Watershed/Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSPSC, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Marcy to Pleasant Valley Project-*NextEra Energy Transmission New York, Inc.*	Proposed about 178 mile 345 kV transmission line between Marcy substation in Oneida County and Pleasant Valley substation in Dutchess County, New York.	New York Loop	2.8	Middle Hudson Watershed/Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	3rd quarter 2017	NYSPSC, 2015a Town of Clinton, 2015
Edic to Fraser and New Scotland to Leeds to Pleasant Valley Transmission Upgrade Project- *North America Transmission LLC and North America Transmission Corp*	Proposed about 80 mile 345 kV transmission line between Edic substation in Oneida County and substation in Delaware County, and about 65 mile 345 kV transmission line between New Scotland substation in Albany County and Pleasant Valley substation in Dutchess County, New York.	New York Loop	0.9	Middle Hudson Watershed/Albany county/1 mile	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSPSC, 2015a North America Transmission, 2013
West Point Transmission Project - Leeds to Buchanan DC Cable-*West Point Partners, LLC*	80 mile 1000 MW power cable, of which 77.3 miles are submarine buried in the Hudson River, between Leeds substation in Green County and Buchanan North substation in Westchester County, New York.	New York Loop	21.5	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	2015 & 2016	NYSPSC, 2015a Transmission Hub, 2015

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Leeds Path West Project-*Boundless Energy NE LLC*	59 miles of existing overhead 345 kV transmission line improvements, and 8 miles of new underground 345 kV line, between Leeds substation in Greene County and the East Fishkill substation in Dutchess County, New York.	New York Loop	21.5	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	2015	NYSPSC, 2015a New York Energy Highway, 2015
Columbia County Transmission Project-*New York State Electric & Gas Corp*	11 mile 1115 kV transmission line, new Ghent Switching Station, and modifications to existing Klinekill Substation. Project located in Chatham, Ghent, & Stockport, Colombia County, New York.	New York Loop	19.0	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSPSC, 2015a NYSEG, 2015
Van Dyke Road Substation and Duct Bank- *Niagara Mohawk Power Corporation d/b/a National Grid*	Proposed construction of a new electrical substation, and an associated 0.7-mile long underground duct bank adjacent to the existing New Scotland- Bethlehem #4 115 kV transmission line. Located in Bethlehem, Albany County, New York.	New York Loop	1.1	Middle Hudson Watershed/Albany County /5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSPSC, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Greater Springfield Reliability Project and Manchester to Meekville Junction Circuit Separation Project- *Northeast Utilities*	39 miles of new and upgraded 345 kV and 115 kV transmission line from North Bloomfield SS in Bloomfield, Connecticut to Ludlow substation in Ludlow, Massachusetts, and 2.7 miles of new 345 kV transmission line from Manchester substation to Meekville Junction in Manchester, Connecticut. Located in Hartford County, Connecticut and Hampden County, Massachusetts.	Massachusetts Loop, Connecticut Loop	1.3	Farmington and Lower Connecticut Watersheds/ Hampden and Hartford Counties/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Ongoing through 2015	Northeast Utilities, 2015 ISO New England, 2015
Central Connecticut Reliability Project- *Northeast Utilities*	Proposed transmission project between Thomaston and Bloomfield, Connecticut, focused on reliability needs in the Central Connecticut area. Located in Hartford and Litchfield Counties, Connecticut.	Massachusetts Loop, Connecticut Loop	0.4	Farmington and Lower Connecticut Watersheds/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	2017	Northeast Utilities, 2015 ISO New England, 2015
Greenville Sewer Line Extension	Proposal to extend existing sewer district, including installation of new sewer lines and a new pump station, in Greenville, Green County, New York.	New York Loop	14.1	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Bethlehem Sewer Improvements	Proposal to replace existing sewer infrastructure along an existing sewer easement in the Town of Bethlehem, Albany County, New York.	New York Loop	1.2	Middle Hudson Watershed/Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDEC, 2015e
Leeds & Jefferson Heights Sewer Project	Formation of a new sewer district, construction of a new sewer collection system, and connection to an existing collection system, and minor upgrades to a pump station and wastewater treatment plant, in the Hamlet of Leeds and Hamlet of Jefferson Heights, in the town of Catskill, Green County, New York.	New York Loop	7.8	Middle Hudson Watershed/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources	Unknown	NYSDEC, 2015e
Construction of Water Transmission Main	7,100 feet of 16-inch water main, hydrants, valves, and appurtenances to connect the well field with its existing water transmission system. Located in the town of Schodack, Rensselaer County, New York.	New York Loop	8.3	Middle Hudson Watershed/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Water for the Future: Upstate Water Supply Resilience Project	Repair significant leaks in the Rondout-West branch (RWBT) Tunnel of the Delaware Aqueduct, including a 3-mile bypass tunnel from the town of Newburgh, Orange County to the town of Wappinger, Dutchess County, Project located in Broome, Delaware, Dutchess, Green, Orange, Putnam, Schoharie, Sullivan, Ulster, and Westchester Counties, New York.	New York Loop	49.9	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Completion 2022	NYSDEC, 2015e New York City Environmental Protection, 2015
Catskill Influent Chamber - Catskill Turbidity Control Program	Dredging of alum floc at Kensico Reservoir. Located in Ulster and Westchester Counties, New York.	New York Loop	44.5	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e
Springfield Long-Term Combined Sewer Overflow Control	Numerous projects for combined sewer overflows in the City of Springfield over a 20 year period. Located in Hampden County, Massachusetts.	Connecticut Loop	6.4	Lower Conn Watershed/Hampden County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	MAEEA, 2015c
Clean Water Project	Project to address combined sewer overflow problems to comply with a federal Consent Decree from EPA and a state Consent Order from CTDEEP. Located in multiple towns in Hartford County, Connecticut.	Connecticut Loop	14.2	Lower Connecticut Watershed/ Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	CTDEEP, 2015b

