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Tennessee Gas Pipeline Company files draft Resource Reports for the Northeast Energy Direct Project

1 message

NEDINFO <NEDINFO@kindermorgan.com> Wed, Nov 5, 2014 at 4:02 PM
To: NEDINFO <NEDINFO@kindermorgan.com>
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Tennessee Gas Pipeline Company, L.L.C. ("Tennessee") recently filed a request to use the Federal Energy Regulatory Commission's ("Commission") pre-filing procedures for the proposed Northeast Energy Direct Project ("Project"). By notice issued October 2, 2014, the Commission approved Tennessee's request to use the pre-filing procedures for the Project.

As part of the Commission's pre-filing process, Tennessee has submitted draft Resource Reports 1 and 10 with this filing. The draft of Resource Report 1 reflects the information available as of the date of this filing regarding the proposed Project facilities and anticipated land requirements, construction procedures, and permitting/clearance requirements for the Project. The draft of Resource Report 10 identifies the alternatives (system and routing) that Tennessee has identified and a discussion of the evaluation of those identified alternatives as of the date of this filing.

Tennessee notes that its development of the resource reports for the Project is an ongoing process, and that updated drafts of both Resource Reports 1 and 10 will be submitted when the first draft of the Environmental Report (consisting of Resource Reports 1 through 13) are filed with the Commission in March 2015. The second draft of the Environmental Resource Report is anticipated to be filed with the Commission in June 2015.

Please find both of these submitted draft reports in the attached and linked below. We look forward to continue working with you. Thank you.

Draft Resource Reports 1 and 10: http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20141105-5096

Sincerely,

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2 attachments

NED draft Resource Report 1 -- November 2014.pdf
3105K

NED draft Resource Report 10 -- November 2014.pdf
10968K

NORTHEAST ENERGY DIRECT PROJECT

DOCKET NO. PF14-22-000

DRAFT
ENVIRONMENTAL REPORT

RESOURCE REPORT 1

GENERAL PROJECT DESCRIPTION

PUBLIC

Submitted by:

Tennessee Gas Pipeline Company, L.L.C.
1001 Louisiana Street
Houston, Texas 77002

November 2014

RESOURCE REPORT 1 – GENERAL PROJECT DESCRIPTION
SUMMARY OF COMMISSION FILING INFORMATION

INFORMATION	FOUND IN
Provide a detailed description and location map of the Project facilities (§ 380.12 (c)(1)).	Section 1.1 Attachment 1a
Describe any non-jurisdictional facilities that would be built in association with the Project (§ 380.12 (c)(2)).	Section 1.7
Provide current original U.S. Geological Survey ("USGS") 7.5-minute series topographic maps with mileposts showing the Project facilities (§ 380.12 (c)(3)).	Attachment 1a
Provide aerial images or photographs or alignment sheets based on these sources with mileposts showing the Project facilities (§ 380.12 (c)(3)).	Attachment 1a
Provide plot/site plans of compressor stations showing the location of the nearest noise-sensitive areas ("NSA") within 1 mile (§ 380.12 (c)(3,4)).	To be provided in a subsequent filing of this Resource Report 1 (following identification of specific locations for new compressor stations)
Describe construction and restoration methods (§ 380.12 (c)(6)).	Section 1.3
Identify the permits required for construction across surface waters (§ 380.12 (c)(9)).	Section 1.6
Provide the names and addresses of all affected landowners and certify that all affected landowners will be notified as required in §157.6(d) (§ 380.12 (c)(10)).	Section 1.8 Volume III, Appendix AA

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1.0 GENERAL PROJECT DESCRIPTION

Tennessee Gas Pipeline Company, L.L.C. ("Tennessee" or "TGP") is filing an application seeking the issuance of a certificate of public convenience and necessity from the Federal Energy Regulatory Commission ("Commission" or "FERC") for the construction and operation of the proposed Northeast Energy Direct Project ("NED Project" or "Project").[1] Tennessee proposes to expand and modify its existing pipeline system in Pennsylvania, New York, Massachusetts, Connecticut, New Hampshire, and Rhode Island.[2] The NED Project is being developed to meet the increased demand in the Northeast United States ("U.S.") for transportation capacity of natural gas.

The NED Project will provide up to 2.2 billion cubic feet per day ("Bcf/d") of new firm natural gas transportation capacity to meet the growing energy needs in the Northeast U.S., particularly in New England. The proposed Project involves the following facilities:

- Approximately 32 miles of pipeline looping on Tennessee's 300 Line in Pennsylvania;
- Approximately 135 miles of new pipeline proposed to be generally co-located with the Constitution Pipeline Project proposed by Constitution Pipeline Company, LLC ("Constitution")[3] in Pennsylvania and New York (extending from Tennessee's existing 300 Line in Troy, Pennsylvania to Wright, New York);
- Approximately 52 miles of pipeline generally co-located with the existing 200 Line in New York and Massachusetts;
- Approximately 125 miles of new pipeline in Massachusetts (extending east to Dracut, Massachusetts);
- Various laterals and pipeline looping segments in Massachusetts, Connecticut, and New Hampshire to serve local markets;

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[1] In compliance with Section 157.21(f)(5) of the Commission's regulations, 18 C.F.R. § 157.21(f)(5)(2014), Tennessee is filing this draft of Resource Report 1 for the NED Project. This draft of Resource Report 1 reflects the information available as of the date of filing regarding the proposed Project facilities and anticipated land requirements, construction procedures, and permitting/clearance requirements for the NED Project. Tennessee will submit an updated version of this Resource Report 1 to be submitted in a subsequent filing of the ER.

[2] Although capacity at Tennessee's existing Cranston Meter Station located in Rhode Island will be increased as a result of the Project, no modifications to the existing meter station facilities or land disturbance are required.

[3] Jointly owned by Williams Partners Operating, LLC; Cabot Pipeline Holdings, LLC; Piedmont Constitution Pipeline Company, LLC; and Capital Energy Ventures Corporation.

Information contained within this Resource Report 1 related to the Constitution Pipeline Project was based on the "*Draft Environmental Impact Statement: Constitution Pipeline and Wright Interconnect Projects,*" FERC EIS No. 0249D, Docket Numbers CP13-499-000, CP13-502-000, and PF12-9-000 ("Constitution DEIS"). Tennessee notes that the Commission, on October 24, 2014, issued the Final Environmental Impact Statement for the Constitution Pipeline Project "*Final Environmental Impact Statement: Constitution Pipeline and Wright Interconnect Projects,"* FERC EIS No. 0249F, Docket Numbers CP13-499-000, CP13-502-000, and PF12-9-000 ("Constitution FEIS"). At the time the Constitution FEIS was issued by the Commission, Tennessee was in the process of finalizing the drafts of Resource Reports 1 and 10 for filing with the Commission on November 5, 2014 and has not had an opportunity to finalize its review of the Constitution FEIS and incorporate any revisions to its proposed route based on that review. Tennessee will determine if any revisions to its proposed route are necessary after its review of the Constitution FEIS and incorporate any such revisions in subsequent filings of the ER.

- Construction of eight new compressor stations and 16 new meter stations, and modifications to existing compressor and meter stations throughout the Project area; and
- Construction of appurtenant facilities, including mainline valves ("MLVs"), cathodic protection, and pig launcher/receivers through the Project area.

To the extent that it is practicable, feasible, and in compliance with existing law, Tennessee proposes to locate proposed pipeline facilities (either pipeline looping segments or co-located pipeline facilities)[4] within or adjacent to its existing right-of-way ("ROW") associated with its existing 300 Line in Pennsylvania and Connecticut and the 200 Line in New York and Massachusetts. Table 1.0-1 provides a summary of the NED Project facilities.

Tennessee is requesting issuance of a certificate order for the Project in October 2016 and proposes to commence construction activities in January 2017, in anticipation of placing the Project facilities in-service by November 2018 (with the exception of two proposed pipeline looping segments in Connecticut, which would be placed in-service by November 2019) consistent with the terms and conditions of the precedent agreements executed with Project Shippers.

Tennessee's existing pipeline infrastructure consists of approximately 14,000 miles of pipeline designated as the 100, 200, 300, 400, 500, and 800 Lines, based on the region they serve. The proposed NED Project focuses on the existing 200 and 300 Lines. The 200 Line consists of multiple pipelines varying from 24 inches to 36 inches in diameter beginning on the suction of Compressor Station 200 in Greenup County, Kentucky, and extending east through Ohio, Pennsylvania, New York, and New England. The 300 Line system consists of two pipelines (24 inches and 30 inches in diameter) beginning on the discharge side of Compressor Station 219 in Mercer County, Pennsylvania, traveling east through Pennsylvania, New Jersey, New York, Connecticut and terminating as a 16-inch-diameter pipeline at Compressor Station 261 in Hampden County, Massachusetts.

TABLE 1.0-1
SUMMARY OF NED PROJECT FACILITIES

Facility Name	Facility Type	New/ Modified	County	Length (miles)[3]	Nearest MP[4]	Associated Pipeline Segment[5]
Pennsylvania						
Loop 317-3	Pipeline	New	Bradford	22.92	N/A	N/A
Loop 319-3	Pipeline	New	Bradford	4.81	N/A	N/A
			Susquehanna	4.24	N/A	
PA to Wright Pipeline Segment (Pennsylvania Portion)	Pipeline	New	Susquehanna	39.87	N/A	N/A

[4] Pipeline loops are those pipeline segments which are laid parallel to another pipeline and used as a way to increase capacity along what is possible on one line. These lines are connected to move a larger flow of gas through a single pipeline segment. Co-located pipelines are those that are laid parallel to another existing pipeline, but are not connected in any way.

TABLE 1.0-1
SUMMARY OF NED PROJECT FACILITIES

Facility Name	Facility Type	New/ Modified	County	Length (miles)[3]	Nearest MP[4]	Associated Pipeline Segment[5]
Station 319	Compressor Station	Modified	Bradford	N/A	0.00-0.20	Loop 319-3
Supply Path - Head Station	Compressor Station	New	Susquehanna	N/A	18.30-22.40	PA to Wright Pipeline Segment (Pennsylvania Portion)
Pennsylvania Subtotal				**71.84**		
New York						
PA to Wright Pipeline Segment (New York Portion)	Pipeline	New	Broome	16.17	N/A	N/A
			Chenango	2.44	N/A	
			Delaware	45.60	N/A	
			Schoharie	30.92	N/A	
Wright to Dracut Pipeline Segment (New York Portion)	Pipeline	New	Schoharie	3.88	N/A	N/A
			Albany	24.18	N/A	
			Rensselaer	11.09	N/A	
			Columbia	10.87	N/A	
Supply Path - Mid Station	Compressor Station	New	Delaware	N/A	75.40-79.50	PA to Wright Pipeline Segment (New York Portion)
Supply Path - Tail Station	Compressor Station	New	Schoharie	N/A	124.80-129.40	PA to Wright Pipeline Segment (New York Portion)
Market Path - Head Station	Compressor Station	New	Schoharie	N/A	0.10-2.10	Wright to Dracut Pipeline Segment (New York Portion)
Market Path - Mid Station 1	Compressor Station	New	Columbia	N/A	41.20-45.30	Wright to Dracut Pipeline Segment (New York Portion)
IGT-Constitution Bi-Directional Meter	Meter Station	New	Schoharie	N/A	0.03	Wright to Dracut Pipeline Segment (New York Portion)

TABLE 1.0-1
SUMMARY OF NED PROJECT FACILITIES

Facility Name	Facility Type	New/ Modified	County	Length (miles)[3]	Nearest MP[4]	Associated Pipeline Segment[5]
NED Check	Meter Station	New	Schoharie	N/A	0.12	Wright to Dracut Pipeline Segment (New York Portion)
NED/200 Line Bi-Directional OPP & Check	Meter Station	New	Schoharie	N/A	0.14	Wright to Dracut Pipeline Segment (New York Portion)
New York Subtotal				**145.15**		
Massachusetts						
Wright to Dracut (Massachusetts Portion)	Pipeline	New	Berkshire	26.37	N/A	N/A
			Hampshire	5.57	N/A	
			Franklin	37.93	N/A	
			Worcester	20.28	N/A	
			Middlesex	36.96	N/A	
Pittsfield Lateral	Pipeline	New	Berkshire	1.77	N/A	N/A
North Worcester Lateral	Pipeline	New	Worcester	14.13	N/A	N/A
Fitchburg Lateral Extension	Pipeline	New	Middlesex	1.26	N/A	N/A
			Worcester	3.70	N/A	
West Nashua Lateral	Pipeline	New	Middlesex	3.56	N/A	N/A
Lynnfield Lateral	Pipeline	New	Essex	8.64	N/A	N/A
			Middlesex	7.98	N/A	
Haverhill Lateral	Pipeline	New	Essex	4.84	N/A	N/A
Market Path - Mid Station 2	Compressor Station	New	Franklin	N/A	93.30-97.30	Wright to Dracut Pipeline Segment (Massachusetts Portion)
Market Path - Mid Station 3	Compressor Station	New	Middlesex	N/A	146.10-150.70	Wright to Dracut Pipeline Segment (Massachusetts Portion)

TABLE 1.0-1
SUMMARY OF NED PROJECT FACILITIES

Facility Name	Facility Type	New/ Modified	County	Length (miles)[3]	Nearest MP[4]	Associated Pipeline Segment[5]
Market Path - Tail Station	Compressor Station	New	Middlesex	N/A	173.10-175.40	Wright to Dracut Pipeline Segment (Massachusetts Portion)
Dalton	Meter Station	New	Berkshire	N/A	66.88	Wright to Dracut Pipeline Segment (Massachusetts Portion)
West Greenfield	Meter Station	New	Franklin	N/A	95.37	Wright to Dracut Pipeline Segment (Massachusetts Portion)
Gardner	Meter Station	New	Worcester	N/A	132.02	Wright to Dracut Pipeline Segment (Massachusetts Portion)
200-2 Check	Meter Station	New	Middlesex	N/A	173.65	Wright to Dracut Pipeline Segment (Massachusetts Portion)
Maritimes	Meter Station	New	Middlesex	N/A	176.08	Wright to Dracut Pipeline Segment (Massachusetts Portion)
North Adams Check	Meter Station	New	Berkshire	N/A	1.77	Pittsfield Lateral
Fitchburg Lateral Check	Meter Station	New	Worcester	N/A	4.97	Fitchburg Lateral Extension
North Worcester	Meter Station	New	Worcester	N/A	14.13	North Worcester Lateral
Haverhill Check	Meter Station	New	Essex	N/A	6.99	Haverhill Lateral
200-1 Check	Meter Station	New	Essex	N/A	16.62	Lynnfield Lateral
North Adams Custody (20103)[1]	Meter Station	Modified	Berkshire	N/A	N/A	Existing TGP Line 256A
Longmeadow[1]	Meter Station	New	Hampden	N/A	N/A	Existing TGP 200 Line

TABLE 1.0-1
SUMMARY OF NED PROJECT FACILITIES

Facility Name	Facility Type	New/ Modified	County	Length (miles)[3]	Nearest MP[4]	Associated Pipeline Segment[5]
Lawrence (20121)[1]	Meter Station	Modified	Essex	N/A	N/A	Existing TGP Line 270B
Granite/Pleasant St. (20206)[1, 2]	Meter Station	Flow change	Essex	N/A	N/A	Existing TGP Line 273B
Everett[1]	Meter Station	New	Middlesex	N/A	N/A	Existing TGP Line 270C
Massachusetts Subtotal				**173.00**		
Connecticut						
Stamford Loop	Pipeline	New	Fairfield	1.51	N/A	N/A
300 Line CT Loop	Pipeline	New	Hartford	14.57	N/A	N/A
Stamford (20124)	Meter Station	Modified	Fairfield	N/A	1.51	Stamford Loop
Long Ridge (20434)[1]	Meter Station	Modified	Fairfield	N/A	N/A	Existing TGP Line 339A
New Britain (20129)[1]	Meter Station	Modified	Hartford	N/A	N/A	Existing TGP Line 350A
Connecticut Subtotal				**16.08**		
New Hampshire						
West Nashua Lateral	Pipeline	New	Hillsborough	8.38	N/A	N/A
Haverhill Lateral	Pipeline	New	Rockingham	2.15	N/A	N/A
West Nashua	Meter Station	New	Hillsborough	N/A	11.88	West Nashua Lateral
New Hampshire Subtotal				**10.53**		
Rhode Island						
Cranston (20750)[1, 2]	Meter Station	Flow change	Providence	N/A	N/A	Existing TGP Line 265E
Rhode Island Subtotal				**N/A**		
Project Total				**416.60**		

TABLE 1.0-1
SUMMARY OF NED PROJECT FACILITIES

Facility Name	Facility Type	New/ Modified	County	Length (miles)[3]	Nearest MP[4]	Associated Pipeline Segment[5]

[1] Mileposts for these facilities are not provided because these facilities are located along other pipeline segments of Tennessee's existing system that are not proposed to be modified as part of this Project.

[2] Although capacity at these two identified existing meter stations will be increased as a result of the Project, no modifications to the existing station facilities or land disturbance will be required. Tennessee is evaluating whether there will be increased flow at other existing meter stations and will provide that information in a subsequent filing of the Environmental Report ("ER").

[3] N/A-Not Applicable for aboveground facilities (compressor stations and meter stations). Pipeline length applies only to the proposed pipeline facilities as reflected in the attached detailed topographic and aerial photography maps included with this Resource Report 1. Addends may not exactly total due to rounding.

[4] N/A-Not Applicable for proposed pipeline facilities. The nearest mileposts are provided for the existing compressor station and the existing and new meter stations. For new compressor stations, the mileposts provided reflect an area where Tennessee is evaluating potential sites along the associated pipeline segment.

[5] N/A-Not Applicable for proposed pipelines. This column indicates the associated pipeline segment for each aboveground facility (compressor stations and meter stations).

1.1 PROPOSED FACILITIES

1.1.1 Purpose and Need

Tennessee proposes to construct, install, and operate the Project facilities to meet the growing energy needs in the Northeast and, more specifically, New England. The Project, as described further herein, is a major new pipeline project that consists of (1) approximately 167 miles of new and co-located pipeline and two pipeline looping segments on Tennessee's existing 300 Line in Pennsylvania, and compression facilities designed to receive gas from Tennessee's 300 Line for deliveries to Tennessee's existing 200 Line system and/or Market Path Component of the NED Project, as defined below, near Wright, New York, Iroquois Gas Transmission System, LP, and/or the Constitution Pipeline Project (may be referred to as the "Supply Path Component" of the NED Project), and (2) approximately 177 miles of new and co-located pipeline facilities extending from Wright, New York to an interconnect with the Joint Facilities of Maritimes & Northeast Pipeline System and Portland Natural Gas Transmission System ("Joint Facilities") at Dracut, Massachusetts and Tennessee's existing 200 Line near Dracut, Massachusetts (may be referred to as the "Market Path Component" of the NED Project). In addition, the Project includes the construction of eight new compressor stations, modifications at an existing compressor station, and approximately 73 miles of market delivery laterals and pipeline looping segments located in the states of Pennsylvania, New York, Massachusetts, Connecticut, and New Hampshire. Additionally, the Project includes construction of 16 new meter stations and modifications to existing meter stations throughout the Project area.

Upon completion, the Project will provide up to 2.2 Bcf/d of additional natural gas transportation capacity to meet the growing energy needs in the Northeast U.S., particularly in New England. This includes needs of local distribution companies ("LDCs"), gas-fired power generators, industrial plants, and other New England consumers. Tennessee has reached commercial agreement, subject to the customary approvals, for approximately 500,000 dekatherms per day ("Dth/d) of long-term firm transportation capacity on the Market Path Component of the proposed NED Project with The Berkshire Gas Company,

Columbia Gas of Massachusetts, Connecticut Natural Gas Corporation, Liberty Utilities (EnergyNorth Natural Gas) Corporation, National Grid, Southern Connecticut Gas Corporation, City of Westfield Gas and Electric Light Department, and two other LDCs, which demonstrates the market need for the Project capacity. Negotiations continue with additional Project Shippers on both the Supply Path and Market Path Components of the Project. This Project and its in-service date of November 2018 are supported by the shippers committed to the Project's capacity.

Multiple studies have concluded that additional pipeline infrastructure is needed in the region to serve increasing demand from LDCs and the power sector.[5] As a result of the fact that current natural gas transportation infrastructure is inadequate to meet the growing demand in the New England region, gas prices in New England are the highest in the U.S.[6] Limited natural gas transportation infrastructure also has led to extremely high electricity prices in the Northeast U.S., and threatens the reliability of the region's electric grid.[7] In fact, National Grid recently announced an increase in the electric rates they will charge their customers, by an average of 37 percent, this winter 2014-15 due to "continued constraints on the natural gas pipelines serving the region, which decrease natural gas availability at times of peak demand, causing some generators to buy gas on the spot market at higher prices, switch over to alternate fuels or not run at all."[8] Additional natural gas infrastructure may benefit the region in the form of lower energy costs and enhanced reliability to both the gas transmission system and the power grid, while also reducing the region's reliance on coal and oil-fired power plants with the added benefit of reducing greenhouse gas emissions. A recent study by the Interstate Natural Gas Association of America ("INGAA") Foundation and ICF International predicted that 6.0 Bcf/d of new natural gas pipeline capacity will be needed in the Northeast U.S. by 2020, and 10.1 Bcf/d of capacity will be needed by 2035.[9]

The New England region as a whole will benefit from the Project as it will enable New England to sustain its electric grid and lower energy costs to compete on a more level economic playing field with other regions of the nation with access to low-cost gas. As part of Tennessee's fully integrated natural gas pipeline transportation system, the Project will provide incremental access to diverse and economic supplies of natural gas to customers in the New England region. As demand for natural gas in New

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[5] Current natural gas transportation infrastructure is inadequate to meet the growing demand in the New England region. *See, e.g.,* U.S. Dept. of Energy, Quadrennial Energy Review Meeting, Statement of Gordon van Welie, President and Chief Executive Officer of ISO New England, at pp. 4-5 (Apr. 21, 2014), available at www.iso-ne.com/pubs/pubcomm/pres_spchs/2014/van_welie_statement_4-21-14.pdf; U.S. Dept. of Energy, Energy Information Administration, High Prices Show Stresses in New England Natural Gas Delivery System at 1 (Feb. 7, 2014), available at www.eia.gov/naturalgas/issuesandtrends/deliverysystem/2013/pdf/newengland_natgas.pdf. *Id*. at 8; *see also* U.S. Dept. of Energy, Energy Information Administration, Natural Gas Explained: Natural Gas Prices (Jun. 29, 2010), available at www.eia.gov/energyexplained/index.cfm?page=natural_gas_prices.