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Agawam Southwest Area Wastewater Treatment Improvements Project	18.6 miles of new sewers and four mains and four new pumping stations. Located in town of Agawam, Hamden County, Massachusetts	Connecticut Loop	3.2	Lower Connecticut Watershed/ Hampden County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	MAEEA, 2015c
Chicopee Long-Term Combined Sewer Overflow Plan	Phase 2 of the City of Chicopee's Long-Term Combined Sewer Overflow Control Plan to further reduce volumes.	Connecticut Loop	8.1	Lower Connecticut Watershed/ Hampden County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015b
TRANSPORTATION							
Peckham Storage and Transfer Facility	Proposed construction of 350 feet of additional track at the southern rail siding at an existing storage and transfer facility. Located in the Town of Athens, Greene County, New York.	New York Loop	6.8	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	USACE, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
High Speed Rail Empire Corridor Program	Proposed improvements to 463 mile rail corridor between New York and Niagara Falls. Tier 1 addresses broad issues and sets forth a package of follow-on studies, proposals, and projects. Subsequent tiers will analyze site specific proposals based on Tier 1 decisions. Located in Albany and Rensselaer Counties, New York and others.	New York Loop	4.0	Middle Hudson Watershed/Albany County/ 5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	FRA &NYSDOT, 2014
Coxsackie to Ravena Second Mainline Track Project	Construct a second mainline tract to improve railroad's fluidity and capacity and connectivity, including culvert and bridge replacements, between the Town of Coxsackie, Greene County, and the Village of Ravena, Albany County, New York.	New York Loop	7.7	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
I-87 Exit 4 Access Improvements	Proposed access improvements between I-87, Wolf Rd., and the Albany International Airport, including access between I-87 and the Airport, safety and traffic operations at Exit 4, I-87 bridge deficiencies, and pedestrian/bicycle facilities. About 8.0 miles of roadway included in the study. Located in the Town of Colonie, Albany County, New York	New York Loop	9.9	Albany County/10 miles	Land Use & Visual Resources; Socioeconomics	2015	FHWA, 2014 State of New York, 2015a
I-787 New York Thruway Exit 23 to SME Complex	Rehabilitate five bridges carrying I- 787 from New York Thruway Exit 23 to SME Complex, and address pavement on an about 2.5 miles section of I-787 from Southern Boulevard to the bridge over the Broadway-Quay Street Connection in the City of Albany, Albany County, New York	New York Loop	4.3	Middle Hudson Watershed/Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	2015	NYSDOT, 2015a
I-87 Exit 3 Airport Connector, Part 2	Construction of a new highway at I-87 Exit 3, Airport Connector, in the Town of Colonie, Albany County, New York.	New York Loop	10.1	Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDOT, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Port of Coeymans Subassembly Staging Area	Dredging of the Hudson River and construction of a bridge section assembly facility for the new New York Tappan Zee Bridge in South Nyack/Tarrytown, Rockland and Westchester Counties, New York. Facility accepts construction materials by barge and truck to be fabricated into bridge sections, which are shipped by barge to the bridge site. Located in Coeymans, Albany County, New York,	New York Loop	7.8	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	USACE, 2015a
Housatonic Railroad Passenger Rail Station Location and Design Project	Study conducted to identify locations for passenger rail stations along a 38 miles section of the Berkshire Line to re-establish passenger rail service between Danbury, Connecticut, and Pittsfield, Massachusetts.	Massachusetts Loop	8.7	Berkshire County/ 10 miles	Land Use & Visual Resources; Socioeconomics	Unknown	Berkshire Regional Planning Commission, 2015

Appendix J Existing or Proposed Projects Evaluated for Potential Cumulative Impacts							
Project Type / Name	**Project Location and Description**	**Facility**	**Distance to Project (miles)**	**Region of Influence**	**Resources Potentially Affected**	**Anticipated Construction (date)**	**Source**
Northern New England Intercity Rail Initiative	Study being conducted to examine the implementation and operation of more frequent and higher speed passenger service and necessary infrastructure improvements on two major rail corridors known as Inland Route and the Boston to Montreal Route, totaling 470 miles between Boston, Massachusetts, and Springfield, Massachusetts, and New Haven, Connecticut to Springfield, Massachusetts to Montreal, Canada.	Massachusetts Loop, Connecticut Loop	Unknown	Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	MADOT, CTDOT, & Vermont Agency of Transportation, 2015

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
New Haven-Hartford-Springfield Rail Program	Project to provide additional and enhanced rail service along a 62 mile corridor between New Haven, Connecticut, Hartford, Connecticut, and Springfield Massachusetts. Project components include operational improvements, track restoration, maintenance facility, bridge and culvert rehabilitations, replacements, and removals, new crossovers and signal upgrades, improvement or relocation of existing passenger rail platforms, additional station parking and access, construction of new regional rail stations, etc. Located in multiple counties in Connecticut and Massachusetts.	Massachusetts Loop, Connecticut Loop	1.9	Farmington, Lower Connecticut Watershed/ Hampden and Hartford Countues/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	2015	CTDOT, 2015
I-91 Viaduct Rehabilitation	Replace I-91 bridge deck, improve drainage, lighting, painting, and other various safety repairs on the elevated viaduct, on an about 1 mile section from State Street to I-291 interchange ramps, in Springfield, Hampden County, Massachusetts.	Connecticut Loop	5.3	Hampden County/ 10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	MADOT, 2015a MADOT, 2014