[6] See ISO New England, 2013 Wholesale Electricity Prices in New England Rose on Higher Natural Gas Prices: Pipeline Constraints and Higher Demand Pushed Up Prices for Both Natural Gas and Power at 1 (Mar. 18, 2014), available at http://www.iso-ne.com/nwsiss/pr/2014/2013_price%20release_03182014_final.pdf.

[7] *Id*. at 2. *See also* Massachusetts Office of The Attorney General, *Overview of Electricity & Natural Gas Rates*, available at http://www.mass.gov/ago/doing-business-in-massachusetts/energy-and-utilities/energy-rates-and-billing/electric-and-gas-rates.html.

[8] National Grid, National Grid Files for Winter Rates in Massachusetts (Sept. 24, 2014), available at https://www.nationalgridus.com/aboutus/a3-1_news2.asp?document=8764.

[9] The INGAA Foundation, North American Midstream Infrastructure through 2035: Capitalizing on Our Energy Abundance at 12 (Mar. 18, 2014), available at http://www.ingaa.org/File.aspx?id=21498.

England increases, Tennessee's LDC Project Shippers have expressed the need for additional firm transportation capacity to serve their growing residential, commercial, industrial, and power generation markets.

Construction of the Project, therefore, will help to alleviate the natural gas pipeline capacity constraint in New England by increasing capacity in high-demand markets in New England. The Project will serve the emergent need for significant natural gas transportation capacity into New England by delivering sufficient incremental supplies that will, based upon basic market forces of supply and demand, put considerable downward pressure on energy commodity prices which are among the highest in the U.S. This will assure greater reliability and fuel certainty in the electric generation sector via the expanded natural gas pipeline transportation infrastructure. The proposed interconnection with the Joint Facilities, together with the anticipated reversal of the primary flow direction of the Joint Facilities and Maritimes & Northeast Pipeline, will potentially enable the Project to access more markets in the region, including those in New Hampshire and Maine, the Atlantic Canada region, as well as markets on Algonquin Gas Transmission's ("AGT") system through its HubLine Pipeline. Additionally, the Project significantly increases capacity via a backhaul on Tennessee's existing 200 Line system and will increase deliverability at an important supply feed to the Algonquin Gas Transmission via an existing Tennessee-Algonquin interconnect at Mendon, Massachusetts.

A portion of the Market Path Component facilities are proposed to be co-located with existing utility corridors other than Tennessee's existing ROW through the Commonwealth of Massachusetts. Tennessee's existing system is located in densely populated and developed parts of Connecticut and Massachusetts. When Tennessee evaluated the market need in New England, and the scope of facilities that would be required to provide the infrastructure that New England needs to reduce its high energy costs and enhance electric reliability, Tennessee conducted extensive evaluation of options to: (1) loop the pipeline along its existing 200 Line pipeline corridor in southern Massachusetts; or (2) construct a new pipeline along a route across northern Massachusetts, utilizing existing utility corridors where feasible. An evaluation of the alternatives that Tennessee is considering is set forth in Resource Report 10 of this filing. Based on an evaluation that includes environmental and landowner impacts, quickest time-to-market gas delivery, constructability, and many other factors, Tennessee has proposed a northern route for its Project. Tennessee believes that the Project would provide the transformative solution that New England needs to reduce energy costs, enhance electric reliability and stimulate economic growth for the New England region. The Project will provide New England with direct access to low-cost gas supplies on the large scale necessary to significantly lower energy costs to the region's homes and businesses. Tennessee's proposed route for the Project would disturb significantly fewer stakeholders and result in lower costs to consumers than it would have if Tennessee were to expand only along its existing 200 Line system corridor. Additionally, the northern route will provide economic service to several geographic areas in northern Massachusetts and southern New Hampshire that are not currently served by an interstate pipeline.

In summary, the purpose of the Project, to create new natural gas transportation capacity to meet the growing energy needs in the Northeast U.S., particularly New England, is clear. The new capacity created by the Project will help reduce natural gas costs for homes and businesses in the region, lower electricity prices, increase the reliability of the electric grid and stimulate economic growth. The Project will also have ancillary environmental benefits by reducing the region's reliance on greenhouse gas emitting coal and oil-fired power plants.

The Public Convenience and Necessity section of the certificate application for the Project will include further discussion of the purpose and need for the Project. The certificate application for the Project, including a final version of this Resource Report 1, is anticipated to be submitted to the Commission in September 2015.

1.1.2 Location and Description of Facilities

The proposed Project includes two components: (1) the Supply Path Component of the Project which is comprised of the proposed Project facilities from Troy, Pennsylvania, to Wright, New York, and (2) the Market Path Component of the Project, which is comprised of the proposed Project facilities from Wright, New York, to Dracut, Massachusetts. A summary of the proposed facilities for the Project is provided in Table 1.0-1.

The Project facilities are described geographically in a general west-to-east direction and by category. Milepost ("MP") notations are used throughout this filing to identify resources and facilities along the proposed routes for the pipeline looping segments, co-located pipeline segments, and new pipeline segments and are included on the aerial photography maps provided with this Resource Report 1. Milepost designations begin at 0.00 for each pipeline looping segment and the new pipeline segment that begins in Pennsylvania and ends at Wright, New York as part of the Supply Path Component of the Project. MPs designations begin again at 0.00 in Wright, New York and end at Dracut, Massachusetts for the Wright to Dracut Pipeline Segment that is part of the Market Path Component of the Project, including both the co-located pipeline segment and the new pipeline segment. Each pipeline lateral in Massachusetts, Connecticut and New Hampshire also begin at MP 0.00 for reference. The pipeline looping segments have been assigned geographical designations by Tennessee to provide for easy identification. The Project facilities are summarized in Table 1.0-1. To the extent practicable, the existing 200 and 300 Line pipeline will be referred to as the "existing pipeline," "200 Line," or "300 Line" while the proposed pipeline segments will be discussed using the assigned geographic designations identified in Table 1.0-1.

Attachment 1a provides an overview map of the proposed Project. Attachment 1a also provides 11 x 17-inch U.S. Geological Survey ("USGS") topographic mapping of the pipeline (pipeline looping segments, co-located pipeline segments and new pipeline segments) and specific locations for the existing compressor and meter station locations that are proposed to be modified, as well as the general locations for the proposed new compressor and meter stations. Tennessee is also submitting detailed aerial photographic maps for the properties along the proposed route for the NED Project, with the proposed pipeline facilities and all major aboveground facilities superimposed over the images, in conformance with Section 380.12(c)(3) of the Commission's regulations, 18 C.F.R. § 380.12(c)(3) (2014). On the attached USGS topographic mapping and aerial photographic maps Tennessee has included a shaded band centered over the proposed pipeline routes within which the proposed new compressor stations will be located in the counties/states identified in Table 1.0-1.[10] The specific locations for the new compressor

[10] Each of the aerial photographic maps includes a highlighted band reflecting the flown image boundary. This band generally follows the proposed pipeline route as set forth in this draft Resource Report 1. Several of the aerial photographic maps, however, reflect a deviation of the flown image boundary from the proposed pipeline route resulting from route deviations that have been made since the proposed pipeline route was originally flown in May 2014. Tennessee intends to re-fly the entirety of the currently proposed pipeline route and include that information in the alignment sheet mapping to be included in a subsequent filing of the ER.

stations have not yet been identified, but will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the Environmental Report ("ER"). At that time, Tennessee will also include location-specific plot plans for each new compressor station.

1.1.2.1 Pipeline Facilities

Initial route planning was selected through desktop analysis of environmental resources and the potential impacts to the resources crossed by the Project. The desktop analysis was supported by field and aerial reconnaissance. Co-location of the proposed route with existing linear infrastructure was a primary consideration during the initial phases of routing and to the extent practicable avoidance of sensitive areas. Areas along the Project routes that parallel existing infrastructure (either pipeline looping segments or co-located facilities) is provided in Table 1.1-2. Areas evaluated for the location of looping or co-locating proposed pipeline segments with existing facilities were based on the identification of existing Tennessee pipelines and other known pipelines within 25 feet of the proposed pipeline segments and existing powerline ROWs within 50 feet of the proposed pipeline segments.

1.1.2.1.1 Pennsylvania

The proposed Project pipeline facilities in Pennsylvania include two pipeline looping segments and new mainline pipeline. The pipeline looping in Pennsylvania will consist of two separate pipeline looping segments of 36-inch-diameter pipeline totaling approximately 32 miles in length and installed generally parallel to Tennessee's existing 300 Line, referred to as Loop 317-3 (approximately 22.92 miles in length) and Loop 319-3 (approximately 9.05 miles in length). The pipeline looping segments will be located within or directly adjacent to Tennessee's existing pipeline ROW, to the extent practicable, feasible and in compliance with existing law. For both pipeline looping segments, the pipeline will be designed for a maximum allowable operating pressure ("MAOP") of 1,200 pounds per square inch ("psig") and a maximum operating pressure ("MOP") of 1,170 psig. In addition to the pipeline looping segments in Pennsylvania, approximately 40 miles of new 30-inch-diameter pipeline will be installed extending from Tennessee's existing 300 Line pipeline toward Wright, New York (referred to as the PA to Wright Pipeline Segment). A portion of the PA to Wright Pipeline Segment will be located in Pennsylvania and a portion will be located in New York (as discussed below). A portion of the 30-inch-diameter pipeline in Pennsylvania will be largely co-located with the pipeline facilities proposed as part of the Constitution Pipeline Project in Docket No. CP13-499-000.[11] The certificate application for the Constitution Pipeline Project is pending before the Commission, so the exact location of this planned pipeline and construction start is not currently known. The final location of that project's proposed pipeline facilities and the construction start date for those facilities is unknown. Tennessee will determine the final location of this segment of the 30-inch-diameter pipeline that would be co-located with the Constitution Pipeline Project

[11] Information contained within this Resource Report 1 related to the Constitution Pipeline Project was based on the "*Draft Environmental Impact Statement: Constitution Pipeline and Wright Interconnect Projects,*" FERC EIS No. 0249D, Docket Numbers CP13-499-000, CP13-502-000, and PF12-9-000 ("Constitution DEIS"). Tennessee notes that the Commission, on October 24, 2014, issued the Final Environmental Impact Statement for the Constitution Pipeline Project "*Final Environmental Impact Statement: Constitution Pipeline and Wright Interconnect Projects,"* FERC EIS No. 0249F, Docket Numbers CP13-499-000, CP13-502-000, and PF12-9-000 ("Constitution FEIS"). At the time the Constitution FEIS was issued by the Commission, Tennessee was in the process of finalizing the drafts of Resource Reports 1 and 10 for filing with the Commission on November 5, 2014 and has not had an opportunity to finalize its review of the Constitution FEIS and incorporate any revisions to its proposed route based on that review. Tennessee will determine if any revisions to its proposed route are necessary after its review of the Constitution FEIS and incorporate any such revisions in subsequent filings of the ER.

facilities after the Commission's decision relative to the Constitution Pipeline Project certificate application. Tennessee will design the 30-inch-diameter pipeline in Pennsylvania for a MAOP and MOP of 1,460 psig. The Pennsylvania pipeline facilities are described in further detail in Table 1.0-1. Additionally, a summary of the individual pipeline facilities and MP designations within each township, county, and state for each pipeline facility is provided in Table 1.1-1.

1.1.2.1.2 New York

The proposed Project pipeline facilities in New York consist of approximately 95 miles of new 30-inch-diameter pipeline, also planned to be generally co-located with the proposed Constitution Pipeline Project for a majority of its length, extending to Wright, New York (referred to as the PA to Wright Pipeline Segment). A portion of the PA to Wright Pipeline Segment will be located in Pennsylvania and a portion will be located in New York (as discussed above), as well as 50 miles of new 36-inch-diameter pipeline generally co-located, with Tennessee's existing 200 Line pipeline (referred to as the Wright to Dracut Pipeline Segment). A portion of the Wright to Dracut Pipeline Segment will be located in New York and a portion will be located in Massachusetts (as discussed below). The 50 miles of 36-inch-diameter pipe will be located within or directly adjacent to Tennessee's existing pipeline ROW, to the extent practicable, feasible and in compliance with existing law. The New York pipeline facilities will be designed for a MAOP and MOP of 1,460 psig, except for up to approximately 10.2 miles of pipe leaving the Supply Path Tail Station which is designed for 1,600 psig.

The New York pipeline facilities are described in further detail in Table 1.0-1. Additionally, a summary of the individual pipeline facilities and MP designations within each township, county, and state for each pipeline segment are provided in Table 1.1-1.

1.1.2.1.3 Massachusetts

The proposed Project mainline pipeline facilities in Massachusetts consist of approximately 127 miles of 36-inch-diameter pipeline, beginning at the New York/Massachusetts border and extending to Dracut, Massachusetts (referred to as the Wright to Dracut Pipeline Segment). A portion of the Wright to Dracut Pipeline Segment will be located in New York and a portion will be located in Massachusetts (as discussed above). Approximately two miles of this new proposed mainline pipeline (beginning at the New York/Massachusetts border) will be generally co-located with Tennessee's existing 200 Line pipeline to the extent practicable, feasible and in compliance with existing law. The remainder of the proposed mainline pipeline facilities in Massachusetts will be new pipeline. The entirety of the proposed mainline pipeline facilities in Massachusetts (127 miles of 36-inch-diameter pipeline) will be designed for a MAOP and MOP of 1,460 psig.

Additionally, Tennessee is proposing six separate new laterals in Massachusetts as part of the Project:

- The 12-inch diameter Pittsfield Lateral will be 1.77 miles in length with a MAOP and MOP of 1,460 psig.
- The 12-inch diameter North Worcester Lateral will be 14.13 miles in length with a MAOP of 1,460 psig and an MOP of 750 psig.
- The 12-inch diameter Fitchburg Lateral Extension will be 4.96 miles in length with a MAOP and MOP of 1,460 psig. This lateral will be an extension of Tennessee's existing Fitchburg Lateral which will connect to the Wright to Dracut Pipeline Segment.

- The 12-inch diameter West Nashua Lateral will be approximately 11.94 miles in total length that will extend from Massachusetts north into New Hampshire with a MAOP and MOP of 1,460 psig. Approximately 3.56 miles of the total 11.94 miles will be located in Massachusetts.
- The 20-inch diameter Lynnfield Lateral will be 16.62 miles in length with a MAOP and MOP of 1,460 psig.
- The 16-inch diameter Haverhill Lateral will be approximately 6.99 miles in length that will extend from Massachusetts through New Hampshire with a MAOP and MOP of 1,460 psig. This lateral will be located within or directly adjacent to Tennessee's existing Haverhill Lateral pipeline ROW, to the extent practicable, feasible, and in compliance with existing law. Approximately 4.84 miles of the 6.99 miles will be located in Massachusetts.

The Massachusetts pipeline facilities are described in further detail in Table 1.0-1 above. Additionally, a summary of the individual pipeline facilities and MP designations within each township, county, and state for each pipeline facility are provided in Table 1.1-1.

1.1.2.1.4 Connecticut

The proposed Project pipeline facilities in Connecticut include the Stamford Loop and the 300 Line Connecticut Loop. The Stamford Loop consists of approximately 1.51 miles of 12-inch-diameter pipeline, generally paralleling Tennessee's existing Stamford Delivery Line to the extent practicable, feasible, and in compliance with existing law. This proposed loop will be designed for an MAOP of 1,460 psig and MOP of 719 psig. The 300 Line Connecticut Loop consists of approximately 14.57 miles of new 24-inch-diameter pipeline located within or directly adjacent to Tennessee's existing 300 Line's ROW. This proposed loop segment will be designed for a MAOP and MOP of 800 psig.

The Connecticut pipeline facilities are described in further detail in Table 1.0-1. Additionally, a summary of the individual pipeline facilities and MP designations within each township, county, and state for each pipeline facility are provided in Table 1.1-1.

1.1.2.1.5 New Hampshire

The proposed Project pipeline facilities in New Hampshire include the remaining lengths of the West Nashua Lateral and the Haverhill Lateral (described above in the discussion of Massachusetts pipeline facilities). Approximately 8.38 miles of the 11.94-mile West Nashua Lateral and approximately 2.15 miles of the 6.99-mile Haverhill Lateral will be located in New Hampshire. The remaining portions of these laterals will be located within Massachusetts. The MAOP and MOP of these pipeline laterals will be 1,460 psig.

TABLE 1.1-1
PROPOSED PIPELINE FACILITIES FOR THE PROJECT

Facility ID	Diameter (inches)	Milepost[1]		Length (miles)[2]	Township	County
		Begin	End			
Pennsylvania						
Loop 317-3	36	0.00	0.58	0.58	Troy	Bradford
		0.58	8.52	7.94	Granville	Bradford

TABLE 1.1-1
PROPOSED PIPELINE FACILITIES FOR THE PROJECT

Facility ID	Diameter (inches)	Milepost[1]		Length (miles)[2]	Township	County
		Begin	End			
		8.52	10.10	1.59	W Burlington	Bradford
		10.10	14.28	4.18	Burlington	Bradford
		14.28	16.58	2.30	Towanda	Bradford
		16.58	20.14	3.55	Monroe	Bradford
		20.14	22.92	2.79	Asylum	Bradford
Loop 319-3	36	0.00	0.19	0.19	Wyalusing	Bradford
		0.19	4.81	4.62	Tuscarora	Bradford
		4.81	9.05	4.24	Auburn	Susquehanna
PA to Wright Pipeline Segment (Pennsylvania Portion)	30	0.00	4.16	4.16	Auburn	Susquehanna
		4.16	10.11	5.95	Dimock	Susquehanna
		10.11	17.78	7.67	Bridgewater	Susquehanna
		17.78	25.78	8.00	New Milford	Susquehanna
		25.78	30.21	4.42	Jackson	Susquehanna
		30.21	33.59	3.38	Thompson	Susquehanna
		33.59	39.87	6.28	Harmony	Susquehanna
Pennsylvania Subtotal				**71.84**		
New York						
PA to Wright Pipeline Segment (New York Portion)	30	39.87	56.04	16.17	Sanford	Broome
		56.04	58.48	2.44	Afton	Chenango
		58.48	63.04	4.56	Masonville	Delaware
		63.04	74.70	11.66	Sidney	Delaware
		74.70	84.12	9.43	Franklin	Delaware
		84.12	99.52	15.40	Davenport	Delaware
		99.52	104.08	4.55	Harpersfield	Delaware
		104.08	104.43	0.35	Summit	Schoharie
		104.43	104.62	0.19	Jefferson	Schoharie
		104.62	106.45	1.82	Summit	Schoharie
		106.45	107.04	0.60	Jefferson	Schoharie
		107.04	107.49	0.45	Summit	Schoharie
		107.49	109.48	1.99	Jefferson	Schoharie
		109.48	115.56	6.08	Summit	Schoharie

TABLE 1.1-1
PROPOSED PIPELINE FACILITIES FOR THE PROJECT

Facility ID	Diameter (inches)	Milepost[1]		Length (miles)[2]	Township	County
		Begin	End			
		115.56	120.69	5.13	Richmondville	Schoharie
		120.69	122.87	2.18	Cobleskill	Schoharie
		122.87	128.18	5.31	Middleburgh	Schoharie
		128.18	133.05	4.87	Schoharie	Schoharie
		133.05	135.00	1.95	Wright	Schoharie
Wright to Dracut Pipeline Segment (New York Portion)	36	0.00	3.88	3.88	Wright	Schoharie
		3.88	8.85	4.96	Knox	Albany
		8.85	13.36	4.52	Berne	Albany
		13.36	20.65	7.29	New Scotland	Albany
		20.65	28.06	7.41	Bethlehem	Albany
		28.06	36.21	8.15	Schodack	Rensselaer
		36.21	39.16	2.94	Nassau	Rensselaer
		39.16	42.20	3.04	Chatham	Columbia
		42.20	46.79	4.59	New Lebanon	Columbia
		46.79	50.03	3.24	Canaan	Columbia
New York Subtotal				**145.15**		
Massachusetts						
Wright to Dracut Pipeline Segment (Massachusetts Portion)	36	50.03	54.51	4.48	Richmond	Berkshire
		54.51	60.06	5.55	Lenox	Berkshire
		60.06	60.39	0.33	Washington	Berkshire
		60.39	61.78	1.39	Pittsfield	Berkshire
		61.78	65.86	4.08	Dalton	Berkshire
		65.86	66.20	0.35	Hinsdale	Berkshire
		66.20	67.75	1.55	Dalton	Berkshire
		67.75	70.80	3.05	Hinsdale	Berkshire
		70.80	71.68	0.88	Peru	Berkshire
		71.68	76.39	4.71	Windsor	Berkshire
		76.39	81.96	5.57	Plainfield	Hampshire
		81.96	89.06	7.10	Ashfield	Franklin
		89.06	93.23	4.17	Conway	Franklin
		93.23	98.97	5.73	Deerfield	Franklin

TABLE 1.1-1
PROPOSED PIPELINE FACILITIES FOR THE PROJECT

Facility ID	Diameter (inches)	Milepost[1]		Length (miles)[2]	Township	County
		Begin	End			
		98.97	103.52	4.55	Montague	Franklin
		103.52	105.73	2.21	Erving	Franklin
		105.73	106.97	1.24	Northfield	Franklin
		106.97	107.56	0.58	Erving	Franklin
		107.56	110.34	2.78	Northfield	Franklin
Wright to Dracut Pipeline Segment (Massachusetts Portion) (con't.)	36	110.34	111.87	1.53	Erving	Franklin
		111.87	115.33	3.46	Warwick	Franklin
		115.33	119.91	4.58	Orange	Franklin
		119.91	123.58	3.67	Athol	Worcester
		123.58	125.82	2.24	Royalston	Worcester
		125.82	132.83	7.01	Winchendon	Worcester
		132.83	140.20	7.36	Ashburnham	Worcester
		140.20	145.10	4.91	Ashby	Middlesex
		145.10	152.50	7.40	Townsend	Middlesex
		152.50	156.91	4.41	Pepperell	Middlesex
		156.91	158.92	2.00	Groton	Middlesex
		158.92	164.02	5.10	Dunstable	Middlesex
		164.02	168.56	4.54	Tyngsborough	Middlesex
		168.56	168.76	0.20	Dracut	Middlesex
		168.76	168.94	0.18	Tyngsborough	Middlesex
		168.94	177.16	8.22	Dracut	Middlesex
Pittsfield Lateral	12	0.00	0.72	0.72	Dalton	Berkshire
		0.72	1.78	1.05	Pittsfield	Berkshire
North Worcester Lateral	12	0.00	2.60	2.60	Bolton	Worcester
		2.60	6.81	4.21	Berlin	Worcester
		6.81	6.87	0.06	Northborough	Worcester
		6.87	7.15	0.28	Boylston	Worcester
		7.15	7.39	0.24	Northborough	Worcester
		7.39	13.47	6.08	Boylston	Worcester
		13.47	13.86	0.39	West Boylston	Worcester
		13.86	14.01	0.15	Shrewsbury	Worcester

TABLE 1.1-1
PROPOSED PIPELINE FACILITIES FOR THE PROJECT

Facility ID	Diameter (inches)	Milepost[1]		Length (miles)[2]	Township	County
		Begin	End			
		14.01	14.10	0.10	West Boylston	Worcester
		14.10	14.13	0.02	Worcester	Worcester
Fitchburg Lateral Extension	12	0.00	1.26	1.26	Townsend	Middlesex
		1.26	4.97	3.70	Lunenburg	Worcester
West Nashua Lateral	12	0.00	3.56	3.56	Pepperell	Middlesex
Lynnfield Lateral	20	0.00	0.93	0.93	Methuen	Essex
		0.93	5.43	4.50	Andover	Essex
		5.43	5.87	0.44	Tewksbury	Middlesex
		5.87	6.62	0.75	Andover	Essex
		6.62	7.14	0.52	Tewksbury	Middlesex
		7.14	8.06	0.93	Andover	Essex
		8.06	8.76	0.70	Tewksbury	Middlesex
		8.76	9.93	1.16	Andover	Essex
		9.93	12.70	2.77	Wilmington	Middlesex
		12.70	15.87	3.17	North Reading	Middlesex
		15.87	16.25	0.38	Reading	Middlesex
		16.25	16.62	0.37	Lynnfield	Essex
Haverhill Lateral	16	0.00	4.57	4.57	Methuen	Essex
		6.72	6.99	0.27	Methuen	Essex
Massachusetts Subtotal				**173.00**		
Connecticut						
Stamford Loop	12	0.00	1.51	1.51	Stamford	Fairfield
300 Line CT Loop	24	0.00	0.65	0.65	East Granby	Hartford
		0.65	3.62	2.97	Windsor	Hartford
		3.62	8.61	4.99	Bloomfield	Hartford
		8.61	8.74	0.13	Simsbury	Hartford
		8.74	10.49	1.75	Bloomfield	Hartford
		10.49	14.03	3.54	West Hartford	Hartford
		14.03	14.28	0.25	Farmington	Hartford
		14.28	14.57	0.29	West Hartford	Hartford

TABLE 1.1-1
PROPOSED PIPELINE FACILITIES FOR THE PROJECT

Facility ID	Diameter (inches)	Milepost[1]		Length (miles)[2]	Township	County
		Begin	End			
Connecticut Subtotal				**16.08**		
New Hampshire						
West Nashua Lateral	12	3.56	11.66	8.10	Hollis	Hillsborough
		11.66	11.88	0.28	Amherst	Hillsborough
Haverhill Lateral	16	4.57	6.72	2.15	Salem	Rockingham
New Hampshire Subtotal				**10.53**		
Project Total				**416.60**		

[1] Milepost designations are derived individually based on the current proposed start and end points of each pipeline facility.
[2] Addends may not exactly total due to rounding.