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
CTFastrak	Bus Rapid Transit system that includes a 9.4 mile guideway dedicated to buses, 10 stations, and a 5 miles multi-use trail. Service is between Hartford and New Britain, Connecticut, Hartford County	Connecticut Loop	11.6	Hartford County	Socioeconomics	Unknown	CTDOT, 2015
I-84 Hartford Project	Project to reduce the highway's adverse impact and footprint, while integrating it more closely into regional multimodal and interstate transportation system. Includes improvements to structural deficiencies, traffic operations and safety, and congestion on I-84 mainline and interchanges. Located in Hartford, Hartford County, Connecticut.	Connecticut Loop	11.4	Lower Connecticut Watershed/Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	CTDOT, 2015
Meads Lane and Van Dyke Road Intersection Improvement Project	Proposed intersection improvement project at the intersection of Meads Land and Van Dyke Road, Bethlehem, Albany County, New York.	New York Loop	0.2	Middle Hudson Watershed/Albany County/ 0.25 miles	Geology & Soils; Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics; Cultural Resources; Air Quality & Noise	Unknown	NYSDOT, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Coeymans Creek Bridge	Proposed construction of a new bridge across Coeymans Creek to connect New York Route 144 along the east side to Riverview Drive along the west bank of the Creek. Located in Coeymans, Albany County, New York	New York Loop	7.0	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	2015	NYSDOT, 2015a Albany County Department of Public Works, 2015
Albany Avenue Reconstruction Project	Reconstruction of Albany Avenue, including regrading and repaving to improve stormwater drainage. Installation of separate stormwater conveyance piping and catch basins. Located in the Village of Green Island, Albany County, New York.	New York Loop	13.5	Albany County	Socioeconomics	2017 & 2018	NYSDOT, 2015a City of Hartford, 2015
Boght Rd - Route 9 Upda	Numerous projects to address traffic conditions with respect to the Route 9 and Boght Road-Columbia Street areas in the Town of Colonie, Albany County, New York.	New York Loop	13.1	Albany County	Socioeconomics	Unknown	NYSDOT, 2015a
Deck Replacement on 5 Bridges in Rensselaer County	Deck replacement on Route 2 over I- 787, in Albany County, Route 22 over East Creek, Route 22 over Dill Creek, Washington Ave. over I-90, I-90 over Krafts Road (two structures) in Rensselaer County, New York [JTC-New York-0006a]	New York Loop	7.7	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDOT, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
I-787 Reconstruction, Downtown Albany	Rehabilitation of I-787 between New York Thruway and Exits 3A/3B and in the vicinity of the Clinton Avenue Viaduct, in Albany, Albany County, New York.	New York Loop	6.4	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDOT, 2015a
Bridge Repair: I-787 Northbound to South Mall	Repair or replace I-787 Northbound to South Mall bridge, in Albany, Albany County, New York.	New York Loop	Unknown	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDOT, 2015a
Bridge Repair: South Mall from I-787 to Empire State Plaza	Repair or replace South Mall Expressway bridges I-787 and the Empire State Plaza, in Albany, Albany County, New York	New York Loop	5.9	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDOT, 2015a
Bethlehem Harsh Winter Paving Program	Paving Route 140, Town of Bethlehem, Albany County, New York	New York Loop	Unknown	Middle Hudson Watershed/Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDOT, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Bridge Reconstruction: Route 144 over Hannacrois Creek	Reconstruct Route 144 bridge over Hannacrois Creek, Coeymans, Albany County, New York.	New York Loop	8.9	Middle Hudson Watershed/Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	2016	NYSDOT, 2015a New York State Thruway Authority, 2015
Route 443 and Route 156 Intersection Improvement Project	Replace Route 443 bridge over Fox Creek at the intersection of Route 443 and Route 156, in Berne, Albany County, New York, and Route 23A over Kaaterskill Creek, Catskill, Greene County, New York	New York Loop	13.9	Middle Hudson Watershed/Albany County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	2015	NYSDOT, 2015a NYSDOT, 2105b
Large Culvert Replacement throughout DOT Region 1	Multi-site project to address deficiencies at 15 large culverts that run under state routes throughout NYSDOT Region 1. Located in Albany, Essex, Greene, Saratoga, and Warren Counties, New York	New York Loop	Region-wide	Middle Hudson Watershed/Albany County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	NYSDOT, 2015a
Critical Bridges Over Water Design throughout DOT Region 1	Critical bridges over water design throughout NYSDOT Region 1. Located in Albany, Washington, Warren, Saratoga, Rensselear, Essex, and Green Counties, New York	New York Loop	Unknown	Middle Hudson Watershed/Albany County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	NYSDOT, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Bridge Repair or Replacement: I-90 over the Moordener Kill	Repair or replace the I-90 bridge over the Moordener Kill, Schodack, Rensselaer County, New York.	New York Loop	8.4	Middle Hudson Watershed/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	2013	NYSDOT, 2015a
Bridge Replacement: Route 66 over Claverack Creek	Replace the superstrucutre Route 66 bridge over Claverack Creek, Greenport, Columbia County, New York.	New York Loop	23.8	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	2014	NYSDOT, 2015a
Taconic State Parkway Catchbasin Repair/Replacement	Repair or replace stormwater catch basins to ensure that the drainage functions as originally designed. Various municipalities throughout Columbia and Dutchess Counties, New York	New York Loop	Region-wide	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDOT, 2015a
Bridge Replacement: Route 9H over Taghkanic Creek	Replace Route 9H bridge over Taghkanic Creek in Claverack, in Columbia County, New York.	New York Loop	26.4	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDOT, 2015a
Bridge Replacement: Route 22 over the Roeliff Jansen Kill	Replace Route 22 bridge over Roeliff Jansen Kill in Hillsdale, Columbia County, New York	New York Loop	18.8	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	2015	NYSDOT, 2015a State of New York, 2015b
Bridge Replacement: Route 199 over Sawhill Creek	Replace Route 199 bridge over Sawkill Creek in Milan, Dutchess County, New York.	New York Loop	Unknown	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDOT, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Bridge Replacement: Route 28 over Esopus Creek	Replace Route 28 bridge over Esopus Creek in Shandaken, Ulster County, New York.	New York Loop	44.8	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	2014	NYSDOT, 2015a
Bridge Replacement: Hopper Road over Green River	Replace Hopper Road bridge over Green River in Williamstown, Berkshire County, Massachusetts	Massachusetts Loop	32.5	Berkshire County	Socioeconomics	2015	MADOT, 2015a Massachusetts Highway District, 2015a
Bridge Replacement: Route 41 over Williams River	Replace Route 41 (Great Barrington Rd) over the Williams River and modification of stream channel in the Town of West Stockbridge, Berkshire County, Massachusetts.	Massachusetts Loop	11.7	Berkshire County	Socioeconomics	2015	MADOT, 2015a Massachusetts Highway District, 2015b
Bridge Replacement: Route 7A (Ashley Falls Rd) over Housatonic River	Replace Route 7A bridge over Housatonic River in Sheffield, Berkshire County, Massachusetts.	Massachusetts Loop	12.5	Berkshire County	Socioeconomics	2015	MADOT, 2015a Massachusetts Highway District, 2015c
Bridge Replacement: Alford Road over Alford Brook	Replace Alford Road bridge over Alford Brook in Alford & Great Barrington, Berkshire County, Massachusetts.	Massachusetts Loop	13.6	Berkshire County	Socioeconomics	2021 & 2022	MADOT, 2015a Massachusetts Highway District, 2015d

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Bridge Replacement: Route 8 & Route 57 over West Branch of Farmington River	Replace Route 8 & Route 57 bridge over West Branch Farmington River in Sandisfield, Berkshire County, Massachusetts.	Massachusetts Loop	3.4	Farmington Watershed/ Berkshire County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	2015 & 2016	MADOT, 2015a Massachusetts Highway District, 2015b
Bridge Replacement: Five Bridges, Route 20 (Jacob's Ladder Road) over Walker Brook and Cushman Brook	Replace 5 bridges carrying Route 20 (Jacob's Ladder Road) over Walker Brook and Cushman Brook in Becket and Chester, Berkshire County, Massachusetts.	Massachusetts Loop	6.0	Farmington Watershed/ Berkshire County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	2020 & 2021	MADOT, 2015a Massachusetts Highway District, 2015e
Bridge Replacement: Clark Road over West Branch Farmington River	Replace Clark Road over West Branch Farmington River in Sandisfield, Berkshire County, Massachusetts.	Massachusetts Loop	4.4	Farmington Watershed/ Berkshire County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	2014 & 2015	MADOT, 2015a Massachusetts Highway District, 2015f
Bridge Maintenance: Route 8 (South Main Street) over West Branch Farmington River	Bridge maintenance on Route 8 (South Main Street) bridge over West Branch Farmington River in Sandisfield, Berkshire County, Massachusetts.	Massachusetts Loop	5.0	Farmington Watershed/ Berkshire County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	2015 & 2016	MADOT, 2015a Massachusetts Highway District, 2015b

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Route 8 Rock Catchment System	Install a rock catchment system along a 1 miles section of Route 8 just north of the Connecticut state line in Sandisfield, Berkshire County, Massachusetts.	Massachusetts Loop	6.3	Farmington Watershed/ Berkshire County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	2022	MADOT, 2015a Massachusetts Highway District, 2015g
Hammertown-Montville Road over Clam River Bridge Replacement	Replace Hammertown-Montville Road bridge over the Clam River in Sandisfield, Berkshire County, Massachusetts.	Massachusetts Loop	0.3	Farmington Watershed/ Berkshire County/ 0.25 miles	Geology & Soils; Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics; Cultural Resources; Air Quality & Noise	2014 & 2015	MADOT, 2015a Massachusetts Highway District, 2015f
Bridge Maintenance: Route 8 (South Main Street) over Silvernail Brook	Bridge maintenance at various locations throughout the district, including Route 8 (South Main Street) bridge over Silvernail Brook, in Sandisfield, Berkshire County, Massachusetts.	Massachusetts Loop	6.6	Farmington Watershed/ Berkshire County/ 10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	2021 & 2022	MADOT, 2015a Massachusetts Highway District, 2015d
Columbia Street Intersection Improvements Project	Reconstruct Route 8 (Columbia Street)/Friend Street/Renfrew Street intersection in Adams, Berkshire County, Massachusetts	Massachusetts Loop	31.7	Berkshire County	Socioeconomics	Unknown	MADOT, 2015a