TABLE 1.1-2
AREAS OF PIPELINE LOOPING AND CO-LOCATION FOR THE PIPELINE FACILITIES

Facility ID	Co-Location Type	Owner/Operator	Milepost[1]		Length (miles)	Township	County	Width of Existing ROW (ft)[3]	Width of Existing ROW To Be Used During Construction (ft)[4]	Width of Existing ROW To Be Used During Operation (ft)[5]
			Begin	End						
Pennsylvania										
Loop-317-3	Pipeline	TGP	0.00	22.92	22.92	Troy, Granville, West Burlington, Burlington, Towanda, Monroe, Asylum	Bradford	75 - 150	40	25
Loop-319-3	Pipeline	TGP	0.00	9.05	9.05	Wyalusing, Tuscarora, Auburn	Bradford, Susquehanna	75 - 150	40	25
PA to Wright Pipeline Segment (Pennsylvania Portion)	Pipeline	TGP	0.00	0.60	0.60	Auburn	Susquehanna	150	40	25
	Powerline	Pennsylvania A Electric Co.	16.83	19.13	2.30	Bridgewater, New Milford	Susquehanna	TBD	15	0
	Powerline	Pennsylvania A Electric Co.	19.28	20.01	0.74	New Milford	Susquehanna	TBD	15	0
	Pipeline	Constitution[2]	23.14	23.43	0.29	New Milford	Susquehanna	50	20	0
	Powerline	Claverack Rural Electric Cooperative, Inc.	24.63	26.17	1.54	New Milford, Jackson	Susquehanna	TBD	15	0
	Powerline	Pennsylvania A Electric Co.	27.22	28.98	1.76	Jackson	Susquehanna	TBD	15	0
	Powerline	Pennsylvania A Electric Co.	29.95	30.14	0.18	Jackson	Susquehanna	TBD	15	0
	Pipeline	Constitution[2]	39.03	39.87	0.83	Harmony	Susquehanna	50	40	0
Pennsylvania Miles of Looping/Co-Location Subtotal					**40.21**					
New York										
PA to Wright Pipeline Segment (New York Portion)	Pipeline	Constitution[2]	39.87	50.11	10.25	Stanford	Broome	50	20	0
	Pipeline	Constitution[2]	63.60	123.63	60.03	Sydney, Franklin, Davenport, Harpersfield, Summit, Jefferson, Richmondville, Cobleskill, Middleburgh	Delaware, Schoharie	50	20	0
Wright to Dracut Pipeline Segment (New York Portion)	Pipeline	TGP	0.06	21.92	21.86	Wright, Knox, Berne, New Scotland, Bethlehem	Schoharie, Albany	100 - 150	40	25
	Pipeline	TGP	26.05	35.02	8.97	Bethlehem, Schodack	Albany, Rensselaer	100 - 150	40	25
	Pipeline	TGP	35.30	50.03	14.73	Schodack, Nassau, Chatham, New Lebanon, Canaan	Rensselaer, Columbia	100 - 150	40	25
New York Miles of Looping/Co-Location Subtotal					**115.84**					

TABLE 1.1-2
AREAS OF PIPELINE LOOPING AND CO-LOCATION FOR THE PIPELINE FACILITIES

Facility ID	Co-Location Type	Owner/Operator	Milepost[1]		Length (miles)	Township	County	Width of Existing ROW (ft)[3]	Width of Existing ROW To Be Used During Construction (ft)[4]	Width of Existing ROW To Be Used During Operation (ft)[5]
			Begin	End						
Massachusetts										
Wright to Dracut Pipeline Segment (Massachusetts Portion)	Pipeline	TGP	50.03	52.83	2.80	Richmond	Berkshire	90 - 115	40	25
	Powerline	Western Mass Electric	64.65	67.56	2.91	Pittsfield, Hinsdale, Dalton	Berkshire	TBD	15	0
	Powerline	Western Mass Electric	69.91	91.71	21.81	Hinsdale, Peru, Windsor, Plainfield, Ashfield, Conway	Berkshire, Franklin	TBD	15	0
	Powerline	Western Mass Electric	97.37	100.20	2.83	Deerfield, Montague	Franklin	TBD	15	0
	Powerline	Western Mass Electric	101.23	105.89	4.66	Montague, Erving, Northfield	Franklin	TBD	15	0
	Powerline	Western Mass Electric	106.74	108.64	1.91	Northfield, Erving	Franklin	TBD	15	0
	Powerline	New England Power	126.39	128.31	1.92	Winchendon	Worcester	TBD	15	0
	Powerline	New England Power	160.45	162.94	2.48	Dunstable	Middlesex	TBD	15	0
	Powerline	Massachusetts Electric	170.93	171.18	0.26	Dracut	Middlesex	TBD	15	0
	Powerline	Massachusetts Electric	171.79	176.99	5.20	Dracut	Middlesex	TBD	15	0
Lynnfield Lateral	Powerline	Massachusetts Electric	3.25	4.73	1.48	Andover	Essex	TBD	15	0
	Powerline	New England Power	10.77	10.98	0.21	Wilmington	Middlesex	TBD	15	0
	Powerline	New England Power	13.06	14.58	1.52	North Reading	Middlesex	TBD	15	0
	Powerline	New England Power	15.29	16.51	1.22	North Reading, Reading, Lynnfield	Middlesex, Essex	TBD	15	0
Haverhill Lateral	Pipeline	TGP	0.67	1.38	0.71	Methuen	Essex	30 - 50	25	25
	Pipeline	TGP	1.63	2.94	1.30	Methuen	Essex	30 - 50	25	25
	Pipeline	TGP	3.62	4.19	0.57	Methuen	Essex	30 - 50	25	25
	Pipeline	TGP	4.39	4.57	0.18	Methuen	Essex	30 - 50	25	25
	Pipeline	TGP	6.72	6.99	0.27	Methuen	Essex	30 - 50	25	25
Massachusetts Miles of Looping/Co-Location Subtotal					**54.24**					
Connecticut										
Stamford Loop	Pipeline	TGP	0.00	1.51	1.51	Stamford	Fairfield	30	25	25
300 Line CT Loop	Pipeline	TGP	0.00	0.06	0.06	East Granby	Hartford	30	40	25
300 Line CT Loop	Pipeline	TGP	0.46	2.75	2.29	East Granby, Windsor	Hartford	30	40	25
300 Line CT Loop	Pipeline	TGP	3.68	4.53	0.85	Bloomfield	Hartford	30	40	25

TABLE 1.1-2
AREAS OF PIPELINE LOOPING AND CO-LOCATION FOR THE PIPELINE FACILITIES

Facility ID	Co-Location Type	Owner/Operator	Milepost[1]		Length (miles)	Township	County	Width of Existing ROW (ft)[3]	Width of Existing ROW To Be Used During Construction (ft)[4]	Width of Existing ROW To Be Used During Operation (ft)[5]
			Begin	End						
300 Line CT Loop	Pipeline	TGP	5.02	9.31	4.29	Bloomfield	Hartford	30	40	25
300 Line CT Loop	Pipeline	TGP	10.40	14.57	4.18	Bloomfield, West Hartford, Farmington	Hartford	30	40	25
Connecticut Miles of Looping/Co-Location Subtotal					**13.18**					
New Hampshire										
Haverhill Lateral	Pipeline	TGP	4.57	4.90	0.33	Salem	Rockingham	30 - 50	40	25
Haverhill Lateral	Pipeline	TGP	5.27	6.08	0.81	Salem	Rockingham	30 - 50	40	25
Haverhill Lateral	Pipeline	TGP	6.44	6.72	0.28	Salem	Rockingham	30 - 50	40	25
New Hampshire Miles of Looping/Co-Location Subtotal					**1.42**					
Total Project Miles of Looping/Co-Location Total					**224.84**					
% of Total Project Looping/Co-Location (416.60 miles)					**54%**					

[1] Milepost designations are derived individually based on the start and end points of each current proposed pipeline facility.

[2] Based on agreements to be negotiated with individual landowners, Tennessee proposes to be adjacent to or overlap with ROW for the proposed Constitution Pipeline Project. The location of the Constitution pipeline route is based upon the proposed route for that project as of February 2014 (as contained within the Constitution DEIS issued by the Commission in February 2014). As noted above, the Commission, on October 24, 2014, issued the Constitution FEIS. At the time the Constitution FEIS was issued by the Commission, Tennessee was in the process of finalizing the drafts of Resource Reports 1 and 10 for filing with the Commission on November 5, 2014 and has not had an opportunity to finalize its review of the Constitution FEIS and incorporate any revisions to its proposed route based on that review. Tennessee will determine if any revisions to its proposed route are necessary after its review of the Constitution FEIS and incorporate any such revisions in subsequent filings of the ER.

[3] TBD-To be Determined. Tennessee is in process of determining the widths of existing ROWs.

[4] Existing ROW widths anticipated to be used during construction of the Project facilities (these widths may vary as Tennessee obtains additional information about the use of existing ROWs for construction of the Project, and will be adjusted in a revised Resource Report 1 to be submitted in a subsequent filing of the ER):

Constitution: 20-50 ft

Powerlines: 15-50 ft

Existing TGP: 25-50 ft

[5] Existing ROW widths anticipated to be used for operations for the Project facilities (these widths may vary as Tennessee obtains additional information about the use of existing ROWs during operation of the Project facilities, and will be adjusted in a revised Resource Report 1 to be submitted in a subsequent filing of the ER).

Constitution: 0 ft

Powerlines: 0 ft

Existing TGP: 25 ft.

1.1.2.2 Aboveground Facilities

This section details information related to the associated aboveground facilities required for the Project. These facilities include new and modified compressor stations, new and modified meter stations, new MLVs, pig launchers/receivers and other pipeline appurtenances. Table 1.1-3 provides a summary, by location, of all new and modified compressor station facilities associated with the Project. Table 1.1-4 provides a summary, with location, of the new and modified meter stations. Table 1.1-5 provides a summary and location of all new appurtenant aboveground facilities including MLVs and internal inspection facilities (e.g., pig launchers and receivers).

The facility locations are shown in Attachment 1a to the extent that the locations have been identified at this time and will be included on full size aerial imagery alignments and 7.5-minute USGS topographic maps to be provided in a subsequent filing of this ER.

1.1.2.3 Compressor Stations

As part of the Project, Tennessee proposes to modify facilities at an existing compressor station, Station 319, located along Tennessee's existing 300 Line, as well as construct eight new compressor station. Compressor stations are facilities which aid in the transportation of natural gas. Compressor stations compress the natural gas, increase its pressure and provide energy to move the natural gas through the pipeline system. Compressor stations are placed along a pipeline route at varying intervals based on the diameter of the pipeline, the volume of gas to be moved, and the terrain.

The new compressor stations proposed for the Supply Path Component portion of the Project will provide Tennessee's system up to 92,000 horsepower. Additionally, the new compressor stations proposed for the Market Path Component of the Project will provide the system up to 403,000 horsepower. On the attached USGS topographic mapping and aerial photographic maps, Tennessee has included a shaded band centered over the proposed pipeline routes within which the proposed new compressor stations will be located in the counties/states identified in Table 1.0-1. Tennessee is still evaluating exact locations of the new compressor stations and will provide updated locations in a revised Resource Report 1 to be submitted in a subsequent filing of the ER. Table 1.1-3 provides further information on the proposed modifications to the existing compressor station and the addition of new compressor stations.

1.1.2.3.1 Pennsylvania

In Pennsylvania, Tennessee proposes to modify the existing Station 319, as well as add one new natural gas-powered compressor station. Proposed modifications to Station 319 include upgrades to its piping systems to accommodate the new 36-inch-diameter pipeline looping segments, re-staging of a centrifugal compressor, and adding blow down silencers. All modifications are proposed within the existing fence line of Station 319. Tennessee owns the property where Station 319 is located as well as the surrounding property (29.2 acres in total). The new compressor station, Supply Path Head Station, will be constructed in Susquehanna County. Tennessee proposes to install two Mars 100 turbines, designed for 32,000 horsepower at the compressor station, Attachment 1a provides a USGS topographic map excerpt of the locations of these facilities.

1.1.2.3.2 New York

Four new natural gas-powered compressor stations will be constructed in New York. The Supply Path Mid Station will be located in Delaware County, and will include one Titan 250 turbine, designed for 30,000 horsepower. The Supply Path Tail Station will be located in Schoharie County, and will include one Titan 250 turbine, designed for 30,000 horsepower. The Market Path Head Station is also proposed to be located in Schoharie County, which will include two Taurus compressors, designed for a total of 20,000 horsepower. The Market Path Mid Station 1 will be located in Columbia County and will include four Titan 250 turbines, designed for a total of 120,000 horsepower.

1.1.2.3.3 Massachusetts

Facilities in Massachusetts will include three new compressor stations. The Market Path Mid Station 2 will be located in Franklin County and will include four Titan 250 turbines, designed for a total of 120,000 horsepower. The Market Path Mid Station 3 will be located in Middlesex County and will also include four Titan 250 turbines, designed for a total of 120,000 horsepower. The Market Path Tail Station will also be located in Middlesex County and will be the Market Path Tail Station, which will include a 23,000 horsepower electrical unit. In Attachment 1a, Tennessee has included USGS topographic mapping and aerial photographic maps showing a shaded band centered over the proposed pipeline routes within which the proposed new compressor stations will be located in these counties.

TABLE 1.1-3
PROPOSED COMPRESSOR STATIONS FOR THE PROJECT

Facility Name	Nearest MP[1]	New Horsepower ("hp")	Area Required for Construction (acres)[2]	Area Required for Operation (acres)[3]	New / Modified	Township[4]	County	Associated Pipeline Segment[5]
Pennsylvania								
Station 319	0.00-0.20	N/A	10.80	0.00	Modified	Wyalusing	Bradford	Loop 319-3
Supply Path - Head Station	18.30-22.40	32,000	20.00	10.00	New	TBD	Susquehanna	PA to Wright Pipeline Segment (Pennsylvania Portion)
Pennsylvania Subtotals		**32,000**	**30.80**	**10.00**				
New York								
Supply Path - Mid Station	75.40-79.50	30,000	20.00	10.00	New	TBD	Delaware	PA to Wright Pipeline Segment (New York Portion)
Supply Path - Tail Station	124.80-129.40	30,000	20.00	10.00	New	TBD	Schoharie	
Market Path - Head Station	0.10-2.10	20,000	20.00	10.00	New	TBD	Schoharie	Wright to Dracut Pipeline Segment (New York Portion)
Market Path - Mid Station 1	41.20-45.30	120,000	20.00	10.00	New	TBD	Columbia	
New York Subtotals		**200,000**	**80.00**	**40.00**				

TABLE 1.1-3
PROPOSED COMPRESSOR STATIONS FOR THE PROJECT

Facility Name	Nearest MP[1]	New Horsepower ("hp")	Area Required for Construction (acres)[2]	Area Required for Operation (acres)[3]	New / Modified	Township[4]	County	Associated Pipeline Segment[5]
Massachusetts								
Market Path - Mid Station 2	93.30-97.30	120,000	20.00	10.00	New	TBD	Franklin	Wright to Dracut Pipeline Segment (Massachusetts Portion)
Market Path - Mid Station 3	146.10-150.70	120,000	20.00	10.00	New	TBD	Middlesex	
Market Path - Tail Station	173.10-175.40	23,000	20.00	10.00	New	TBD	Middlesex	
Massachusetts Subtotals		**263,000**	**60.00**	**30.00**				
Project Totals		**495,000**	**170.80**	**80.00**				

[1] For new compressor stations, the mileposts provided reflect a range of area where Tennessee is evaluating potential sites along the associated pipeline segment.

[2] The modified compressor station has been assumed to require the area of the existing fenced in facility (5.80 acres) and an additional five acres of temporary construction workspace. New compressor stations are assumed to require 20 acres of temporary construction workspace. Updated acreages will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

[3] Modifications at Station 319 will operate within the existing fenced facility boundaries and will not require additional permanent workspace for operational use. New compressor stations are assumed to require 10 acres for operation. Updated acreages will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

[4] TBD-To Be Determined.

[5] This column indicates the associated pipeline segment for each compressor station.

NOTE: New parcels purchased for new compressor station sites will vary based on available land.

1.1.2.4 Meter Stations

As part of the Project, Tennessee proposes to construct 16 new meter stations and modify five existing meter stations within New York, Massachusetts, Connecticut, and New Hampshire.[12] Meter stations are built for the purposes of measuring continuous natural gas flow entering and exiting a pipeline system. Meter stations also possess regulating components which regulate the pressure and delivery volumes of natural gas into and out of the pipeline system.

The construction and modification of custody transfer meters is to meet the specific needs of Project Shippers contracting for firm transportation service on the Project. Metering facilities will include the installation of tap, metering, regulation, heating, flow control, and overpressure protection, as necessary unless specified otherwise.

Table 1.1-4 provides further information on the proposed modifications to existing and new stations.

1.1.2.4.1 New York

New meter stations in New York will include the following:

- IGT-Constitution Bi-Directional Meter-Schoharie County, New York
- NED Check-Schoharie County, New York
- NED/200 Line Bi-Directional OPP and Check-Schoharie County, New York

1.1.2.4.2 Massachusetts

The new and modified meter stations in Massachusetts will include the following:

- Dalton-Berkshire County, Massachusetts
- West Greenfield-Franklin County, Massachusetts
- Gardner-Worcester County, Massachusetts
- 200-2 Check-Middlesex County, Massachusetts
- Maritimes-Middlesex County, Massachusetts
- North Adams Check-Berkshire County, Massachusetts
- Fitchburg Lateral Check-Worcester County, Massachusetts
- North Worcester-Worcester County, Massachusetts
- Haverhill Check-Essex County, Massachusetts
- 200-1 Check-Essex County, Massachusetts
- North Adams Custody-Berkshire County, Massachusetts (modifications include installation of a new tie-in assembly that includes fitting, tap valve, riser, and check valve, and new interconnecting station piping and metering).
- Longmeadow-Hampden County, Massachusetts

[12] Additionally, two existing meter stations (Cranston [20750] and Granite/Pleasant St. [20206]) will have an increase of flow as a result of the Project; however, no modifications to the facilities or land disturbance will be required.

- Lawrence-Essex County, Massachusetts (modifications include installation of a new tie-in assembly that includes fitting, valve, and riser, modifications to the existing interconnecting station piping and metering, and the addition of cathodic protection).
- Granite/Pleasant St.-Essex, Massachusetts
- Everett-Middlesex County, Massachusetts
- Cranston-Providence, Rhode Island

1.1.2.4.3 Connecticut

The modified meter stations in Connecticut will include the following:

- Stamford-Fairfield County, Connecticut (modifications include installation of an additional hot tap assembly, as well as upgraded interconnecting station piping and metering).
- Long Ridge-Fairfield County, Connecticut (modifications include installation of new interconnecting station piping).
- New Britain-Hartford County, Connecticut (modifications include installation of two new tap assemblies and new interconnecting station piping).

1.1.2.4.4 New Hampshire

The new meter station in New Hampshire will be the following:

- West Nashua-Hillsborough County, New Hampshire

TABLE 1.1-4
PROPOSED METER STATIONS FOR THE PROJECT

Facility Name	New / Modified	Township	County	Nearest MP[2]	New Capacity (Dth/d)	Area Required for Construction (acres)[3]	Area Required for Operation (acres)[4]	Associated Pipeline Segment[5]
New York								
IGT-Constitution Bi-Directional Meter	New	Wright	Schoharie	0.03	1,000,000	1.43	0.92	Wright to Dracut Pipeline Segment (New York Portion)
NED Check	New	Wright	Schoharie	0.12	2,200,000	1.43	0.92	
NED/200 Line Bi-Directional OPP and Check	New	Wright	Schoharie	0.14	1,000,000	1.43	0.92	
					New York Subtotal	**4.29**	**2.76**	
Massachusetts								
Dalton	New	Dalton	Berkshire	66.88	10,000	1.43	0.92	Wright to Dracut Pipeline Segment (Massachusetts Portion)
West Greenfield	New	Deerfield	Franklin	95.37	30,000	1.43	0.92	
Gardner	New	Winchendon	Worcester	132.02	10,000	1.43	0.92	
200-2 Check	New	Dracut	Middlesex	173.65	670,000	1.43	0.92	
Maritimes	New	Dracut	Middlesex	176.08	120,000	1.43	0.92	
North Adams Check	New	Pittsfield	Berkshire	1.77	130,000	1.43	0.92	Pittsfield Lateral
Fitchburg Lateral Check	New	Lunenburg	Worcester	4.97	120,000	1.43	0.92	Fitchburg Lateral Extension

TABLE 1.1-4
PROPOSED METER STATIONS FOR THE PROJECT

Facility Name	New / Modified	Township	County	Nearest MP[2]	New Capacity (Dth/d)	Area Required for Construction (acres)[3]	Area Required for Operation (acres)[4]	Associated Pipeline Segment[5]
North Worcester	New	Worcester	Worcester	14.13	60,000	1.43	0.92	North Worcester Lateral
Haverhill Check	New	Methuen	Essex	6.99	300,000	1.43	0.92	Haverhill Lateral
200-1 Check	New	Lynnfield	Essex	16.62	300,000	1.43	0.92	Lynnfield Lateral
North Adams Custody (20103)	Modified	North Adams	Berkshire	Existing Facility	20,000	0.53	0.23	Existing TGP Line 256A
Longmeadow	New	Longmeadow	Hampden	Proposed Facility	10,000	1.43	0.92	Existing TGP 200 Line
Lawrence (20121)	Modified	Methuen	Essex	Existing Facility	90,000	0.54	0.23	Existing TGP Line 270B
Granite/Pleasant St. (20206)[1]	Flow Change	Haverhill	Essex	Existing Facility	TBD	0.00	0.00	Existing TGP Line 273B
Everett	New	Everett	Middlesex	Proposed Facility	40,000	1.43	0.92	Existing TGP Line 270C
					Massachusetts Subtotal	**18.23**	**11.50**	

TABLE 1.1-4
PROPOSED METER STATIONS FOR THE PROJECT

Facility Name	New / Modified	Township	County	Nearest MP[2]	New Capacity (Dth/d)	Area Required for Construction (acres)[3]	Area Required for Operation (acres)[4]	Associated Pipeline Segment[5]
Connecticut								
Stamford (20124)	Modified	Stamford	Fairfield	1.51	50,000	0.54	0.23	Stamford Loop
Long Ridge (20434)	Modified	Stamford	Fairfield	Existing Facility	70,000	0.53	0.23	Existing TGP Line 339A
New Britain (20129)	Modified	New Britain	Hartford	Existing Facility	50,000	0.53	0.23	Existing TGP Line 350A
					Connecticut Subtotal	**1.60**	**0.69**	
New Hampshire								
West Nashua	New	Amherst	Hillsborough	11.88	50,000	1.43	0.92	West Nashua Lateral
					New Hampshire Subtotal	**1.43**	**0.92**	
Rhode Island								
Cranston (20750)[1]	Flow Change	Cranston	Providence	Existing Facility	40,100	0.00	0.00	Existing TGP Line 265E
					Rhode Island Subtotal	**0.00**	**0.00**	
					Project Total	**25.55**	**15.87**	

TABLE 1.1-4
PROPOSED METER STATIONS FOR THE PROJECT

Facility Name	New / Modified	Township	County	Nearest MP[2]	New Capacity (Dth/d)	Area Required for Construction (acres)[3]	Area Required for Operation (acres)[4]	Associated Pipeline Segment[5]

[1] Although capacity at these two existing meter stations will be increased as a result of the Project, no modifications to the existing meter stations or land disturbance will be required.
[2] Nearest mileposts are provided for meter stations and refer to the mileposts of the meter stations' associated pipeline segment.
[3] Modified meter stations will require the area of the existing facility and an approximate 150 ft x 150 ft area (22,500 ft^2 = 0.52 acres) of temporary workspace during construction. New meter stations will require approximately 250 ft x 250 ft (62,500 ft^2 = 1.43 acres) of temporary workspace during construction. Updated acreages will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.
[4] Modified meter stations will require approximately 100 ft x 100 ft (10,000 ft^2 = 0.23 acres) of permanent workspace for operation. New meter stations will require 200 ft x 200 ft (40,000 ft^2 = 0.92 acres) of permanent workspace for operations. Updated acreages will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.
[5] This column indicates the associated pipeline segment for each meter station.

1.1.2.5 Mainline Valves, Pig Launcher/Receivers and Cathodic Protection Facilities (Appurtenant Aboveground Facilities)

MLVs are integral operation and safety components in a transmission pipeline. The Code of Federal Regulations ("CFR"), under Title 49, Part 192.179 outlines the requirements for MLV spacing. The guidelines are as follows:

a) Each transmission line, other than offshore segments, must have sectionalizing block valves spaced as follows, unless in a particular case the Administrator finds that alternative spacing would provide an equivalent level of safety:

(1) Each point on the pipeline in a Class 4 location must be within 2.5 miles (4 kilometers) of a valve.

(2) Each point on the pipeline in a Class 3 location must be within 4 miles (6.4 kilometers) of a valve.

(3) Each point on the pipeline in a Class 2 location must be within 7.5 miles (12 kilometers) of a valve.

(4) Each point on the pipeline in a Class 1 location must be within 10 miles (16 kilometers) of a valve.

(b) Each sectionalizing block valve on a transmission line, other than offshore segments, must comply with the following:

(1) The valve and the operating device to open or close the valve must be readily accessible and protected from tampering and damage.

(2) The valve must be supported to prevent settling of the valve or movement of the pipe to which it is attached.

(c) Each section of a transmission line, other than offshore segments, between mainline valves must have a blowdown valve with enough capacity to allow the transmission line to be blown down as rapidly as practicable. Each blowdown discharge must be located so the gas can be blown to the atmosphere without hazard and, if the transmission line is adjacent to an overhead electric line, so that the gas is directed away from the electrical conductors.

For the Project, Tennessee proposes that MLVs will generally be installed and operated within the proposed permanent ROW associated with the applicable pipeline segment(s). Each MLV will consist of a 25-foot by 25-foot graveled area and will be fenced within the permanent ROW. Permanent access roads to these sites will be required. Tennessee is in the process of conducting a class study on each proposed pipeline segment and will design MLV locations that will meet or exceed the federal spacing requirements. This information will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

Locations of MLVs will be provided in Table 1.1-5 and included on full size 7.5-minute USGS topographic maps and alignment sheets which will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

TABLE 1.1-5
PROPOSED APPURTENANT ABOVEGROUND FACILITIES FOR THE PROJECT

Facility ID	Approximate Milepost	Approximate Area (acres)	Township	County	State
TBD	TBD	TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD	TBD	TBD

NOTE: Information related to appurtenant facilities will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

In addition to MLVs, Tennessee also intends on installing launcher and receiver barrels to accommodate internal inspection of the pipeline segments in accordance with 49 CFR, Part 192, Subpart O which provides requirements for gas transmission pipeline integrity management. At a minimum, these barrels will be installed at compressor stations and the beginning and end of each proposed laterals. Permanent access roads to these sites will also be required.

As Tennessee continues the design of the Project, additional launcher/receiver sites may be deemed necessary. Locations of launcher/receivers will be provided in Table 1.1-5 and included on full size 7.5-minute USGS topographic maps and alignment sheets which will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

Requirements for pipeline corrosion control are provided in 49 CFR Subpart I, Part 192. Tennessee intends to design cathodic protection for the Project in accordance with these regulations. For pipeline segments that are proposed to be co-located with Tennessee's pipeline system, the new segments will be interconnected to the existing cathodic protection system and evaluated for compliance with USDOT regulations. Enhancements will be provided if required to comply with the regulations. On new segments, a new cathodic protection system will be designed and installed. This will include above ground rectifiers and buried ground beds. The rectifiers will generally be installed on poles within the permanent ROW. These rectifiers will require low voltage power and thus are typically located at road crossing or other facility sites. These sites may be graveled so that future maintenance can be performed in a safe manner. The locations of these rectifiers and ground beds will be provided in Table1.1-5 and included on full size 7.5 minute USGS topographic maps in a subsequent filing of this Resource Report 1.

Tennessee anticipates the need to install buried ground beds that will extend perpendicular from the pipeline due to the relatively shallow bedrock that is anticipated. Deep well ground beds will be considered if subsurface conditions permit. Additional information regarding the locations of the ground beds will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

A portion of the proposed pipeline segments will be located adjacent to or co-located with high voltage powerlines. Tennessee will design an AC mitigation system that will protect the pipeline facilities and operations personnel. It is anticipated that the design will include zinc ribbon, grounding mats, and other equipment, most of which will be buried.

1.1.3 Location Maps, Detailed Site Maps, and Plot/Site Maps

The location of the Project is illustrated in Attachment 1a. Attachment 1a provides 11 x 17-inch USGS topographic mapping of the pipeline (pipeline looping segments, co-located pipeline segments, and new pipeline segments) and specific locations for the existing compressor and meter station locations that are proposed to be modified, as well as the specific locations for the proposed new meter stations. Tennessee is also submitting detailed aerial photographic maps for the properties along the proposed route for the NED Project, with the proposed pipeline facilities and all major aboveground facilities superimposed over the images, in conformance with Section 380.12(c)(3), 18 C.F.R. § 380.12(c)(3) (2014). The specific locations for the new compressor stations have not yet been identified, but will be identified in a revised Resource Report 1 to be submitted in a subsequent filing of the ER. At that time, Tennessee will also include location-specific plot plans for each new compressor station. Tennessee has included a shaded band on the attached USGS topographic mapping and aerial photographic maps centered over the proposed pipeline routes depicting where the proposed new compressor stations may be located in the counties/states identified in Table 1.0-1.[13]

1.2 LAND REQUIREMENTS

The construction workspace (including temporary workspace ("TWS"), additional temporary workspace ("ATWS"), permanent (or operational) ROW, temporary and permanent access roads, pipeyards and contractor yards and aboveground facilities for the Project (to the extent that these areas have been identified) will total approximately 6,768.13 acres (Table 1.2-1). Operation of the Project facilities will require approximately 2,620.71 acres that will be maintained as permanent ROW (or fee property as it pertains to compressor station facilities (Table 1.2-1). Table 1.2-1 includes a summary of all Project-related land requirements that will be affected by construction and operation of the Project facilities (pipeline facilities, new and modified compressor stations, and new and modified meter stations), temporary and permanent access roads, and pipeyards and contractor yards, to the extent that these areas have been identified. The photo-based alignment sheets to be provided in a subsequent filing of this Resource Report 1 will depict the location and configuration of all temporary and permanent construction workspace and access roads required for the Project. Typical construction workspace configurations will also be provided in a subsequent filing of this Resource Report 1.

[13] Each of the aerial photographic maps includes a highlighted band reflecting the flown image boundary. This band generally follows the proposed pipeline route as set forth in this draft Resource Report 1. Several of the aerial photographic maps, however, reflect a deviation of the flown image boundary from the proposed pipeline route resulting from route deviations that have been made since the proposed pipeline route was originally flown in May 2014. Tennessee intends to re-fly the entirety of the currently proposed pipeline route and include that information in the alignment sheet mapping to be included in a subsequent filing of the ER.

TABLE 1.2-1
SUMMARY OF LAND REQUIREMENTS FOR THE PROJECT

Facility	Land Affected During Construction (acres)[5]	Land Affected During Operation (acres)[5]	Land Affected within TGP Existing Operational ROW (acres)[5,6]
Pennsylvania			
Pipeline	870.79[1]	435.39[2]	98.73
Additional Temporary Workspace[3]	511.12	0.00	0.00
Compressor Stations	30.80	10.00	5.80
Meter Stations	N/A	N/A	N/A
Cathodic Protection Ground Beds	TBD	TBD	N/A
Total Temporary and Permanent Access Roads	TBD	TBD	TBD
Pipeyards and Contractor Yards	TBD	TBD	TBD
Appurtenant Facilities[4]	TBD	TBD	TBD
Pennsylvania Subtotal	1,412.71	445.39	104.53
New York			
Pipeline	1,759.39[1]	879.70[2]	138.06
Additional Temporary Workspace[3]	365.08	0.00	0.00
Compressor Stations	80.00	40.00	0.00
Meter Stations	4.29	2.76	0.00
Cathodic Protection Ground Beds	TBD	TBD	N/A
Total Temporary and Permanent Access Roads	TBD	TBD	TBD
Pipeyards and Contractor Yards	TBD	TBD	TBD
Appurtenant Facilities[4]	TBD	TBD	TBD
New York Subtotal	2,208.76	922.46	138.06
Massachusetts			
Pipeline	1,988.16[1]	1,048.48[2]	17.70
Additional Temporary Workspace[3]	754.07	0.00	0.00
Compressor Stations	60.00	30.00	0.00
Meter Stations	18.23	11.50	0.03
Cathodic Protection Ground Beds	TBD	TBD	TBD
Total Temporary and Permanent Access Roads	TBD	TBD	TBD
Pipeyards and Contractor Yards	TBD	TBD	TBD

TABLE 1.2-1
SUMMARY OF LAND REQUIREMENTS FOR THE PROJECT

Facility	Land Affected During Construction (acres)[5]	Land Affected During Operation (acres)[5]	Land Affected within TGP Existing Operational ROW (acres)[5,6]
Appurtenant Facilities[4]	TBD	TBD	TBD
Massachusetts Subtotal	2,820.46	1,089.98	17.73
Connecticut			
Pipeline	172.67[1]	97.45[2]	39.91
Additional Temporary Workspace[3]	36.57	0.00	0.00
Compressor Stations	N/A	N/A	N/A
Meter Stations	1.60	0.69	0.04
Cathodic Protection Ground Beds	TBD	TBD	N/A
Total Temporary and Permanent Access Roads	TBD	TBD	TBD
Pipeyards and Contractor Yards	TBD	TBD	TBD
Appurtenant Facilities[4]	TBD	TBD	TBD
Connecticut Subtotal	210.84	98.14	39.95
New Hampshire			
Pipeline	95.73[1]	63.82[2]	4.30
Additional Temporary Workspace[3]	18.19	0.00	0.00
Compressor Stations	N/A	N/A	N/A
Meter Stations	1.43	0.92	0.00
Cathodic Protection Ground Beds	TBD	TBD	N/A
Total Temporary and Permanent Access Roads	TBD	TBD	TBD
Pipeyards and Contractor Yards	TBD	TBD	TBD
Appurtenant Facilities[4]	TBD	TBD	TBD
New Hampshire Subtotal	115.35	64.74	4.30
PROJECT SUBTOTALS			
Total Pipeline	**4,886.74**[1]	**2,524.84**[2]	**298.70**
Total Additional Temporary Workspace[3]	**1,685.04**	**0.00**	**0.00**
Total Compressor Stations	**170.80**	**80.00**	**5.80**
Total Meter Stations	**25.55**	**15.87**	**0.07**

TABLE 1.2-1
SUMMARY OF LAND REQUIREMENTS FOR THE PROJECT

Facility	Land Affected During Construction (acres)[5]	Land Affected During Operation (acres)[5]	Land Affected within TGP Existing Operational ROW (acres)[5,6]
Total Cathodic Protection Ground Beds	TBD	TBD	TBD
Total Temporary and Permanent Access Roads	**TBD**	**TBD**	**TBD**
Pipeyards and Contractor Yards	**TBD**	**TBD**	**TBD**
Total Appurtenant Facilities[4]	**TBD**	**TBD**	**TBD**
Project Grand Totals	**6,768.13**	**2,620.71**	**304.57**

[1] Construction workspace acreage impacts were calculated along the pipeline facilities according to the following construction ROW widths (which encompasses TWS and the operational ROW widths described in footnote 2). Construction workspace through wetlands and waterbodies will be reduced to 75 ft as required and were practicable. However, these reduced areas have not yet been incorporated into the overall construction workspace acreage calculations.

Pipe Diameter	Construction ROW Width (ft)
8" - 16"	75
18" - 24"	90
26" - 36"	100

[2] Operational workspace acreage impacts were calculated along the pipeline facilities according to the following permanent ROW widths:

Pipe Diameter	Operational ROW Width (ft)
8" - 16"	50
18" - 24"	50
26" - 36"	50

[3] Acreages for additional temporary workspace are not included in the Land Affected During Construction pipeline acreage values.

[4] All appurtenant ancillary aboveground facilities, including MLVs, and pig launcher/receivers will be constructed and operated within areas of existing or new permanent easements associated with the pipeline facilities. This information will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

[5] TBD (To Be Determined). The locations for certain Project components have not yet been determined; therefore, acreage impacts have not yet been calculated but will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER. Project components designated as N/A (not applicable) indicate that these facility types are not proposed in those states.

[6] The permanent ROW for the proposed pipeline segments will overlap approximately 25 ft of existing TGP ROW. N/A (not applicable) indicates that certain Project components will not overlap existing ROW. TBD-To Be Determined, indicates some Project components have not yet been determined; therefore, acreage impacts within existing ROW have not yet been calculated but will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

1.2.1 Pipeline Facilities

The approximate land requirements for the pipeline facilities are summarized in Table 1.2-1. Tennessee will provide additional detail in a subsequent filing of this Resource Report 1. The pipeline acreages are based on varying construction ROW widths to accommodate the outer diameter of the pipeline proposed for each pipeline segment. Tennessee's proposed construction ROW widths for each pipeline segment

are provided in Table 1.2-2 and construction and operational impacts along individual pipeline facilities are provided in Table 1.2-3. These widths will be maintained through uplands and a reduced construction ROW width of 75 feet is proposed for areas crossing wetlands and waterbodies. However, these reduced areas have not yet been incorporated into the overall construction workspace acreage calculations. Preliminary pipeline ROW workspace configurations and dimensions are depicted on the aerial alignment sheets to be provided in a subsequent filing of the ER.

TABLE 1.2-2
PROPOSED CONSTRUCTION ROW WIDTHS FOR THE PROJECT PIPELINE FACILITIES

Facility Name	Pipeline Diameter (inches)	Construction ROW (ft)[1]	Operational ROW (ft)
Pennsylvania			
Loop 317-3	36	100	50
Loop 319-3	36	100	50
PA to Wright Pipeline Segment (Pennsylvania Portion)	30	100	50
New York			
PA to Wright Pipeline Segment (New York Portion)	30	100	50
Wright to Dracut Pipeline Segment (New York Portion)	36	100	50
Massachusetts			
Wright to Dracut Pipeline Segment (Massachusetts Portion)	36	100	50
Pittsfield Lateral	12	75	50
North Worcester Lateral	12	75	50
Fitchburg Lateral Extension	12	75	50
West Nashua Lateral	12	75	50
Lynnfield Lateral	20	90	50
Haverhill Lateral	16	75	50
Connecticut			
Stamford Loop	12	75	50
300 Line CT Loop	24	90	50
New Hampshire			
West Nashua Lateral	12	75	50
Haverhill Lateral	16	75	50

[1] Construction workspace through wetlands and waterbodies will be reduced to 75 ft as required and were practicable. However, these reduced areas have not yet been incorporated into the overall construction workspace acreage calculations.

TABLE 1.2-3
LAND REQUIREMENTS FOR THE PROJECT PIPELINE FACILITIES

Facility Name	Pipeline Diameter (inches)	Pipeline Length (miles)	Construction ROW (acres)[1]	Operational ROW (acres)[2]
Pennsylvania				
Loop 317-3	36	22.92	277.82	138.91
Loop 319-3	36	9.05	109.70	54.85
PA to Wright Pipeline Segment (Pennsylvania Portion)	30	39.87	483.27	241.64
Pennsylvania Subtotal		**71.84**	**870.79**	**435.39**
New York				
PA to Wright Pipeline Segment (New York Portion)	30	95.13	1,153.09	576.55
Wright to Dracut Pipeline Segment (New York Portion)	36	50.02	606.30	303.15
New York Subtotal		**145.15**	**1,759.39**	**879.70**
Massachusetts				
Wright to Dracut Pipeline Segment (Massachusetts Portion)	36	127.12	1,540.85	770.42
Pittsfield Lateral	12	1.77	16.09	10.73
North Worcester Lateral	12	14.13	128.45	85.64
Fitchburg Lateral Extension	12	4.96	45.09	30.06
West Nashua Lateral	12	3.56	32.36	21.58
Lynnfield Lateral	20	16.62	181.31	100.73
Haverhill Lateral	16	4.84	44.00	29.33
Massachusetts Subtotal		**173.00**	**1,988.16**	**1,048.48**
Connecticut				
Stamford Loop	12	1.51	13.73	9.15
300 Line CT Loop	24	14.57	158.95	88.30
Connecticut Subtotal		**16.08**	**172.67**	**97.45**
New Hampshire				
West Nashua Lateral	12	8.38	76.18	50.79
Haverhill Lateral	16	2.15	19.55	13.03
New Hampshire Subtotal		**10.53**	**95.73**	**63.82**

TABLE 1.2-3
LAND REQUIREMENTS FOR THE PROJECT PIPELINE FACILITIES

Facility Name	Pipeline Diameter (inches)	Pipeline Length (miles)	Construction ROW (acres)[1]	Operational ROW (acres)[2]
Project Total		**416.60**	**4,886.74**	**2,524.84**

[1] Construction workspace acreage impacts were calculated along the pipeline facilities according to the following construction ROW widths (which encompasses the operational ROW widths described in footnote 2). Construction workspace through wetlands and waterbodies will be reduced to 75 ft as required and were practicable. However, these reduced areas have not yet been incorporated into the overall construction workspace acreage calculations.

Pipe Diameter	Construction ROW Width (ft)
8" - 16"	75
18" - 24"	90
26" - 36"	100

[2] Operational workspace acreage impacts were calculated along the pipeline facilities according to the following permanent ROW widths:

Pipe Diameter	Operational ROW Width (ft)
8" - 16"	50
18" - 24"	50
26" - 36"	50

1.2.2 Aboveground Facilities

The land requirements for the new and modified aboveground facilities to the extent that the locations have been identified as of the date of the filing of this draft Resource Report 1, are summarized in Table 1.2-4.

1.2.3 Access Roads

Construction access to the Project areas and ancillary facilities will be by way of the construction ROW and existing roads. Tennessee will utilize temporary and permanent access roads during the construction of each portion of the Project. Where public road access is unavailable, Tennessee will identify private access roads. As these sites are identified and acquired for use, Tennessee will provide locations, lengths, and acreages in a subsequent filing of this ER. Locations of proposed temporary and permanent access roads will be depicted on full size 7.5-minute USGS topographic maps to be provided in a subsequent filing of this ER.