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Bridge Reconstruction: Six CSX Railroad Bridges	Reconstruct 6 bridges which all intersect the CSX Railroad in Chester, Hinsdale, Richmond, and West Springfield, Hampden and Berkshire Counties, Massachusetts. Part of comprehensive multi-year rail transportation agreement between Massachusetts and CSX, designed to expand commuter rail service and increase vertical clearance from Albany, New York to Worcester, Massachusetts.	Massachusetts Loop, Connecticut Loop	5.4	Berkshire and Hampden Counties/ 10 miles	Land Use & Visual Resources; Socioeconomics	Unknown	MADOT, 2015a
Memorial Ave Rotary Replacement	Replace 2 Route 147 (Memorial Avenue) bridges over Route 5 (Riverdale Street), including Route 147 and Route 5 interchange area, in West Springfield, Hampden County, Massachusetts.	Connecticut Loop	3.1	Hampden County/5 miles	Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	2015	CTDOT, 2015 MADOT, 2015b
Lozierville and Meadows Old Town Roadway Improvements	Reconstruct about 18,500 linear feet of roadway along 16 streets, relocate above ground utilities to subsurface, in Westfield, Hampden County, Massachusetts.	Connecticut Loop	8.7	Hampden County/10 miles	Land Use & Visual Resources; Socioeconomics	2015	CTDOT, 2015 City of Westfield, 2015

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Reconstruction of Feeding Hills Road (Route 187)	Reconstruct Feeding Hills Road, replace two culverts, and drainage and other improvements, beginning north of Old Feeding Hills Rd to the Agawam Town line, in Westfield, Hampden County, Massachusetts.	Connecticut Loop	5.9	Hampden County/10 miles	Land Use & Visual Resources; Socioeconomics	Unknown	CTDOT, 2015
Harvey Lane Railroad Crossing	Modernize Harvey Lane railroad crossing, Suffield, Hartford County, Connecticut.	Connecticut Loop	3.1	Lower Conn Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDOT, 2015
2015 Roadway Improvement Project	Rehabilitate and resurface various roadways within the Town of East Hartford, Hartford County, Connecticut.	Connecticut Loop	12.8	Lower Conn Watershed/Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	2015	CTDOT, 2015
I-95 Between Interchanges 70 and 72	Road reconstruction, resurfacing, safety improvements, and drainage improvements on I-95 between Interchanges 70 and 72, in Old Saybrook, Old Lyme, and East Lyme, Middlesex and New London Counties, Connecticut.	Connecticut Loop	46.4	Lower Connecticut Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	CTDOT, 2015

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Parking Area Paving Improvements-Lot H	Parking area pavement improvements in Windsor Locks, Hartford County, Connecticut.	Connecticut Loop	1.4	Farmington Watershed/Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDOT, 2015.
Parking Area Paving and Traffic Improvements	Parking area paving and traffic improvements in Windsor Locks, Hartford County, Connecticut.	Connecticut Loop	1.6	Farmington Watershed/Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDOT, 2015
Route 66 Improvements	Road reconstruction on Route 66 by Route 196 and Old Marlborough Road, East Hampden, Hartford County, Connecticut.	Connecticut Loop	26.5	Lower Connecticut Watershed/Hartford County/	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	CTDOT, 2015
Bradley International Airport Improvements	Airport improvements in Windsor Locks, Hartford County, Connecticut.	Connecticut Loop	0.9	Lower Connecticut Watershed/Hartford County/1 mile	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	USAF, 2014

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
ALTERATIVE ENERGY							
Byron Weston Dam No. 2, FERC Docket No. P-13583	Project had not operated since 1942. Owners restored the hydroelectric plant to operation, including a new powerhouse, turbine, and transmission line, on the East Branch of the Housatonic River, in Town of Dalton, Berkshire County, Massachusetts.	Massachusetts Loop	20.3	Berkshire County	Socioeconomics	Unknown	FERC, 2015
Rising Paper Solar	2 MW solar power facility in Great Barrington, Berkshire County, Massachusetts.	Massachusetts Loop	11.7	Berkshire County	Socioeconomics	Unknown	MAEEA, 2015b
Canton Hydroelectric Project, FERC Docket No. P- 13273	Successive Preliminary Permit to study the feasibility of the Canton Hydroelectric Project (new turbine units and transmission lines), on the Farmington River, in Canton, Burlington, and Avon, Hartford County, Connecticut	Massachusetts Loop, Connecticut Loop	13.5	Farmington Watershed/Hartford Counties	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	FERC, 2015
Union Pond Dam Hydroelectric Project, FERC Docket No. P-14574	Preliminary permit to study the feasibility of the Union Pond Dam Hydroelectric Project (new intake canal, generator unit, powerhouse, and transmission line), on the Hockanum River, in Manchester, Hartford County, Connecticut.	Connecticut Loop	13.1	Lower Connecticut Watershed/Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	FERC, 2015