TABLE 1.2-4
LAND REQUIREMENTS FOR THE PROJECT
ABOVEGROUND AND APPURTENANT FACILITIES

Facility Name	Facility Type	New / Modified	Nearest MP[1]	Township[2]	County	Land Affected During Construction (acres)[3]	Land Affected During Operation (acres)[4]	Associated Pipeline Segment[5]
Pennsylvania								
Station 319	Compressor Station	Modified	0.00-0.20	Wyalusing	Bradford	10.80	0.00	Loop 319-3
Supply Path - Head Station	Compressor Station	New	18.30-22.40	TBD	Susquehanna	20.00	10.00	PA to Wright Pipeline Segment (Pennsylvania Portion)
Pennsylvania Subtotal						**30.80**	**10.00**	
New York								
Supply Path - Mid Station	Compressor Station	New	75.40-79.50	TBD	Delaware	20.00	10.00	PA to Wright Pipeline Segment (New York Portion)
Supply Path - Tail Station	Compressor Station	New	124.80-129.40	TBD	Schoharie	20.00	10.00	
IGT-Constitution Bi-Directional Meter	Meter Station	New	0.03	Wright	Schoharie	1.43	0.92	Wright to Dracut Pipeline Segment (New York Portion)
Market Path - Head Station	Compressor Station	New	0.10-2.10	TBD	Schoharie	20.00	10.00	
NED Check	Meter Station	New	0.12	Wright	Schoharie	1.43	0.92	

TABLE 1.2-4
LAND REQUIREMENTS FOR THE PROJECT
ABOVEGROUND AND APPURTENANT FACILITIES

Facility Name	Facility Type	New / Modified	Nearest MP[1]	Township[2]	County	Land Affected During Construction (acres)[3]	Land Affected During Operation (acres)[4]	Associated Pipeline Segment[5]
NED/200 Line Bi-Directional OPP and Check	Meter Station	New	0.14	Wright	Schoharie	1.43	0.92	
Market Path - Mid Station 1	Compressor Station	New	41.20-45.30	New Lebanon	TBD	20.00	10.00	
New York Subtotal						**84.29**	**42.76**	
Massachusetts								
Dalton	Meter Station	New	66.88	Dalton	Berkshire	1.43	0.92	Wright to Dracut Pipeline Segment (Massachusetts Portion)
Market Path - Mid Station 2	Compressor Station	New	93.30-97.30	Deerfield	TBD	20.00	10.00	
West Greenfield	Meter Station	New	95.37	Deerfield	Franklin	1.43	0.92	
Gardner	Meter Station	New	132.02	Winchendon	Worcester	1.43	0.92	
Market Path - Mid Station 3	Compressor Station	New	146.10-150.70	Townsend	TBD	20.00	10.00	
200-2 Check	Meter Station	New	173.65	Dracut	Middlesex	1.43	0.92	
Market Path - Tail Station	Compressor Station	New	173.10-175.40	Dracut	TBD	20.00	10.00	
Maritimes	Meter Station	New	176.08	Dracut	Middlesex	1.43	0.92	
North Adams Check	Meter Station	New	1.77	Pittsfield	Berkshire	1.43	0.92	Pittsfield Lateral

TABLE 1.2-4
LAND REQUIREMENTS FOR THE PROJECT
ABOVEGROUND AND APPURTENANT FACILITIES

Facility Name	Facility Type	New / Modified	Nearest MP[1]	Township[2]	County	Land Affected During Construction (acres)[3]	Land Affected During Operation (acres)[4]	Associated Pipeline Segment[5]
Fitchburg Lateral Check	Meter Station	New	4.97	Lunenburg	Worcester	1.43	0.92	Fitchburg Lateral Extension
North Worcester	Meter Station	New	14.13	Worcester	Worcester	1.43	0.92	North Worcester Lateral
Haverhill Check	Meter Station	New	6.99	Methuen	Essex	1.43	0.92	Haverhill Lateral
200-1 Check	Meter Station	New	16.62	Lynnfield	Essex	1.43	0.92	Lynnfield Lateral
North Adams Custody (20103)	Meter Station	Modified	Existing Facility	North Adams	Berkshire	0.53	0.23	Existing TGP Line 256A
Longmeadow	Meter Station	New	Proposed Facility	Longmeadow	Hampden	1.43	0.92	Existing TGP 200 Line
Lawrence (20121)	Meter Station	Modified	Existing Facility	Methuen	Essex	0.54	0.23	Existing TGP Line 270B
Granite/Pleasant St. (20206)[5]	Meter Station	Flow Change	Existing Facility	Haverhill	Essex	0.00	0.00	Existing TGP Line 273B
Everett	Meter Station	New	Proposed Facility	Everett	Middlesex	1.43	0.92	Existing TGP Line 270C
Massachusetts Subtotal						**78.23**	**41.50**	

TABLE 1.2-4
LAND REQUIREMENTS FOR THE PROJECT
ABOVEGROUND AND APPURTENANT FACILITIES

Facility Name	Facility Type	New / Modified	Nearest MP[1]	Township[2]	County	Land Affected During Construction (acres)[3]	Land Affected During Operation (acres)[4]	Associated Pipeline Segment[5]
Connecticut								
Stamford (20124)	Meter Station	Modified	1.51	Stamford	Fairfield	0.54	0.23	Stamford Loop
Long Ridge (20434)	Meter Station	Modified	Existing Facility	Stamford	Fairfield	0.53	0.23	Existing TGP Line 339A
New Britain (20129)	Meter Station	Modified	Existing Facility	New Britain	Hartford	0.53	0.23	Existing TGP Line 350A
Connecticut Subtotal						**1.60**	**0.69**	
New Hampshire								
West Nashua	Meter Station	New	11.88	Amherst	Hillsborough	1.43	0.92	West Nashua Lateral
New Hampshire Subtotal						**1.43**	**0.92**	
Rhode Island								
Cranston (20750)[5]	Meter Station	Flow Change	Existing Facility	Cranston	Providence	0.00	0.00	Existing TGP Line 2565E
Rhode Island Subtotal						**0.00**	**0.00**	
Project Total						**196.35**	**95.87**	

TABLE 1.2-4
LAND REQUIREMENTS FOR THE PROJECT
ABOVEGROUND AND APPURTENANT FACILITIES

Facility Name	Facility Type	New / Modified	Nearest MP[1]	Township[2]	County	Land Affected During Construction (acres)[3]	Land Affected During Operation (acres)[4]	Associated Pipeline Segment[5]

[1] Nearest mileposts provided for the existing compressor station and the existing and new meter stations refer to the mileposts of the aboveground facilities' associated pipeline segments. For new compressor stations, the mileposts provided reflect a range of area where Tennessee is evaluating potential sites along the associated pipeline segment.

[2] TBD-To Be Determined. Final locations of the compressor stations have not yet been determined.

[3] Modified meter stations will require the area of the existing facility and an approximate 150 ft x 150 ft area (22,500 ft^2 = 0.52 acres) of temporary workspace during construction. New meter stations will require approximately 250 ft x 250 ft (62,500 ft^2 = 1.43 acres) of temporary workspace during construction. The modified compressor station will require the area of the existing fenced in facility (5.8 acres) and an additional five acres of temporary construction workspace. New compressor stations will require 20 acres of temporary construction workspace. Updated acreages will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

[4] Modified meter stations will require approximately 100 ftx100 ft (10,000 ft^2 = 0.23 acres) of permanent workspace for operation. New meter stations will require 200 ft x 200 ft (40,000 ft^2 = 0.92 acres) of permanent workspace for operations. Modifications at Station 319 will operate within the existing fenced facility boundary and will require no additional permanent workspace for operational use. New compressor stations will require 10 acres for operation. Updated acreages will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

[5] This column indicates the associated pipeline segment for each aboveground facility.

[6] Although capacity at these two existing meter stations will be increased as a result of the Project, no modifications to the existing meter stations or land disturbance will be required.

1.2.4 Additional Temporary Workspace

ATWS requirements are summarized in Table 1.2-1. A complete list of ATWS locations by MP will be provided in Resource Report 8 of this ER (to be provided in a subsequent filing of the ER).

ATWS areas typically are required at road, railroad, wetland, and waterbody crossing locations and for areas requiring specialized construction techniques, including steep slopes and agricultural land. The configurations and sizes of ATWS areas will be based on site-specific conditions and vary in accordance with the construction methodology, crossing type, and other construction needs. Tennessee currently is in the process of identifying areas where potential ATWS will be required to facilitate construction and anticipates providing detailed information relative to location, size and land acreage requirements in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

1.2.5 Pipeyards and Contractor Yards

Tennessee is in the initial phases of identifying potential sites and exact locations to be utilized for pipeyards and contractor yards. As these sites are identified and acquired for use, Tennessee will provide locations and acreages in Table 1.2-5 in a revised Resource Report 1 to be submitted in a subsequent filing of the ER. Locations of proposed pipeyards and contractor yards will be depicted on full size 7.5-minute USGS topographic maps and alignment sheets to be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

These areas will be used for equipment, pipe, and material storage, as well as temporary field offices and pipe preparation/field assembly areas. Site selection and acquisition will continue throughout the planning and permitting stages of the Project. Resource Report 8 (to be provided in a subsequent filing of the ER) will provide additional information regarding pipeyards and contractor yards associated with the Project.

TABLE 1.2-5
LAND REQUIREMENTS FOR THE PROJECT
PIPEYARDS AND CONTRACTOR YARDS

Name/Purpose	Approximate Location	Address	Existing Land use Classification	Size (acres)	Comments
TBD	TBD	TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD	TBD	TBD
Project Total				TBD	TBD

NOTE: Information related to pipeyards and contractor yards will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

1.2.6 Areas of No Access

Tennessee is in the process of contacting affected landowners and obtaining survey permission for the properties proposed to be crossed by the Project. Field surveys on properties for which Tennessee obtained survey access began in July 2014. These surveys include wetland and waterbody delineation

surveys, rare species habitat assessments and cultural resource surveys. The schedule for completing field surveys will depend on the timing of obtaining survey permission on all affected parcels. Survey permission was requested from landowners within a 400 foot corridor on the proposed pipelines. The status of landowner permissions obtained to date is provided in Table 1.2-6.

Tennessee will provide an update on the status of field surveys, including a detailed account of the location (by MP) and extent of all non-surveyed areas, in a revised Resource Report 1 to be submitted in a subsequent filing of the ER. In the event that a certificate order is ultimately issued by the Commission for the Project, Tennessee would have eminent domain authority to obtain access to these properties to conduct necessary surveys.

TABLE 1.2-6
AREAS OF NO ACCESS FOR THE PROJECT BY STATE

Pennsylvania[1]	
Total Landowners with No Access - in Pennsylvania	110
Percent of No Access in Pennsylvania	26%
New York[1]	
Total Landowners with No Access - in New York	484
Percent of No Access in New York	49%
Massachusetts[1]	
Total Landowners with No Access - in Massachusetts	945
Percent of No Access in Massachusetts	56%
Connecticut[1]	
Total Landowners with No Access - in Connecticut	79
Percent of No Access in Connecticut	43%
New Hampshire[1]	
Total Landowners with No Access - in New Hampshire	101
Percent of No Access in New Hampshire	82%
Total No Access	**1,719**
Total Percent of No Access	**51%**

[1] NOTE: The information in this table represents survey permission for those landowners located within the Project survey corridor (400 ft).

1.3 CONSTRUCTION PROCEDURES

The Project facilities will 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 CFR Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards" and Commission regulations at 18 CFR Section 380.15, "Siting and Maintenance Requirements". In addition, unless otherwise authorized through a variance granted by the

Commission, Tennessee will comply with the Commission's *Upland Erosion Control, Revegetation and Maintenance Plan* (the "Plan", May 2013 version) and the Commission's *Wetland and Waterbody Construction and Mitigation Procedures* (the "Procedures", May 2013 version), and will also follow Tennessee's Spill Prevention and Response Procedures ("SPRP"), Unanticipated Discovery Plan for cultural resources, Waste Management Plan, and typical construction workspace layout drawings. These documents will be provided in Tennessee's Project-specific Environmental Construction Plans ("ECPs") for each state which will be submitted in a subsequent filing of the ER. These Project-specific ECPs for each state will incorporate the Commission's Plan and Procedures with the exception of any variances granted by the Commission. Proposed Project-specific variances to the Plan and Procedures will be detailed in Section 1.3.2.9, and further explained in Resource Report 8 (to be submitted with the draft of the ER).

1.3.1 Pipeline Construction

The general procedures for pipeline construction that will be followed for the Project are described in this section. Tennessee will use conventional techniques for buried pipeline construction and will follow the requirements set forth in Tennessee's Project-specific ECPs for each state to ensure safe, stable, and reliable transmission facilities consistent with Commission and USDOT specifications. At a minimum, Tennessee will perform the following procedures:

- Marking the corridor;
- Clearing and grading;
- Trenching;
- 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
- Cleanup and restoration.

The above-listed procedures will typically follow in the sequence listed. Areas requiring special construction techniques include road or utility crossings, waterbodies and wetlands, unusual topographies such as unstable soils and trench conditions, residential or urban areas, agricultural areas, areas requiring rock removal and permanent recreation facilities.

1.3.1.1 Marking the Corridor

Land survey crews will mark the centerline of Tennessee's pipeline mainline, looping segments, and laterals with stakes prior construction. The centerline will be marked at frequent intervals as well as at known crossings of foreign lines and utilities, at road crossings, and at points of inflection. Additionally, avoidance areas including wetland boundaries, cultural resource sites, and rare species habitat, as applicable, will be marked with appropriate fencing, signage, and/or flagging, based on environmental and archaeology surveys and environmental permit conditions, prior to construction.

1.3.1.2 Erosion and Sediment Control

Temporary soil erosion and sediment control measures will be installed along the proposed construction ROW, ATWS areas, access roads, and other work areas, as applicable, in accordance with Tennessee's

Project-specific ECPs for each state. Typically, staked straw bales and/or silt fence barriers are positioned along the limit of wetland boundaries within the construction workspace. To ensure that appropriate erosion and sediment control measures are maintained until the construction workspace is fully stabilized, full-time Environmental Inspectors ("EIs") will be assigned to the Project and will inspect all disturbed areas of the construction spread(s) (e.g., construction ROW, pipeyards and contractor yards) that have not been permanently stabilized in accordance with the following schedule: (1) on a daily basis in areas of active construction; (2) on a weekly basis in areas with no construction or equipment operation; or (3) within 24 hours of the end of a storm event that produces 0.5 inch or greater of precipitation.

1.3.1.3 Clearing, Grading, and Fencing

The construction corridor will be cleared and graded to remove brush, trees, roots, and other obstructions such as large rocks and stumps. Non-woody vegetation may be mowed to ground level. Temporary fences and gates will be installed as needed. No cleared material will be placed within wetland areas.

Tennessee anticipates disposal of trees cleared from the ROW using several different methods. Trees, if suitable, may be taken off-site by the clearing contractor and used for timber. Trees and stumps may be chipped on-site and removed. Chipped material not removed may be spread across the ROW within upland areas in a manner that does not inhibit revegetation. Wood chips will not be left within agricultural lands, wetlands or within 50 feet of wetlands. Also, wood chips will not be stockpiled in a manner that they may be transported into a wetland.

Grading activities will be scheduled to minimize the time between initial clearing operations and the actual installation of pipe. Access to the construction corridor will normally be obtained via public roads that intersect the ROW. Permission will be obtained from landowners for the use/upgrade of access roads across their property to the construction corridor. At the request of a landowner, Tennessee will erect temporary gates along access roads where necessary.

Grading of the construction workspace will allow for the movement of heavy equipment and the safe passage of work crews. Grading will include removing rock outcrops, tree stumps, ridges and topographic irregularities. Generally, machinery will operate on one side of the trench (working side) with excavated materials stockpiled on the other (non–working side).

As appropriate, the clearing and grading operations will incorporate special construction procedures to minimize the amount of vegetation removed from stream banks and slopes, prevent undue disturbance of the soil profile, restore the original contours of the natural ground, and prevent topsoil erosion. To minimize impact to the soil profile on agricultural lands, up to 12 inches of topsoil will be segregated from subsoil during trenching and will remain segregated during construction to avoid loss due to mixing with subsoil material. Tennessee will utilize either full ROW topsoil segregation or ditch plus spoil side topsoil segregation, as requested by the landowner, as required by the applicable U.S. Department of Agriculture ("USDA") National Resource Conservation Service ("NRCS") District or County Conservation District, or as appropriate based upon site-specific conditions. Upon the completion of backfilling operations, the topsoil will be properly replaced over the graded area. Grading activities will be scheduled to minimize the time between initial clearing operations and the actual installation of pipe.

1.3.1.4 Trenching

In most areas characterized by normal soils, the trench for the pipeline is excavated by crawler-mounted, rotary wheel-type trenching machines or track–mounted excavators. The trench generally will be approximately 12 inches wider than the diameter of the pipe and of sufficient depth to allow for the minimum cover requirements to the top of the pipe in accordance with USDOT regulations pursuant to the Natural Gas Pipeline Safety Act of 1968, as amended. Landowner requests or permitting requirements may dictate greater depth.

Except as depicted on site-specific plans, the depth of cover for the proposed pipeline facilities, as well as the depth of cover for other, non-typical conditions, such as horizontal directional drills ("HDD"), will be in accordance with Tennessee's minimum specifications, as set forth in Table 1.3-1. Scour analysis and potential for external damage may increase these depths. In actively cultivated agricultural lands, Tennessee plans to install the pipeline with 48 inches of cover, except where rock prevents this depth. In these cases, Tennessee's minimum specifications for depth of cover will be used.

TABLE 1.3-1
TENNESSEE MINIMUM SPECIFICATIONS FOR DEPTH OF COVER (INCHES)

Location[1]	Normal Soil	Consolidated Rock
USDOT PHMSA Class 1	36	24
USDOT PHMSA Classes 2, 3, and 4	36	24
Land in Agriculture	48	24
Drainage ditches of public roads or railroad crossings	36	24
Navigable river, stream, or harbor	60	24
Minor stream crossings	60	24

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

Crossing of foreign pipelines will generally require the pipeline to be buried at greater depths depending upon the depth of the foreign pipeline. A minimum of 12 inches of clearance will be maintained when crossing foreign pipelines, utilities or other structures as required by USDOT. Pipeline burial depths in areas requiring special construction techniques through rock will be in accordance with USDOT requirements, 49 CFR Part 192. Prior to the commencement of construction activities, the following will be contacted to have underground utilities and foreign pipelines identified and marked: the "Pennsylvania One Call," for Pennsylvania, the "Dig Safe" system for the states of New York, Massachusetts and New Hampshire, and the "Call Before You Dig" system for the state of Connecticut as well as the national "811" call system. Trenching in the vicinity of these foreign utilities will begin only after completing the appropriate notification procedures.

In accordance with Tennessee's Project-specific ECPs for each state, measures will be employed to minimize erosion during trenching operations and construction activities. Measures also will be taken to minimize the free flow of water into the trench and through the trench into waterbodies. Compacted earth for temporary trench breakers and sandbags for permanent trench breakers may be installed within the trench to reduce erosion.

1.3.1.5 Pipe Stringing

The stringing operation involves moving the pipe into position along the prepared ROW. Pipe will be delivered to the Project area's pipeline storage areas typically by truck and will then be moved by truck from the pipeline storage areas to the construction zone, where it will be placed along the ROW in a continuous line in preparation for subsequent lineup and welding operations. Individual joints of pipe will be strung along the ROW parallel to the centerline and arranged so they are easily accessible to construction personnel. The amount of pipe necessary for stream or road crossings will be stockpiled in pipeline storage areas in the vicinity of each crossing. Stringing activities will be coordinated with the advance of the trenching and pipe laying crews to minimize the potential impact to the resources.

1.3.1.6 Pipe Bending

The pipe will be delivered to the Project site in straight sections. However, bending of the pipe will be required to allow the pipeline to follow natural grade changes and direction changes of the ROW. For this purpose, prior to line-up and welding, selected joints will be field-bent by track-mounted hydraulic bending machines. For larger horizontal changes of direction, manufactured induction bends may be used.

Pipe bending in the field will be utilized for turns involving slight deflections and/or large radii. For turns involving larger deflections and/or small radii, often related to spatial limitations due to easement and topographic constraints, prefabricated elbow fitting (ells) will be utilized, rather than pipe bending on-site.

1.3.1.7 Pipe Assembly and Welding

Following stringing and bending, the joints of pipe will be placed on temporary supports adjacent to the trench. The ends will be carefully aligned and welded together using multiple passes for a full penetration weld. Only welders qualified according to applicable American National Standards Institute ("ANSI"), American Society of Engineers ("ASME"), and American Petroleum Institute ("API") Standards will be permitted to perform the welding. A Tennessee-approved welding inspector will conduct the welder qualification testing and document all test results. A welder failing to meet acceptance criteria of the Kinder Morgan Company[14] Standard Welder Qualification Test – API1104 will be disqualified. Bending, welding, and coating in the field will comply with USDOT regulations (49 CFR Part 192).

It has not yet been determined if automated welding will be implemented during pipe assembly. Tennessee believes that automated welding may be appropriate for portions of the proposed route, although the use of automated welding may prove impractical for steep construction areas. Tennessee

[14] Tennessee is an indirect wholly-owned subsidiary of Kinder Morgan, Inc. ("Kinder Morgan") and is a member of Kinder Morgan's natural gas pipeline group.

and the construction contractors will jointly determine whether automated welding is appropriate for portions of the Project.

1.3.1.8 X-Ray and Weld Repair

To ensure that the assembled pipe meets or exceeds the design strength requirements and to ensure weld quality and integrity, the welds will be inspected visually and tested non-destructively using radiographic (x-ray) or another approved test method, in accordance with API Standards. Welds displaying inclusions (void spaces) or other defects will be repaired, or they will be cut out (removed) and new welds will be installed and retested.

1.3.1.9 Coating Field Welds, Inspection and Repair

Following welding, the previously uncoated ends of the pipe at the joints will be field-coated per Tennessee coating specifications. Prior to lowering the pipe into the trench, the coating on the entire pipe Section will be visually inspected and jeeped using a holiday detector (inspection of pipe coating using electronic equipment). Damaged areas will be repaired per Kinder Morgan's coating repair specifications.

1.3.1.10 Pipe Preparation and Lowering-In

Once the pipeline has been welded together, coated, and inspected, the pipe is lowered into the trench. If the bottom of the trench is rocky, methods to protect the pipe will be used, including the possible use of sandbags or support pillows at designated intervals along the trench. Rock shield will be installed as needed to protect the pipe coating. Trench dewatering may be required in certain locations to prevent the pipe from floating and also to perform certain limited activities in the trench. Trench dewatering will be performed in accordance with Tennessee's Project-specific ECPs for each state.

1.3.1.11 Tie-Ins

At select locations, such as waterbody crossings, road crossings, and terrain changes along the pipeline system, the pipe will be lowered into the trench in segments. The segments then will be welded together or tied-in prior to backfilling. A crew will be assigned to make these tie-ins at designated locations ahead of the backfill operations.

1.3.1.12 Backfilling and Grade Restoration

After lowering the pipe into the trench, the trench will be backfilled. Backfill usually consists of the material originally excavated from the trench; however, in some cases, additional backfill from other sources may be required. Any excess excavated materials or materials unsuitable for backfill will be handled, as approved by landowner or land management agency, or disposed of in accordance with applicable regulations. In areas where topsoil has been segregated, the subsoil will be placed in the trench first and then the topsoil will be placed over the subsoil. Backfilling will occur to approximate grade. However, a soil crown may be placed above the trench at the discretion of the Tennessee inspector to accommodate any future soil settlement.

1.3.1.13 Clean-up and Restoration

After the completion of backfilling, disturbed areas will be graded, and any remaining trash and debris will be properly disposed of in compliance with federal, state, and local regulations. The construction corridor will be protected through the implementation of erosion control measures including site specific contouring, permanent slope breakers, mulching, and reseeding or sodding with soil-holding vegetation. Contouring will be accomplished using acceptable excess soils from construction. If sufficient soils are not available, additional soil will be imported and inspected by Tennessee prior to use.

Tennessee will restore the construction workspace in accordance with Tennessee's Project-specific ECPs for each state, applicable seed mix requirements from the NRCS or applicable County Conservation Districts and relevant landowner agreements.

1.3.1.14 Hydrostatic Testing and Tie-Ins

Hydrostatic testing procedures will be described in Tennessee's Project-specific ECPs for each state. Tennessee will seek coverage under the Pennsylvania, New York, Massachusetts, Connecticut and New Hampshire state-required hydrostatic test water discharge permits. If the proposed discharge location(s) do not allow for discharges covered under a General Permit, Tennessee will seek coverage under an individual permit. Hydrostatic test water will be discharged within an upland area through a filter structure.

The pipeline will be tested hydrostatically in accordance with the USDOT's regulations, 49 CFR Part 192. The pipeline will be filled with water and maintained at a test pressure and duration in compliance with Kinder Morgan's engineering standards and applicable federal regulations. After the completion of a satisfactory test, the water will be discharged to the ground through a containment structure to a vegetated upland area. The discharge rate of the test water will be regulated using values and energy dissipation devices to prevent erosion. Tie-in locations will be cleaned and restored after hydrostatic testing. Please refer to Resource Report 2 of this ER (which will be provided in a subsequent filing of the ER) for additional information regarding hydrostatic pressure testing of the pipeline including anticipated water volumes for each pipeline.

1.3.1.15 Alternating Current Mitigation and Cathodic Protection

During the design phase of the Project, if determined to be necessary by Tennessee's technical services group and cathodic protection consultant, field work would be conducted to determine if soil conditions may affect the need for alternating current mitigation measures. Specifically, soil resistivity, AC voltage and DC voltage measurements would be obtained at various locations along the proposed pipeline routes in the vicinity of existing transmission lines. Additionally, information about the adjacent powerlines would be obtained from the applicable utility company including voltage levels, available fault current, and the location of transformers. Special software modeling techniques would then be applied to predict potential induced voltages and determine if mitigation measures are needed for safety and cathodic protection.

Cathodic protection equipment needed for the pipeline facilities will be determined in the design phase of the Project. Where additional equipment is required, it is expected to consist of rectifiers, anode beds and AC mitigation devices. Rectifiers and anode beds are routinely located outside the permanent ROW of the pipeline. AC mitigation devices are located within the permanent ROW of the pipeline. Tennessee

will seek the appropriate approvals from landowners, regulatory agencies, and the Commission for all cathodic protection facilities located outside the permanent ROW of the pipeline.

1.3.2 Specialized Construction Procedures

Dependent upon site conditions, Tennessee may implement the following special pipeline construction methods in residential, agricultural, and environmentally sensitive areas. Typical construction drawings for each of these specialized construction procedures are included, as applicable.

1.3.2.1 Rugged Topography

Rugged topography may be present along portions of several pipeline sections. These areas have not fully been determined, therefore, Tables 1.3-2 and 1.3-3 will include a list of potential locations of rugged topography in a revised Resource Report 1 to be submitted in a subsequent filing of the ER. Permanent trench breakers consisting of sandbags or foam will be installed in the ditch over and around the pipe in areas of slope with high erosion potential. Trench breakers will be used to isolate wet areas and to minimize channeling of groundwater along the ditch line.

In the areas of construction where the slope exceeds 30 percent, a special means of manipulating the construction equipment must be utilized. The preferred method will be "winching" the equipment. This process consists of placing and anchoring a tractor at the top of the slope and using a winch to manipulate the equipment up and down the slope. Tables 1.3-2 and Tables 1.3-3 identifies areas along the proposed pipeline facilities where slopes 15 to 30 percent and greater than 30 percent, respectively, are encountered and the specialized construction techniques noted above may be implemented.

TABLE 1.3-2
STEEP SLOPES (15-30 PERCENT) CROSSED BY THE PROJECT

Begin Milepost	End Milepost	Distance (miles)
Pennsylvania		
TBD	TBD	TBD
	Pennsylvania Subtotal	TBD
New York		
TBD	TBD	TBD
	New York Subtotal	TBD
Massachusetts		
TBD	TBD	TBD
	Massachusetts Subtotal	TBD
Connecticut		
TBD	TBD	TBD
	Connecticut Subtotal	TBD

TABLE 1.3-2
STEEP SLOPES (15-30 PERCENT) CROSSED BY THE PROJECT

Begin Milepost	End Milepost	Distance (miles)
New Hampshire		
TBD	TBD	TBD
	New Hampshire Subtotal	TBD
Project Total		**TBD**

NOTE: Information related to steep slopes will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

TABLE 1.3-3
STEEP SLOPES (>30 PERCENT) CROSSED BY THE PROJECT

Begin Milepost	End Milepost	Distance (miles)
Pennsylvania		
TBD	TBD	TBD
	Pennsylvania Subtotal	TBD
New York		
TBD	TBD	TBD
	New York Subtotal	TBD
Massachusetts		
TBD	TBD	TBD
	Massachusetts Subtotal	TBD
Connecticut		
TBD	TBD	TBD
	Connecticut Subtotal	TBD
New Hampshire		
TBD	TBD	TBD
	New Hampshire Subtotal	TBD
	Project Total	**TBD**

NOTE: Information related to steep slopes will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

In areas along the ROW where steep side slopes are encountered, the two-tone cut and fill construction methods will be utilized for equipment and/or personnel safety considerations. ATWS will be needed at these locations to accommodate excavated material from the temporary cut and fill areas, while allowing for the temporary storage of trench spoil, excess rock material, cut timber, and, in some cases, salvageable topsoil. Tables 1.3-4 and Table 1.3-5 includes specific locations where two-tone cut and fill construction

methods are anticipated to be required. When side slopes that require special construction are encountered, the two-tone construction technique will be employed, which entails benching into the side-slope to provide a level work surface. During grade restoration of side slope locations, the spoil will be placed back in the cut and compacted. Any springs or seeps found in the cut will be carried down-slope through polyvinyl chloride ("PVC") pipe and/or gravel French drains installed as part of the cut restoration.

TABLE 1.3-4
STEEP SIDE SLOPES (15-30 PERCENT) CROSSED BY THE PROJECT

Begin Milepost	End Milepost	Distance (miles)
Pennsylvania		
TBD	TBD	TBD
	Pennsylvania Subtotal	
New York		
TBD	TBD	TBD
	New York Subtotal	TBD
Massachusetts		
TBD	TBD	TBD
	Massachusetts Subtotal	TBD
Connecticut		
TBD	TBD	TBD
	Connecticut Subtotal	TBD
New Hampshire		
TBD	TBD	TBD
	New Hampshire Subtotal	TBD
	Project Total	**TBD**

NOTE: Information related to steep side slopes will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

TABLE 1.3-5
STEEP SIDE SLOPES (>30 PERCENT) CROSSED BY THE PROJECT

Begin Milepost	End Milepost	Distance (ft)
Pennsylvania		
TBD	TBD	TBD
	Pennsylvania Subtotal	TBD
New York		
TBD	TBD	TBD
	New York Subtotal	TBD

TABLE 1.3-5
STEEP SIDE SLOPES (>30 PERCENT) CROSSED BY THE PROJECT

Begin Milepost	End Milepost	Distance (ft)
Massachusetts		
TBD	TBD	TBD
	Massachusetts Subtotal	TBD
Connecticut		
TBD	TBD	TBD
	Connecticut Subtotal	TBD
New Hampshire		
TBD	TBD	TBD
	New Hampshire Subtotal	TBD
	Project Total	**TBD**

NOTE: Information related to steep side slopes will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

In areas of rugged topography, ROW restoration will begin within 10 days of final pipeline installation to minimize potential erosion and sedimentation control problems, where weather and access issues allow. Tennessee will restore workspace locations within rugged terrain to pre-construction grades and contours. Excavated locations will be backfilled with the original substrate material and if necessary, permanent erosion control devices will be installed following site grading. To facilitate revegetation of the ROW restored workspace locations will be seeded, fertilized and mulched in accordance with Tennessee's Project-specific ECPs for each state.

1.3.2.2 Residential Areas

Detailed information relative to construction within residential areas, including techniques and mitigation measures to be implemented are discussed within Resource Report 8 (to be provided in the draft ER). Additionally, site specific drawings will be developed for occupied residential buildings within 50 feet of the construction workspace that will identify measures to minimize disruption and maintain access to the residences.

Temporary construction impacts on residential areas could include inconvenience caused by noise and dust generated by construction equipment, personnel, and trenching of roads or driveways; ground disturbance of lawns; removal of trees, landscaped shrubs, or other vegetative screening between residences; potential damage to existing septic systems or wells; and removal of aboveground structures such as fences, sheds, or trailers from the ROW.

Construction through or near residential areas will be done in a manner to ensure that all construction activities minimize adverse impacts on residences and that cleanup is prompt and thorough. Affected landowners will be notified at least three to five days before construction commences, unless more advance notice is required pursuant to a landowner agreement. Access to homes would be maintained, except for the brief periods essential for laying the new pipeline. Tennessee would implement general

measures to minimize construction-related impacts on all residences and other structures located within 50 feet of the construction ROW, including:

- attempt to maintain, where feasible, a minimum distance of 25 feet between any residence and the edge of the construction work area;
- install a safety fence at the edge of the construction ROW for a distance of 100 feet on either side of the residence;
- fence the boundary of the construction work area to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;
- attempt to leave mature trees and landscaping intact within the construction work area, unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions;
- ensure piping is welded and installed as quickly as reasonably possible to minimize the amount of time a neighborhood is affected by construction;
- backfill the trench within 10 days after the pipe is laid or temporarily place steel plates over the trench during non-working hours; and
- complete final cleanup, grading, and installation of permanent erosion control devices within 10 days after backfilling the trench, weather and access permitting.

To ensure that the trench is backfilled within 10 days after pipeline installation, Tennessee will use a typical pipeline construction sequence in which the pipeline installation crew is followed by a separate backfill crew. Tennessee will require its contractor, by contractual agreement, to backfill trenches in residential areas as soon as practicable after the installation of the pipeline. The minimal length of each construction spread will not require construction crews to be separated by significant distances during pipeline construction. Pipeline construction crews will be in close proximity to each other and will be able to efficiently communicate during the entire construction phase of the Project.

Topsoil in landscaped lawns will be segregated and replaced or topsoil will be imported. Immediately after backfilling, residential areas will be restored and all construction debris will be removed. Compaction testing will be performed and soil compaction mitigation will be performed in severely compacted areas. Lawns will be raked, topsoil added as necessary, and restored per landowner agreements.

Private property such as mailboxes, fences, gates, and other structures that have been removed will be restored, unless alternate plans have been made with the landowner. Sidewalks, driveways, and roads disturbed by pipeline construction will be restored to original condition upon completion of construction activities. Additionally, Tennessee may test water wells within 200 feet of the construction workspace, both before and after construction. After restoration is complete, a Tennessee representative will contact landowners to ensure that conditions of all agreements have been met and that the landowner has been compensated for damage incurred during construction.

If the construction ROW crosses a road or driveway, Tennessee will maintain existing access, or provide alternative access so residents have ingress/egress to their homes. If the road is open cut, one lane will remain open during construction or traffic will be detoured around the work area through the use of adjacent roadways. Traffic safety personnel will be present during construction periods, and signage and safety measures will be developed in compliance with applicable state and local roadway crossing

permits. To the maximum extent practicable, Tennessee will schedule work within roadways to avoid commuter traffic and impacts on school bus schedules.

In general, Tennessee will implement the following practices during construction within residential areas, where necessary to minimize impact:

1.3.2.2.1 Stove-Pipe Construction Method

The stove-pipe construction method is typically used when the pipeline is to be installed in very close proximity to an existing structure and an open trench would have an adverse impact. The technique involves installing one joint of pipe at a time in which the welding, weld inspection, and coating activities are all performed in the open trench, thereby reducing the width of the construction ROW. At the end of each day, the trench is backfilled and/or covered with steel plates or timber mats, or protected by fencing. The length of excavation performed each day will typically not exceed the amount of pipe installed.

1.3.2.2.2 Drag-Section Method

The drag-section construction method is another method that reduces the width of the construction ROW and is normally preferred over the stove-pipe method. This technique involves the trenching, installation, and backfill of a prefabricated length of pipe containing several segments all in one day. As in the stove-pipe method, the trench is backfilled and/or covered with steel plates or timber mats or protected by fencing at the end of each day after the pipe is lowered in, as necessary to ensure safety.

1.3.2.3 Agricultural Lands

To preserve soil productivity in agricultural lands, up to 12 inches of topsoil will be segregated and stored separately from subsoil during construction. Tennessee will utilize the full ROW topsoil segregation, as required by landowner agreements, or as required by the NRCS or County Conservation District, or as appropriate based upon site-specific conditions. Rock shall be removed from the top 12 inches (topsoil layer) or to the existing subsoil horizon during initial clean-up to a level such that the construction ROW is similar to surrounding areas. During the backfilling and restoration phases, topsoil will be replaced, and any rock uncovered during construction will be returned to the construction work area similar to that of adjacent areas not disturbed by construction. Any drain tiles damaged during construction will be repaired or replaced. Please refer to Resource Report 8 of this ER (to be provided in a subsequent filing of the ER) for additional information regarding agricultural land crossed by the Project.

1.3.2.4 Road and Railroad Crossings

Prior to construction, Tennessee will locate all existing underground utilities and make provisions for traffic management in work areas as necessary. The majority of road crossings will be completed using standard open cut or conventional boring methods. Conventional boring entails drilling a hole beneath travel arteries through which the pipe will pass. Additionally, any railroad alignments without rails in which the easement is no longer valid will be open cut. Resource Report 8 of this ER (to be provided in a subsequent filing of the ER) provides additional information regarding the crossing of roadways and railroads associated with the Project.

1.3.2.5 Trenchless Construction Methods

1.3.2.5.1 Conventional Bore

Conventional boring consists of creating a shaft/tunnel for a pipe or conduit to be installed to minimize surface disturbance. This is accomplished by first excavating a bore pit and a receiving pit. The bore pit is excavated to a depth slightly deeper than the depth of the associated trench and is graded such that the bore will follow the proposed angle of the pipe. A boring machine is then lowered to the bottom of the bore pit to tunnel using a cutting head mounted on an auger. The auger rotates through a bore tube, both of which are pushed forward as the hole is cut. The pipeline is then installed through the bored hole and welded to the adjacent pipeline. The typical workspace configurations required for boring operations consists of staging areas (50 feet x 100 feet) for boring machine setup, cuttings/return settlement and storage pits, pipe storage, entrance and exit pit spoil storage and construction equipment necessary to support the operation.

Major factors limiting the success of a boring operation include the crossing distance, subsurface soil and geologic conditions, and existing topography. Boring operations typically occur over crossing distance of 50 to 60 feet. The maximum length a bore could achieve in ideal soil conditions typically does not exceed 400 feet. Subsurface soil and geologic conditions must be conducive to establishing and maintaining a safe bore pit excavation, as well as provide the capabilities for the boring equipment to conduct a successful bore. Loose packed sediment, free of rock material, is preferred when conducting boring operations. The topographic conditions at a site may also limit the use of this method, as preferred locations are generally consistent with level or moderately convex terrain, such that the depth of the bore pit does not present concerns relative to constructability or safety constraints. Most roads along the proposed pipeline facilities are expected to be crossed via conventional bore.

1.3.2.5.2 Horizontal Directional Drill

HDD is a trenchless method of installing pipelines in areas where traditional open cut excavations are not feasible due to sensitive resource areas or logistical reasons. The greatest advantage of the HDD crossing technique is the fact that open cut trenching and equipment disturbance within sensitive resource areas are not necessary, and, as a result, environmental impacts on sensitive resource areas are minimized. However, a greater amount of equipment staging is required for HDD than for the open cut crossing method, and typical installation of an HDD segment generally occurs at durations two to three times slower than a conventional open cut crossing.

A minimum workspace footprint of 200 feet wide by 250 feet long is required at the entry and exit points to support the drilling operation. The amount of workspace required can vary significantly from site to site based on site specific conditions. The entry-side equipment and operations typically will include the drilling rig and entry hole, control cab, drill string pipe storage, site office and tool storage trailers, power generators, bentonite storage, bentonite slurry mixing equipment, slurry pump, cuttings separation equipment, cuttings return/settlement pit, water trucks and water storage, and the heavy construction equipment necessary to support the operation.

Exit-side equipment and operations typically will include the exit point and slurry containment pit, cuttings return/settlement pit, cuttings separation and slurry reclamation equipment, drill string pipe storage, and the heavy construction equipment necessary to support the operation. In addition to the drilling operations to be conducted within this workspace footprint, ATWS will be required along the

working side ROW. ATWS in the form of "false" ROW may be required to provide a straight corridor for handling pipe at HDD locations where the ROW changes direction, in which to prefabricate the pipeline into one continuous section in preparation for the pull-back. Because this "false" ROW must be relatively straight to accommodate a long section of pipe before it is pulled through the annulus, a significant area of ATWS would be required outside of the standard pipeline construction workspace. Once assembled, the pipeline will be placed on pipe rollers so that it may be conveyed into the drill hole during the pull-back operation.

The locations where proposed HDDs will be included in Table 1.3-6 as evaluations of HDD crossings are ongoing. Locations of any HDDs as well as site-specific plans will be provided for these areas in a revised Resource Report 1 to be submitted in a subsequent filing of ER. There are risks associated with HDD, including inadvertent returns during drilling operations and inaccessibility for visual inspection of the pipe and repairs post construction. Each HDD crossing proposed will be analyzed to confirm feasibility during the detailed design of the Project, including geotechnical core borings at proposed locations. For crossings where an HDD is determined to be not feasible, Tennessee will propose an alternative construction method at those crossings.

TABLE 1.3-6
HORIZONTAL DIRECTIONAL DRILL CROSSINGS FOR THE PROJECT

Pipeline ID	Milepost	Length (feet)	Township	County / State	Comment
TBD	TBD	TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD	TBD	TBD
Project Total		**TBD**	**TBD**	**TBD**	**TBD**

NOTE: Information related to HDDs will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

1.3.2.6 Rock Removal

Rock encountered during trenching will be removed using one of the techniques detailed below. The technique selected is dependent on relative hardness, fracture susceptibility, expected Volume, and location. Techniques 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.

While some of this rock may be rippable by conventional excavation equipment, some of it may require blasting. All blasting activity will be performed according to strict guidelines designed to control energy

release. Proper safeguards will be taken to protect personnel and property in the area. Please refer to Resource Report 6 of this ER (to be provided in a subsequent filing of the ER), for details relative to blasting. Methods will be employed to prevent the scattering of rock and debris. Tennessee will strictly 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. Special care will be taken to monitor and assess blasting within 150 feet of dwellings and private or public water supply wells.

Tennessee will develop a Project-specific Blasting Plan for the Project that establishes procedures and safety measures that Tennessee's contractor will be required to adhere to while implementing blasting activities along the pipeline ROW during the Project. Tennessee will also obtain all the necessary Federal, state, or local blasting permits prior construction. Tennessee's construction contractor will be required to submit a detailed Blasting Specification Plan to Tennessee that is consistent with the provisions of the Blasting Plan and Kinder Morgan Construction Specifications. The construction contractor's plan, when approved by Tennessee, will be incorporated into the contractor's scope of work. Tennessee's Blasting Plan will be provided in a subsequent filing of the ER.

Excess rock is defined as all rock that cannot be returned to the existing rock profile in the trench or graded cuts or is not needed to restore the ROW surface to a condition comparable to that found adjacent to the ROW. Excess rock will be hauled off the ROW and disposed of at an approved landfill or recycling facility unless approved for use as slope stabilization, windrowing or for some other use on the construction work areas as approved by the landowner or land managing agency.

TABLE 1.3-7
SHALLOW DEPTH TO BEDROCK FOR THE PROJECT

Pipeline ID	Length of Pipe (miles)	Length of Pipe in Rock (ft)
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD
Project Total		**TBD**

NOTE: Information related to HDDs will be included a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

1.3.2.7 Wetland Crossing Construction

Wetland locations along the pipeline segments will be described in Resource Report 2 and shown on the aerial alignment sheets and site-specific wetland plans (all to be provided in a subsequent filing of the ER). Pipeline construction across wetlands will be performed in accordance with Tennessee's Project-specific ECPs for each state.

Tennessee will utilize one of the following methods for installing the pipeline within wetlands during construction. The construction methods include:

- Standard Pipeline Construction
- Conventional Wetland Construction
- Conventional bore
- HDD
- Push-Pull Technique

These wetland crossing techniques will be described in detail in Resource Report 2 (to be provided in a subsequent filing of the ER). Typical drawings depicting these construction methods will be provided in a subsequent filing of this ER. The wetland impact summary tables will be located in Resource Report 2 and the alignment sheets identifying the proposed crossing technique for each wetland and will be provided in a subsequent filing of this ER (all to be provided in a subsequent filing of the ER).