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
COMMERCIAL							
Albany Capitol Center	Proposed construction of the Albany Capitol Center to expand the capacity of Albany to host conventions, consumer shoes, conferences, and meetings. Located within the City of Albany, Albany County, New York.	New York Loop	5.9	Middle Hudson Watershed/ Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDEC, 2015e
Fountain Flats Park	Proposed construction of business park for a distribution center on an about 103-acre parcel in Coxsackie, Greene County, New York.	New York Loop	16.0	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e
Wemple Corners Rezoning Petition and Mixed Use Project	Petition to rezone 95 acres of land from Mixed Economic Development District to Commercial hamlet District to allow construction of a mixed-use development consisting of apartments, town homes, retail commercial uses, and professional offices. Located in the Town of Bethlehem, Albany County, New York.	New York Loop	2.4	Middle Hudson Watershed/ Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Homegoods Trailer Expansion	Proposed construction of 226 trailer parking spaces on an about 15 acre parcel adjacent to the Homegoods distribution center in Bloomfield, Hartford County, Connecticut.	Massachusetts Loop, Connecticut Loop	4.8	Farmington Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015b
RESIDENTIAL							
Delmar Pointe Planned Development District	Proposed construction of a residential Planned Development District on 23.5 acre of vacant land in Bethlehem, Albany County, New York.	New York Loop	1.6	Middle Hudson Watershed/ Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDEC, 2015e
Elm Avenue East Subdivision	Proposed construction of a single family residential subdivision on a 128.6 acre parcel of land in Bethlehem, Albany County, New York.	New York Loop	1.5	Middle Hudson Watershed/ Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Heritage Acreage Subdivision	Proposed residential development in East Granby, Hartford County, Connecticut.	Connecticut Loop	1.3	Lower Connecticut Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c
801 Day Hill Rd.	Proposed residential development in Windsor, Hartford County, Connecticut	Connecticut Loop	4.2	Farmington Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c
110 & 220 Tradeport Drive	Proposed residential development in Windsor, Hartford County, Connecticut.	Connecticut Loop	1.4	Farmington Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c
The Villages at Poquonock	Proposed residential development in Windsor, Hartford County, Connecticut.	Connecticut Loop	2.4	Farmington Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Kingswood of Avon	Proposed residential development in Avon, Hartford County, Connecticut.	Connecticut Loop	13.2	Farmington Watershed/ Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	CTDEEP, 2015c
Weatherston East of Avon, Phase I & II	Proposed residential development in Avon, Hartford County, Connecticut.	Connecticut Loop	13.5	Farmington Watershed/ Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	CTDEEP, 2015c
Mercy Knoll Property	Proposed multi-family apartment complex on a 15.5 acre parcel in West Hartford, Hartford County, Connecticut.	Connecticut Loop	10.6	Lower Connecticut Watershed/ Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	CTDEEP, 2015c
Clark Estates	Proposed single-family residential development on a 6.16 acre parcel in South Windsor, Hartford County, Connecticut.	Connecticut Loop	11.2	Lower Connecticut Watershed/ Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c
Olde Village Green of Suffield	Proposed residential development in Suffield, Hartford County, Connecticut.	Connecticut Loop	0.5	Lower Connecticut Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
OTHER							
Riverwalk and Bikeway Project	Widen segments of School Street and River Road and construct new bikeway loop in the center of Agawam, Hampden County, Massachusetts.	Connecticut Loop	2.9	Lower Connecticut Watershed/ Hampden County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	MADOT, 2015a
Harlem Valley Rail Trail	Proposed development of multiple sections along 46 miles of former rail line for use as a paved multi-use trail, including earthwork, paving, drainage, fencing, signage, in the Towns of Chatham, Ghent, Philmont, Copake, Hillsdale, and Ancram, in Columbia County, the Village of Millerton and Town of North East in Dutchess County, New York.	New York Loop	19.3	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e
Tivoli Bay Wildlife Management Area	Rehabilitation of the roadway, expansion of the parking lot, construction of new marsh viewing area and canoe launch, within Tivoli Bay Wildlife Management Area, Dutchess County, New York.	New York Loop	38.7	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Hudson River Estuary Habitat Restoration Plan	Restoration Plan identifies priority habitats for restoration (intertidal, shallow water, shorelines, tributary streams) and identifies five restoration actions. Detailed site specific design information has not been developed. Individual projects implemented under the Plan will be subject to own permitting process. Located in multiple counties around the Hudson River, New York.	New York Loop	Region-wide	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e
Wetland Restoration and Landscape Enhancements	Project to address environmental deficiencies related to wetland sites that are not currently functioning as intended. Other environmental issues dealt with to comply with existing environmental standards and regulations. Located in Columbia, Orange, Westchester, Dutchess, and Ulster Counties, New York.	New York Loop	Region-wide	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDOT, 2015a
Livingston State Forest Timber Harvest	Clear cutting 62 acres and thinning of 31 acres of forest to stop spread of Armillaria (fungal root disease) and save white and red pines. Located in the Town of Livingston, Columbia County, New York.	New York Loop	28.6	Middle Hudson Watershed	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Port of Coeymans, Hudson River, Maintenance Dredging	Proposed dredging of about 7,030 cubic yards of material from an approximate 79,200 square foot area that is located within the limits of a previously dredged area to allow for the continued use of the Port of Coeymans as a deepwater port. Located in the Town of Coeymans, Albany County, New York.	New York Loop	7.4	Middle Hudson Watershed/ Albany County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	USACE, 2015a
Town of Colonie Landfill - Area 7 Development	Proposed further development of the Town of Colonie's existing landfill, including new waste footprint and removal of leachate lagoons. Development to provide 20 years of waste disposal capacity. Located in the Town of Colonie, Albany County, New York.	New York Loop	16.3	Albany County	Socioeconomics	Unknown	NYSDEC, 2015be
Albany Air Separation Unit	Industrial Gases facility, in the Town of Bethlehem, Albany County, New York.	New York Loop	0.4	Middle Hudson Watershed/ Albany County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	NYSDEC, 2015e