1.3.2.8 Waterbody Crossing Construction

Waterbody locations along the pipeline segments will be described in Resource Report 2 and shown on the aerial alignment sheets and site-specific wetland plans (to be provided in a subsequent filing of the ER). Pipeline construction across waterbodies will be performed in accordance with the Tennessee's Project-specific ECPs for each state and with applicable permit conditions. It is not anticipated that any crossings will take place outside of the timeframes outlined in Tennessee's Project-specific ECPs for each state. If any crossings are required to take place outside of the specified timeframes, Tennessee will consult with the applicable state agencies to obtain concurrence to proceed with construction outside of the specified timeframes. The waterbody tables to be included in Resource Report 2 and alignment sheets (all of which will be provided in a subsequent filing of the ER) identify the proposed crossing technique for each waterbody. Typical drawings depicting these crossing techniques will be located in Tennessee's Project-specific ECPs for each state to be provided in a subsequent filing of the ER.

Tennessee will utilize one of the following methods for installing the pipeline across waterbodies:

- Wet Open Cut Method
- Dry Crossing Method
  - Flume crossing
  - Dam and pump
  - Cofferdam
  - Dry Open Cut (conventional trenching waterbodies that are dry or frozen at the time of crossing during periods of no flow)
- Conventional Bore
- HDD

These waterbody crossing techniques will be described in detail in Resource Report 2. The waterbody impact summary tables will be located in Resource Report 2 and the alignment sheets identifying the proposed crossing technique for each waterbody will be provided in a subsequent filing of the ER.

1.3.2.9 Project Specific Alternative Measures or Modifications to Commission's Plan and Procedures

Tennessee anticipates that it will request exceptions to the Commission's Plan and Procedures as Tennessee continues to develop its route. Proposed modifications to the Commission's Plan and Procedures will be requested in a subsequent filing of the ER. These exceptions will be incorporated in the Project-specific ECPs for each state.

1.3.2.9.1 Upland Erosion Control, Revegetation, and Maintenance Plan

Any exceptions to the Commission's Plan will be requested in a subsequent filing of the ER.

1.3.2.9.2 Wetland and Waterbody Construction and Mitigation Measures

Any exceptions to the Commission's Procedures will be requested in a subsequent filing of the ER.

1.3.3 Compressor Stations, Meter Stations, and Appurtenant Facilities (Aboveground)

The new compressor stations, modifications to one existing compressor station, new meter stations, modifications to existing meter stations, and appurtenant facilities will be constructed in accordance with industry standards. Preliminary plans which will be provided in a subsequent version of the ER, will detail the new compressor stations, modifications to one existing compressor station, new meter stations, modifications to existing meter stations, MLVs and pig launcher/receivers. Construction of these facilities will coincide with construction of the pipeline facilities. Cathodic protection will be installed at each compressor station location. Some appurtenant facilities may need cathodic protection (as determined by cathodic protection pre-and post-surveys).

1.3.3.1 Clearing and Grading

The sites for the aboveground facilities will be cleared of vegetation and graded as necessary to create level surfaces for the movement of construction vehicles on the sites and to prepare the areas for the building foundations, where required for specific aboveground facilities. Tennessee will install silt fence and/or hay bales around disturbed areas, as appropriate to the land, soil, and weather conditions, to minimize the potential for erosion and for impacts to off-site wetlands and waterbodies. Erosion and sediment controls will conform to Tennessee's Project-specific ECPs for each state.

1.3.3.2 Foundations

Where required, building foundations are likely to be constructed of poured reinforced concrete. Topsoil, if present, would be stripped from the area of the building foundations. Such soil may be used on-site either for landscaping or to provide soil cover for the septic system leach field, if acceptable. Additional soil or subsurface materials may be imported from approved sources to achieve the desired site/foundation grade.

1.3.3.3 Building Design and Construction

The valve shed buildings will have the same size footprint with open walls and a sloping roof that will tie in to the compressor building roof line. Each compressor building will house the natural gas fueled turbine driven-compressor packages and the electric-driven compressor package.

Tennessee will perform air quality impact modeling to support its applications to the Pennsylvania Department of Environmental Protection ("PADEP"), New York State Department of Environmental Conservation ("NYSDEC), and Massachusetts Department of Environmental Protection ("MassDEP") for air permits to construct and operate the proposed turbine-compressors. Final stack heights will be determined through the applicable state-permit review process. Air quality modeling reports will be submitted to the regulatory agencies in the respective states as part of Tennessee's air permit applications. The modeling reports document that the proposed stack heights and other design parameters achieve acceptable dispersion of turbine exhaust emissions to comply with ambient air quality regulations and standards. The compressor unit design will incorporate various safety features, discussed in Section 1.4.3 of this Resource Report 1.

During a typical building construction sequence, the steel frames would be erected followed by the installation of the roof system, exterior wall sheathing, wall insulation, and interior wall sheathing, as specified by the building design plans. Cutouts for protrusions through the siding (e.g., inlet and exhaust vents) would be flashed to ensure that the buildings would be weather-tight.

1.3.3.4 High Pressure Piping

Tennessee proposes to design and construct the high pressure station piping in both the new compressor and meter stations and modified stations to meet the requirements of the USDOT, 49 CFR Part 192. Tennessee proposes to coat the station piping for protection against corrosion.

1.3.3.5 Pressure Testing

Prior to placing each of the compressor stations and meter stations (whether new or modified) in-service, Tennessee proposes to conduct pressure testing of the piping system. Tennessee proposes to conduct this test in accordance with applicable state and local code or regulatory requirements.

1.3.3.6 Infrastructure Facilities

The installation of the infrastructure facilities includes the various compressors and auxiliary equipment, piping, and other electrical and mechanical systems. These systems have been previously installed at the existing compressor station and meter station sites where modifications are planned. Tennessee is still evaluating the potential need for new electric and communication utilities, in addition to domestic water service and sewer disposal systems in the form of on-site water wells and septic systems for the proposed new compressor stations.

1.3.3.7 Control Checkout and Engine Startup

Before the new compressor units are put into service at the new and modified compressor stations, Tennessee shall develop and implement station commissioning plans. These plans would include the checking and testing of controls and safety features, including the blowdown silencers, relief valves, gas

and fire detection facilities, over-speed, vibration, and other on- and off-engine protection and safety devices.

1.3.3.8 Final Grading and Landscaping

Prior to construction, Tennessee will develop plans for the final grading and landscaping of the areas that will be disturbed during construction. These final grading and landscaping plans will be consistent with Tennessee's Project-specific ECPs for each state for the restoration of uplands.

1.3.3.9 Erosion Control Procedures

During the construction of the new and modified compressor stations, meter stations and other aboveground facilities, Tennessee will adhere to the applicable provisions of Tennessee's Project-specific ECPs for each state. As set forth in the referenced documents, Tennessee proposes to install appropriate erosion controls (e.g., silt fence and/or hay bales) to minimize the potential for erosion from construction of the facilities.

1.3.4 Timeframe for Construction

Construction of the Project will commence after private ROWs and federal and state ROWs and permits have been acquired for the Project. Tennessee anticipates that it will file an application with the Commission seeking a certificate of public convenience and necessity for the Project in September 2015, which will request issuance of a certificate by October 2016. Certain aspects of construction, including winter tree clearing to avoid Indiana bat breeding periods, compliance with the Migratory Bird Treaty Act ("MBTA"), installation of HDD segments, and pipeyard and contractor yard preparation are planned begin in the first quarter of 2017. The 2017 construction activities for the Project are scheduled to commence in the spring of 2017, pending specific construction windows imposed on the Project. Winter tree clearing for the 2018 construction activities is scheduled to commence in October 2017, with the 2018 construction activities scheduled to commence in the spring of 2018. All Project facilities are anticipated to go in-service November 2018 (with the exception of two proposed pipeline looping segments in Connecticut which would be placed in service by November 1, 2019). The details regarding the 2017 and 2018 construction activities will be provided in a subsequent filing of the ER.

Tennessee estimates that seven construction spreads will be required for the PA to Wright Pipeline Segment and Wright to Dracut Pipeline Segment mainlines. Each spread will consist of approximately 400-450 personnel depending upon the pipeline facility, and each spread will take approximately nine months to one year to complete, depending upon site-specific conditions for each pipeline facility.

Construction of the new and modified compressor station facilities will require approximately nine months to one year to complete and will require up to 60-75 construction workers depending upon the facility.

Construction of the new and modified meter station facilities will require approximately two months to six months to complete and will require up to 25 construction workers depending on the facility.

Tennessee anticipates there will be a need for additional permanent staff for operation of the new Project facilities, and new operations offices or district offices will be required for operation of the Project facilities have been identified as of the date of filing this draft Resource Report 1.

1.3.5 Supervision and Inspection

Tennessee will use a minimum of one qualified, full-time EI for each pipeline spread during Project construction, as well as a minimum of one Lead Environmental Inspector ("LEI") to oversee the EI staff. The EIs assigned to oversee construction for the individual pipeline spreads will also oversee the construction of the new and modified compressor stations, meter stations and appurtenant facilities in the area. Tennessee conducts in-house Environmental Inspector training to ensure that the EIs will be able to carry out their duties as described in this document and that construction activities will be in compliance with the Project-specific ECP requirements for each state and with requirements of applicable federal, state and local environmental permits and approvals and environmental requirements in landowner easement agreements. Additionally, Tennessee will conduct environmental training in advance of construction, and the EIs would perform all duties as specified in Tennessee's Project-specific ECPs for each state. The level of training will be commensurate with the type of duties of the Project personnel.

1.4 OPERATION AND MAINTENANCE PROCEDURES

Tennessee will operate and maintain the newly constructed pipeline segments in the same manner as it currently operates and maintains its existing major interstate pipeline facilities in accordance with the requirements of the Commission, the USDOT's PHMSA in accordance with 49 CFR Part 192, and industry-proven practices and techniques. The facilities will be operated and maintained in a manner such that pipeline integrity is protected to ensure that a safe, continuous supply of natural gas reaches its ultimate destination. Maintenance activities will include regularly scheduled gas-leak surveys and measures necessary to repair any potential leaks. The latter may include repair or replacement of pipe segments. All fence posts, signs, marker posts, aerial markers, and decals will be maintained to ensure that the pipeline locations will be visible from the air and ground. The pipeline and aboveground facilities will be patrolled on a routine basis, and personnel qualified to perform both emergency and routine maintenance on interstate pipeline facilities will handle maintenance.

The Project facilities will be patrolled on a periodic basis (see Section 1.4.2.1 below), as are Tennessee's existing facilities. This will provide information on possible leaks, construction activities, erosion, exposed pipe, population density, possible encroachment, and any other potential problems that may affect the safety and operation of the pipeline. In addition, Tennessee is a participant in the "Pennsylvania One Call," for Pennsylvania, the "Dig Safe" system for the states of New York, Massachusetts and New Hampshire, and the "Call Before You Dig" system for the state of Connecticut as well as the national "811" call system. Under these systems, anyone planning excavation activities must call a dedicated telephone number to alert all utility companies. Representatives of the utility companies that may be affected then visit the site and mark their facilities so that the excavation can proceed with relative certainty as to the location of all underground lines.

1.4.1 Cleared Areas

A typical post-construction permanent ROW of 50 feet will be maintained for the new pipeline segments in accordance with the Tennessee's Project-specific ECPs for each state. Maintaining a cleared ROW is necessary for the following reasons:

- Access for routine pipeline patrols and corrosion surveys;
- Avoid pipeline damage from large roots

- Access in the event that emergency repairs of the pipeline are needed;
- Visibility during aerial patrols; and
- To serve as a visual indicator to the public of an underground pipeline utility and easement.

Operational vegetation maintenance of Tennessee's permanent ROW in uplands would be conducted on a frequency of approximately once every three years to maintain in an herbaceous to low scrub-shrub cover state. Tennessee will annually maintain from edge to edge of right-of-way in uplands and a 10-foot corridor centered over the pipeline in wetlands to facilitate pipeline surveys and emergency access on an as-needed basis.

Within wetlands, Tennessee will only maintain the 10-foot corridor centered over the pipeline, allowing the balance of Tennessee's permanent easement to revert back to its natural, pre-construction vegetated cover state. Additionally, within wetlands, Tennessee reserves the right to selectively cut and remove trees located within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating.

Post-construction management of the ROW will be conducted in accordance with the procedures outlined in the Project-specific Invasive Species Management Plans ("ISMP") for each state that will be contained within Tennessee's Project-specific ECPs for each state (to be provided in a subsequent filing of the ER). Vegetation maintenance (with respect to the control of invasive species) as well as yearly monitoring and mitigation measures will be detailed in the ISMP.

Following construction of the pipeline facilities, areas used for TWS and ATWS will be allowed to revert to their pre-construction land use/land cover with no further vegetation maintenance by Tennessee. Additionally, crop production will be allowed to continue in agricultural areas, immediately following construction or the following growing season.

1.4.1.1 Erosion Control

Erosion problems on the pipeline ROW will be reported to the local operations supervisor. These reports may originate from landowners or company personnel performing routine patrols. Corrective measures will be conducted as needed.

1.4.2 Pipeline Facilities

The pipeline will be patrolled on a periodic basis as specified in Section 1.4.2.1. This will provide information on possible leaks, construction activities, erosion, exposed pipe, population density, possible encroachment, and any other potential problems that may affect the safety and operation of the pipeline. Tennessee is a participant in the "Pennsylvania One Call," for Pennsylvania, the "Dig Safe" system for the states of New York, Massachusetts and New Hampshire, and the "Call Before You Dig" system for the state of Connecticut as well as the national "811" call system. Under these systems, anyone planning excavation activities must call a single number to alert all utility companies. Representatives of the utility companies that may be affected then visit the site and mark their facilities so that the excavation can proceed with relative certainty as to the location of all underground lines. In addition, Tennessee employs damage prevention personnel whose job it is to monitor, inspect, and assess all third-party activities near Tennessee's pipeline facilities.

Other maintenance functions will include:

(1) periodic seasonal vegetation management of the ROW in accordance with the timing restrictions outlined in Tennessee's Project-specific ECPs for each state;

(2) terrace repair, backfill replacement, and drain tile repair as necessary;

(3) periodic inspection of water crossings; and

(4) maintenance of a supply of emergency pipe, leak repair clamps, sleeves, and other equipment needed for repair activities.

Tennessee will not use herbicides or pesticides within 100 feet of a wetland or waterbody unless approved by applicable federal, state and local agencies and directly affected landowners.

Cathodic protection of the pipeline will be conducted with impressed current systems that employ rectifier/groundbed systems. Units will be installed at various locations perpendicular to the pipeline and aboveground test stations will be installed at various locations along the pipeline to gather accurate information for potential current adjustments. The cathodic protection system will be regularly monitored to maintain required pipe-to-soil potential and will be achieved in accordance with the specifications set forth by Tennessee that meet USDOT regulations. Locations of cathodic protection areas will be identified in Table 1.4-1 below in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

In areas where the pipeline parallels high-voltage electric transmission lines, an alternating current mitigation system will be implemented as necessary to reduce stray current, to prevent possible shock to personnel during post-construction activities, and to prevent interference with the cathodic protection system. This system will be primarily composed of zinc ribbon, grounding mats and solid state decouplers, or other suitable design.

TABLE 1.4-1
CATHODIC PROTECTION AREAS ALONG THE PROJECT

Pipeline	County	Township	Milepost
TBD	TBD	TBD	TBD

NOTE: Information related to cathodic protection will be included in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

1.4.2.1 Periodic Pipeline and ROW Patrols

The pipeline and ROW will be patrolled on a periodic basis. The frequency of the patrol of the pipeline by either aerial or ground surveys is determined by the size, operating pressure, class, terrain, weather and other relevant factors. The interval between patrols may not be longer than the applicable USDOT regulations.

Additional ground surveys are conducted on an as needed basis to respond to issues such as landowner concerns and third-party encroachments. During ROW patrols, all permanent erosion control devices that are installed during construction will be inspected to ensure that they are functioning properly. Additionally, attention will be given to:

- Existing stormwater outfalls along the alignment;
- Erosion and washouts along the ROW;

- Water control devices such as diversions;
- Condition of banks at drainage ditch crossings;
- Fallen timber or other threats to the pipeline;
- Shrubs and other vegetation planted during construction; and
- Any other conditions that could endanger the pipeline.

The local operations supervisor will be notified of any conditions that need attention. Corrective measures will be performed as needed.

1.4.3 Aboveground Facilities

Tennessee will operate and maintain the proposed aboveground facilities in accordance with standard procedures designed to ensure the integrity of the facilities and to provide its shippers and the general public with a safe and dependable natural gas supply. The facilities will be designed, constructed, and operated in accordance with requirements of the Commission, USDOT, industry-proven practices and techniques, and other federal, state, and local requirements as applicable.

Responsibilities of Tennessee will include:

(1) operation and maintenance of pipeline and aboveground facilities safely to provide the required gas flow;
(2) inspection and maintenance of the pipeline system;
(3) regular monitoring of the ROW;
(4) development and implementation of an ongoing program of safety and environmental compliance;
(5) regulatory compliance maintenance inspections;
(6) administration; and
(7) landowner relations. All operational, environmental, and regulatory inspections will be followed per applicable Tennessee Operations & Maintenance procedure.

In accordance with USDOT regulations, 49 CFR Part 192, the facilities will be regularly inspected for leakage as part of scheduled operations and maintenance. Tennessee intends to follow the established Tennessee operations and maintenance procedures to ensure that the compressor stations operate safely. Standard Tennessee operations at existing compressor stations include activities such as the calibration, maintenance, and inspection of equipment, as well as the monitoring of pressure, temperature, and vibration data, and traditional landscape maintenance such as mowing. Tennessee's standard operations currently also include the periodic checking of safety and emergency equipment and cathodic protection systems.

Project facilities will be marked and identified in accordance with applicable regulations. Liaison will be maintained with the public as well as with government agencies regulating activities at compressor stations. Overall, maintenance activities will be in compliance with requirements of Tennessee's Project-Specific ECPs for each state, as well as other applicable regulatory requirements. The compressor stations will be remotely linked to Tennessee's information and data software networks and infrastructure which monitors the pipeline system on a 24-hour per day basis.

1.5 FUTURE PLANS AND ABANDONMENT

The addition of the pipeline facilities, the addition and modification of compressor and meter stations, and the installation of associated appurtenant facilities that comprise the Project are designed to efficiently meet market needs as discussed in Section 1.1.1, Purpose and Need, above. The Project is in direct response to increased demand for natural gas pipeline transportation capacity in the Northeast U.S.

This Project is a stand-alone project. It does not require or necessitate the construction of any pipeline or compression facilities that are proposed as part of any pending or current project or anticipated to be proposed for any future project. Tennessee will proceed with this Project even if no other expansion projects are proposed. Any future expansion of the facilities proposed as part of this Project will be dependent upon a showing of additional demand for natural gas services.

On July 31, 2014, Tennessee filed an application for a certificate of public convenience and necessity for the Connecticut Expansion Project with the Commission in Docket No. CP14-529-000. The Connecticut Expansion Project involves the construction of three pipeline looping segments in New York, Massachusetts, and Connecticut, as well as minor modifications at its existing Agawam Compressor Station located in Massachusetts. The Connecticut Expansion Project is a stand-alone project, limited in size and scope, and supported by binding precedent agreements for 100 percent of the firm transportation capacity to be created by that project. Tennessee has requested a certificate order to be issued for the Connecticut Expansion Project in July 2015 so that it may construct and place the proposed facilities in service by November 1, 2016, the in-service date requested by the three shippers that have executed binding precedent agreements for all of the firm transportation capacity to be created by the Connecticut Expansion Project.

The facilities that are proposed for the NED Project will not require modifications to the pipeline looping segments and appurtenant facilities proposed as part of the Connecticut Expansion Project. However, Tennessee, as part of the NED Project, is proposing to extend one of the pipeline looping segments proposed as part of the Connecticut Expansion Project (this looping segment is referred to as the "Connecticut Loop", a partial loop segment proposed to be installed on Tennessee's 300 Line in Connecticut, in the certificate application for the Connecticut Expansion Project) in order to efficiently create the incremental capacity for the proposed NED Project. This pipeline looping segment is referred to as the "300 Line CT Loop" in this Project filing. In addition, Tennessee is proposing to add a co-located pipeline on Tennessee's 200 Line in New York as part of the NED Project that would be in close geographic proximity to the New York Loop, which was proposed as part of the Connecticut Expansion Project. Tennessee identified these two limited areas where the project facilities for both projects may be adjacent or in close geographic proximity in Section 1.5, Future Plans and Abandonment, of Resource Report 1 that was submitted as part of the ER with the Connecticut Expansion Project certificate application. As Tennessee noted, as the plans for the NED Project progress, Tennessee stated that it would update the Commission with information regarding any proposed facilities for the NED Project that potentially may impact the proposed facilities for the Connecticut Expansion Project.

Tennessee intends to submit information regarding areas where proposed facilities are adjacent or in the same geographic area for both projects in this proceeding, as well as in the Connecticut Expansion Project proceeding, to assist the Commission in its evaluation of cumulative impacts of the two projects. Tennessee anticipates that it will include information regarding cumulative impacts for the NED Project and Connecticut Expansion Project in subsequent filings of the ER, as well as updating the ER that was submitted with the certificate application for the Connecticut Expansion Project in that proceeding, to

allow the Commission to perform a meaningful analysis of the cumulative impacts of the two projects.[15] Tennessee will also include in its cumulative impacts analysis for the NED Project other past, present or reasonably foreseeable projects identified in the areas of impact for resources impacted by the NED Project.

Tennessee is also in the planning stages for a proposed backhaul project for the 300 Line, in which gas supplies would be transported from east to west on Tennessee's 300 Line beginning in Susquehanna County, Pennsylvania, through Bradford and Tioga Counties, for deliveries in Potter County, Pennsylvania (referred to as the "Susquehanna West Project"). Tennessee has conducted a binding open season to determine interest in that project. The anticipated in-service date for the Susquehanna West Project is expected to be November 2017 or later. Tennessee is determining the final scope and facilities needed for the Susquehanna West Project, but does not believe that any facilities required for that project will require any modifications to the pipeline looping segments proposed for the 300 Line as part of the NED Project. Tennessee is also in the conceptual stage for other potential projects on the 300 Line, east of the location of the pipeline looping segments proposed for the NED Project. Tennessee is determining if other such projects are economically justified and, if so, determining the proposed scope and facilities needed for such future projects. Although the evaluation is not yet complete, Tennessee believes that any facilities required for future projects will not require any modifications to the pipeline looping facilities on the 300 Line proposed as part of the NED Project. Tennessee will design any facilities (which may consist of pipeline looping and/or compression) needed for future expansions of the 300 Line to be compatible with Tennessee's existing facilities, including the proposed NED Project facilities, and will undergo the applicable federal, state, and local regulatory review (including the filing of a separate application for a certificate of public convenience and necessity from the Commission) for any such future expansions.

1.6 PERMITS AND APPROVALS

All construction, operation, and maintenance of the Project will be conducted in accordance with Tennessee's specifications and all applicable federal, state, and local permit requirements. The environmental permits, licenses, approvals, and certificates that have been or will be sought for the Project are identified in Table 1.6-1. Tennessee and its agents have consulted federal, state, and local regulatory officials and government agencies regarding this Project. A list of regulatory contacts and agency correspondence is included in Volume II, Appendix A and Appendix B.