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Coppermine Brook Restoration	Proposed project to widen and stabilize Coppermine Brook to improve flooding conditions, in Bristol, Hartford County, Connecticut	Massachusetts Loop, Connecticut Loop	19.7	Farmington Watershed/Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	USACE, 2015b
Bradley International Airport Bulk Fuel Storage	Proposed construction project to address compliance issues at the current Bradley International Airport Bulk Fuel Storage Facility, including a new earthen dike and upgrades to above- and underground storage tanks, on an about 3.5 acre parcel in Windsor Locks, Hartford County, Connecticut	Massachusetts Loop, Connecticut Loop	0.9	Farmington Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c
Wethersfield Cove Maintenance Dredging	Proposed maintenance dredging of the Federal Navigation Project at Wethersfield Cove. Located in Wethersfield, Hartford County, Connecticut.	Connecticut Loop	14.7	Lower Connecticut Watershed/Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	USACE, 2015b
John Dempsey Hospital	Proposed renovations to the existing John Dempsey Hospital and construction of a new patient care tower on the campus of UConn Health in Farmington, Hartford County, Connecticut	Connecticut Loop	14.6	Lower Connecticut Watershed/Hartford County	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Socioeconomics	Unknown	CTDEEP, 2015c.

Appendix J

Existing or Proposed Projects Evaluated for Potential Cumulative Impacts

Project Type / Name	Project Location and Description	Facility	Distance to Project (miles)	Region of Influence	Resources Potentially Affected	Anticipated Construction (date)	Source
Camp Hartell Windsor Locks	Proposed construction of a central repair facility to serve as the maintenance headquarters for vehicles and equipment in the Connecticut Army National Guard, in Windsor Locks, Hartford County, Connecticut.	Connecticut Loop	3.2	Lower Connecticut Watershed/ Hartford County/5 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Threatened & Endangered Species; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c
Kaman Corporation Infrastructure Improvement	Project details Unknown. Kaman Corporation is an aerospace and industrial distribution company with headquarters located in Bloomfield, Hartford County, Connecticut.	Connecticut Loop	5.2	Lower Connecticut Watershed/ Hartford County/10 miles	Water Resources & Wetlands; Vegetation, Fisheries & Wildlife; Land Use & Visual Resources; Socioeconomics	Unknown	CTDEEP, 2015c

APPENDIX K

References

APPENDIX K
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APPENDIX L

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