[15] Tennessee notes that it submitted an application seeking a certificate of public convenience and necessity for the Niagara Expansion Project on February 21, 2014 in Docket No. CP14-88-000, and that certificate application remains pending. As part of that filing, Tennessee is seeking authorization to install an approximately 3.1 mile 30-inch pipeline looping segment on its 200 Line in Chautauqua County, New York, as well as to modify existing compressor facilities in Chautauqua County, New York and Mercer County, Pennsylvania, as well as modify the Hamburg Meter Station in Erie County, New York. The proposed facilities for the Niagara Expansion Project, though also involving Tennessee's 200 Line, are located approximately 130 miles to the west of the Project facilities.

TABLE 1.6-1
PERMITS, LICENSES, APPROVALS, AND CERTIFICATES REQUIRED FOR CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROJECT

Permit/Approval	Administering Agency	Status
Federal		
Certificate of Public Convenience and Necessity	Federal Energy Regulatory Commission	Certificate application to be submitted September 2015
Section 404/Individual Permits	United States Army Corps of Engineers-Baltimore District	Applications to be submitted in September 2015
	United States Army Corps of Engineers-New York District	
	United States Army Corps of Engineers-New England District	
Endangered Species Act Section 7 Clearance, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act	United States Fish and Wildlife-Pennsylvania Field Office	Consultations in Progress
	United States Fish and Wildlife-New York Field Office	
	United States Fish and Wildlife-New England Field Office	
National Oceanic and Atmospheric Administration (NOAA)	Northeast Region	Consultation in Progress
Pennsylvania State		
401 Water Quality Certification	PADEP Bureau of Water Quality Protection	Applications to be submitted in September 2015
Water Obstruction and Encroachment Permits	PADEP Bureau of Water Quality Protection	Applications to be submitted in September 2015
National Pollutant Discharge Elimination System (“NPDES”) – Hydrostatic Test Water Discharge General Permit (PAG 10) or Individual Permit	PADEP Bureau of Water Quality Protection	Application to be submitted in January 2016
NPDES Section 402 Chapter 102 Erosion and Sediment Control Permit (“ESCGP-2”) for Construction Activities	PADEP Bureau of Water Quality Protection and County Conservation Districts	Applications to be submitted in December 2016
Submerged Land License Agreement	PADEP Bureau of Water Quality Protection	Applications to be submitted in May 2016

TABLE 1.6-1
PERMITS, LICENSES, APPROVALS, AND CERTIFICATES REQUIRED FOR CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROJECT

Permit/Approval	Administering Agency	Status
Water Allocation Permit	Susquehanna River Basin Commission	Application to be submitted May 2016
Consumptive Use Permit for Horizontal Directional Drills	Susquehanna River Basin Commission	Application to be submitted May 2016
Permit for Use of Explosives in Commonwealth Waters	Pennsylvania Fish and Boat Commission	Applications to be submitted in September 2016
State Species Consultations	Pennsylvania Department of Conservation and Natural Resources	Consultations in progress
	Pennsylvania Fish and Boat Commission	Consultations in progress
	Pennsylvania Game Commission	Consultations in progress
Section 106, National Historic Preservation Act Consultation	Pennsylvania Historical and Museum Commission	Consultations in progress
Plan Approval Permit	PADEP Bureau of Air Quality—Northeast/Northcentral Regions	Applications to be submitted in September 2015
Highway Occupancy Permit	Pennsylvania Department of Transportation	Application to be submitted May 2016
Highway Crossing Permit	Pennsylvania Department of Transportation	Application to be submitted May 2016
New York State		
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	New York State Department of Environmental Conservation-Division of Environmental Permits	Applications to be submitted in September 2015
State Pollution Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity	New York State Department of Environmental Conservation-Division of Water Bureau of Water Permits	Applications to be submitted in December 2015

TABLE 1.6-1
PERMITS, LICENSES, APPROVALS, AND CERTIFICATES REQUIRED FOR CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROJECT

Permit/Approval	Administering Agency	Status
Coastal Zone Consistency Determination (Federal and State Reviews)	New York State Department of State	Consultation to be submitted in September 2015
Water Allocation Permit	Susquehanna River Basin Commission	Applications to be submitted in November 2015
Water Allocation Permit	Delaware River Basin Commission	Applications to be submitted in November 2015
Temporary Revocable Permit	New York State Department of Environmental Conservation-Bureau of Forest Lands	Applications to be submitted in November 2015
State Species Consultation	New York Department of Environmental Conservation-Division of Fish, Wildlife and Marine Resources	Consultations in progress
Agricultural Lands Consultation	New York State Department of Agricultural Management	Consultations to be submitted in March 2015
Section 106, National Historic Preservation Act Consultation	New York State Office of Parks, Recreation and Historic Preservation	Consultations in progress
Air State Facility Permit	New York State Department of Environmental Conservation-Air Quality	Applications to be submitted in September 2015
Highway Occupancy Permit	New York State Department of Transportation	Applications to be submitted in November 2015
Massachusetts State		
Massachusetts Environmental Policy Act (MEPA) Certificate (301 CMR 11.00) Environmental Notification Form	Massachusetts Office of Energy and Environmental Affairs	ENF to be submitted in July 2015
Clean Water Act 401 Water Quality Certification	Massachusetts Department of Environmental Protection-Division of Environmental Permits	Applications to be submitted in September 2015

TABLE 1.6-1
PERMITS, LICENSES, APPROVALS, AND CERTIFICATES REQUIRED FOR CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROJECT

Permit/Approval	Administering Agency	Status
Chapter 91 License (MA Waterfront Act)	Massachusetts Department of Environmental Protection	Applications to be submitted in December 2015
NPDES General Permit for Stormwater Discharges from Construction Sites	United States Environmental Protection Agency	Applications to be submitted in September 2015
Hydrostatic Testwater Discharge Permit	United States Environmental Protection Agency	Applications to be submitted in December 2015
Water Withdrawal Permit	Massachusetts Department of Environmental Protection	Applications to be submitted in May 2016
Air Quality Permit	Massachusetts Department of Environmental Protection	Applications to be submitted in September 2015
State Species Consultation, MA Endangered Species Act	Massachusetts Division and Wildlife and Fishers	Consultation to be submitted in December 2014
Article 97 for Easements on State Lands	Massachusetts State Legislature and Governor	Application to be submitted in January 2016
Section 106, National Historic Preservation Act Consultation	Massachusetts Historical Commission	Consultation in progress
Massachusetts Wetland Protection Act	Massachusetts Town and Conservation Commissions	Applications to be submitted in January 2016
Approval to Construct	Massachusetts Energy Siting Board	Coordination in September 2015
State Highway Access Permits	Massachusetts Department of Transportation	Applications to be submitted in May 2016
Connecticut State		
Clean Water Act 401 Water Quality Certificate	Connecticut Department of Energy and Environmental Protection-Bureau of Water Protection	Applications to be submitted in September 2015
General Permit for Hydrostatic Discharges	Connecticut Department of Energy and Environmental Protection-Bureau of Water Protection	Applications to be submitted in March 2016

TABLE 1.6-1
PERMITS, LICENSES, APPROVALS, AND CERTIFICATES REQUIRED FOR CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROJECT

Permit/Approval	Administering Agency	Status
General Permit for Stormwater and Dewatering Wastewater from Construction Sites	Connecticut Department of Energy and Environmental Protection-Bureau of Water Protection	Applications to be submitted in May 2016
Water Diversion Permit	Connecticut Department of Energy and Environmental Protection-Bureau of Water Protection	Applications to be submitted in December 2015
State Species Consultation	Connecticut Natural Diversity Database	Consultation to be submitted in December 2014
Inlands Wetlands and Watercourses	Connecticut Town Inland Wetland Commissions	Applications to be submitted in January 2016
Section 106, National Historic Preservation Act Consultation	Connecticut State Historic Preservation Office	Consultation in progress
New Hampshire State		
New Hampshire Site Evaluation Committee	New Hampshire Certificate of Site and Facility	Application to be submitted in December 2015
Clean Water Act 401 Water Quality Certificate	New Hampshire Department of Environmental Services-Watershed Management	Applications to be submitted in September 2015
Dredge and Fill Permit	New Hampshire Department of Environmental Services-Wetlands Bureau	Applications to be submitted in May 2016
Shoreland Permit	New Hampshire Department of Environmental Services-Wetlands Bureau	Applications to be submitted in May 2016
NPDES Construction General Permit	United States Environmental Protection Agency	Applications to be submitted in December 2015
Large Groundwater Withdrawal Permit or Surface Water Use Registration	New Hampshire Department of Environmental Services-Watershed Management	Applications to be submitted in December 2016
Alteration of Terrain	New Hampshire Department of Environmental Services-Alteration of Terrain	Applications to be submitted in May 2016

1.7 NON-JURISDICTIONAL FACILITIES

Tennessee is not proposing nor is it aware of any non-jurisdictional facilities being construction by others as a direct result of this Project. If, upon further evaluation of the Project, non-jurisdiction facilities are identified, further information will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

1.8 LANDOWNER/AGENCY CONSULTATION

Tennessee began its stakeholder outreach efforts in January 2014 to inform the public, including government officials about the Project. Lists of Project Stakeholders (Federal and State Regulatory Agency Contact List, Governmental Official List and Non-Governmental Organizations (NGOs) Contact List, and Landowner Line List) has been provided in Volume II, Appendix A and C and Volume III (Privileged and Confidential), Appendix AA, respectively. The objective in implementing a comprehensive stakeholder outreach strategy has been to identify and potentially resolve issues raised by stakeholders in a timely fashion. To that end, Tennessee met with governmental officials in advance of or nearly simultaneously with landowner notification beginning in Massachusetts, and New York, Connecticut and New Hampshire. As discussed herein, Tennessee has been interacting with and informing the public and receiving feedback on the Project through meetings and discussions with landowners and other affected stakeholders and written materials.

Key components of the outreach program include:

- Timely notification to federal, state, county and municipal government officials, state legislative and U.S. Congressional delegation members, and leaders of tribal nations in advance of or simultaneously with notification to affected landowners to ensure that all parties have access to Project information in a timely fashion;
- Active coordination among all specialties within the Project team to facilitate information exchange and dissemination to interested stakeholders; and
- Ongoing communication with interested parties as facility designs are reviewed and modifications considered based on the response to the open season and stakeholder feedback.

For the Project, Tennessee has proposed facilities that seek to balance landowner and community concerns, environmental resource issues, and Project requirements. In accordance with the guidelines adopted by the Commission, Tennessee encourages landowners; federal, state, county, and municipal, government officials; environmental groups; and other stakeholders to discuss their concerns with Tennessee as well as the Commission and to provide input on the most appropriate locations for the pipeline loops and related facilities associated with the Project. Tennessee has attempted to address the concerns raised by various stakeholders and where it has not been possible to modify the Project facilities in the manner requested, to clearly identify the basis for that conclusion. Moreover, Tennessee is continuing to collect the data necessary to fully evaluate various alternatives that have been advanced so that an informed decision may be reached.

1.8.1 Landowner Consultation/Public Participation

Tennessee has engaged individuals and organizations in Pennsylvania, New York, Massachusetts, Connecticut and New Hampshire. As noted above, beginning in early 2014, Tennessee has been in

contact with (a) federal, state, county, and municipal government officials; (b) state legislators in the communities located along the proposed Project facilities; (c) state executive offices, state administration officials, state legislative leadership; and (d) the U.S. Congressional delegations and their staffs regarding the Project. Additionally, Tennessee representatives have had multiple contacts with all 93 affected municipalities. As part of that contact, Tennessee representatives have given 39 public presentations about the proposed Project that were attended by over 4,100 members of the public. A list of town presentations is included in Volume II, Appendix C.

During meetings and telephone conversations and in correspondence, Tennessee provided these governmental officials with information regarding the open season, the proposed facilities, the status of the requests to landowners for survey permission, the timing and permitting process for the Project, and the Commission's certificate process, including the National Environmental Policy Act ("NEPA") environmental review process. In addition, periodic updates have been provided to governmental officials and other stakeholders since the initial contact.

The names and addresses of landowners whose property will be crossed by the Project are provided in Volume III, Appendix AA (Privileged and Confidential). These landowners were contacted beginning in January 2014 to request access for civil and environmental surveys (wetland/waterbody delineations, habitat evaluations, cultural resources) for the pipeline routes, access roads, pipeyards and contractor yards, and aboveground facility sites. Surveys have been commenced on many of the properties along the Project area where access permission has been granted.

After Tennessee submits the certificate application for the Project in September 2015, in accordance with Section 157.6(d) of the Commission's regulations, 18 CFR § 157.6(d) (2014), Tennessee will provide notification of the Project to affected and abutting landowners, towns, communities, and local, state, and federal government agencies within three business days following the date that the Commission issues a notice of the certificate application for the Project. In addition, within three business days of the date that the Commission assigns a docket number to the certificate application, an electronic copy of the certificate application will be placed in public libraries across the Project area (Table 1.8-1). Tennessee will also have a public notice of the filing of the certificate application published twice in a daily or weekly newspaper of general circulation (Table 1.8-2) across the Project area no later than 14 days after the Commission assigns a docket number to the certificate application.

TABLE 1.8-1
LIBRARIES WITHIN THE PROJECT AREA

Counties	Town	Library Name
Pennsylvania		
Bradford	Troy	Allen F. Pierce Free Library
Bradford	Towanda	Towanda Public Library
Bradford	Monroe	Monroeton Public Library
Bradford	Troy	Bradford County Library
Susquehanna	Montrose	Susquehanna County-Montrose
Susquehanna	New Milford	Pratt Memorial Library
New York		

TABLE 1.8-1
LIBRARIES WITHIN THE PROJECT AREA

Counties	Town	Library Name
Broome	Deposit	Deposit Free Library
Broome	Binghamton	Broome County Public Library
Chenango	Afton	Afton Free Library
Delaware	Masonville	Sidney Library-Masonville Branch
Delaware	Sidney	Sidney Memorial Public Library
Delaware	Franklin	Franklin Free Library
Schoharie	Schoharie	Schoharie Free Library
Schoharie	Cobleskill	The Community Library
Schoharie	Middleburgh	Middleburgh Library
Schoharie	Schoharie	Old Stone Fort Library
Albany	Berne	Berne Public Library
Albany	Delmar	Bethlehem Public Library
Albany	Feura Bush	The Feura Bush Library
Albany	Voorheesville	Voorheesville Public Library
Albany	Greenville	Greenville Public Library
Albany	Guilderland	Guilderland Public Library
Rensselaer	Castleton	Castleton Public Library
Rensselaer	East Greenbush	East Greenbush Community Library
Rensselaer	Rensselaer	Rensselaer Library
Columbia	North Chatham	North Chatham Free Library
Columbia	Chatham	Chatham Public Library
Columbia	Nassau	Nassau Free Library
Columbia	New Lebanon	New Lebanon Library
Columbia	Canaan	Canaan Public Library
Massachusetts		
Berkshire	Richmond	Richmond Free Public Library
Berkshire	Lenox	The Lenox Library
Berkshire	Pittsfield	Berkshire Athenaeum
Berkshire	Dalton	Dalton Free Public Library
Berkshire	Hinsdale	Hinsdale Public Library
Berkshire	Peru	Peru Public Library

TABLE 1.8-1
LIBRARIES WITHIN THE PROJECT AREA

Counties	Town	Library Name
Berkshire	Windsor	Windsor Free Public Library
Hampshire	Plainfield	Shaw Memorial Library
Franklin	Ashfield	Franklin
Franklin	Conway	Field Memorial Library
Franklin	Shelburne	Shelburne Free Public Library
Franklin	Shelburne	Arms Library
Franklin	Deerfield	Tilton Library
Franklin	Montague	Carnegie Public Library
Franklin	Montague	Millers Falls Library
Franklin	Montague	Montague Center Library
Franklin	Erving	Erving Public Library
Franklin	Shelburne	Arms Library
Franklin	Deerfield	Tilton Library
Franklin	Montague	Carnegie Public Library
Franklin	Montague	Millers Falls Library
Franklin	Montague	Montague Center Library
Franklin	Erving	Erving Public Library
Franklin	Northfield	Dickson Memorial Library
Franklin	Warwick	Warwick Free Public Library
Franklin	Orange	Wheeler Memorial Library
Worcester	Athol	Athol Public Library
Worcester	Bolton	Berlin Public Library
Worcester	Berlin	Berlin Public Library
Worcester	Bolyston	Boylston Public Library
Worcester	Lunenburg	Lunenburg Public Library
Worcester	Royalston	Phinehas S. Newton Library
Worcester	Northborough	Northborough Free Library
Worcester	Shrewsbury	Shrewsbury Public Library
Worcester	West Boylston	Beaman Memorial Public Library
Worcester	Winchendon	Beals Memorial Library
Worcester	Ashburnham	Stevens Memorial Library

TABLE 1.8-1
LIBRARIES WITHIN THE PROJECT AREA

Counties	Town	Library Name
Middlesex	Townsend	Townsend Public Library
Middlesex	Pepperell	Pepperell, Lawrence Library
Middlesex	Groton	Groton Public Library
Middlesex	Dunstable	Dunstable Free Public Library
Middlesex	Tyngsborough	Tyngsborough Public Library
Middlesex	Methuen	Methuen, Nevins Memorial Library
Middlesex	Andover	Memorial Hall Library
Middlesex	Tewksbury	Tewksbury Public Library
Middlesex	Wilmington	Wilmington Memorial Library
Middlesex	Reading	Reading Public Library
Middlesex	Reading	Flint Memorial Library
Middlesex	Lynnfield	Lynnfield Public Library
Middlesex	Ashby	Ashby Free Public Library
Middlesex	Dracut	Parker Memorial Library
Connecticut		
Hartford	Bloomfield	Prosser Public Library
Hartford	Bloomfield	P. Faith McMahon Wintonbury Library
Hartford	Farmington	Main Library
Hartford	Farmington	Barney Library
Hartford	Windsor	Windsor Public Library
Hartford	East Granby	East Granby Public Library
Fairfield	Stamford	Ferguson Library – Main
Fairfield	Stamford	Harry Bennett Branch
Fairfield	Stamford	South End Branch
Fairfield	Stamford	Weed Memorial & Hollander Branch
New Hampshire		
Hillsborough	Hollis	Hollis Social Library
Rockingham	Salem	Kelley Library

TABLE 1.8-2
NEWSPAPERS WITHIN THE PROJECT AREA

County	Newspaper Name
Pennsylvania	
Bradford	The Daily Review
Bradford	Rocket Courier
Bradford	Troy Pennysaver
Bradford	Bradford-Sullivan Pennysaver
Susquehanna	Susquehanna Independent Weekender
Susquehanna	Susquehanna Transcript
New York	
Broome	Binghamton Press & Sun Bulletin
Chenango	The Evening Sun
Delaware	Oneonta Daily Star
Delaware	Tri-Town News
Schoharie	Cobleskill Times Journal
Schoharie	Altamont Enterprise
Schoharie	Albany Times Union
Albany	Spotlight Newspapers Weekly
Albany	Albany Times Union
Rensselaer	The Eastwick Press
Rensselaer	The Record
Columbia	Chatham Courier
Columbia	Columbia Paper News
Massachusetts	
Berkshire	Berkshire Eagle
Hampshire	Daily Hampshire Gazette
Franklin	Greenfield Recorder
Worcester	Worcester Telegram & Gazette
Worcester	Coulter Press
Worcester	The Item
Worcester	The Banner
Middlesex	Lowell Sun
Middlesex	Town Crier

TABLE 1.8-2
NEWSPAPERS WITHIN THE PROJECT AREA

County	Newspaper Name
Middlesex	Reading Chronicle & Daily Time
Middlesex	Reading Advocate
Middlesex	North Reading Transcript
Middlesex	Pepperell Free Press
Middlesex	Groton News
Middlesex	Nashoba Publications Newspapers
Middlesex	Haverhill Gazette
Essex	Lawrence Eagle Tribune
Essex	Haverhill Gazette
Essex	Andover Townsman
Connecticut	
Fairfield	Stamford Times
Fairfield	The Advocate
Hartford	Hartford Courant
New Hampshire	
Hillsborough	The Telegraph
Hillsborough	Cabinet Press
Hillsborough	Londonderry Times
Hillsborough	Union Leader
Hillsborough	Nashua Telegraph

Tennessee developed a Public Participation Plan for the Project, which was filed with the Commission on September 15, 2014 with Tennessee's request to use the Commission's pre-filing process. The Public Participation Plan is included in Volume II, Appendix D. Tennessee is planning to conduct open houses in two phases. Open houses beginning in Dracut, Massachusetts and moving west to Wright, New York will be conducted from October to December, 2014. Open houses beginning in Wright, New York and moving west to Pennsylvania will be conducted from January to March 2015. Specific information on the location of the open house meetings will be provided to the Commission and stakeholders, including affected landowners, once they are finalized.

1.8.2 Agency Consultation

In addition to public outreach efforts with landowners and governmental officials described in Section 1.8.1, Tennessee has begun conducting an extensive planning and consultation process with federal and state regulatory agencies, resource agencies, Native American Tribes, and other groups having

a stake in the Project. The consultation process has involved briefings, meetings, letter requests for resource information, and telephone discussions and emails. As of the date of this Resource Report 1, Project information and letters requesting environmental information have been sent to the state and local agencies in Pennsylvania, New York, and Connecticut. Consultations in Massachusetts and New Hampshire are ongoing. This section provides a brief description of the more significant agency and stakeholder consultations that have occurred. A list of agencies contacted to date, as well as correspondence materials is provided in Volume II, Appendix A and Appendix B.

1.8.2.1 Threatened and Endangered Species Consultations

As required under Section 7 of the U.S. Endangered Species Act ("ESA") and the endangered species laws in Pennsylvania, New York, Massachusetts, Connecticut and New Hampshire, Tennessee initiated informal consultations with federal and state resource agencies to update the known locations of federal- or state-listed threatened and endangered species or candidate species that could potentially be affected by construction or operation of the Project. As of the date of filing this Resource Report 1, Tennessee has provided preliminary information regarding the Project, including a project description, aerial mapping and 7.5-minute USGS topographic maps to the U.S. Fish and Wildlife Service ("USFWS") (Pennsylvania and New York Districts) and the state agencies in Pennsylvania, New York and Connecticut. Further consultations with the federal agencies in Massachusetts, Connecticut and New Hampshire as well as the state in Massachusetts and New Hampshire are ongoing. A listing of the federal and state agencies that Tennessee has contacted and copies of this agency correspondence is provided in Volume II, Appendix A and Appendix B.

1.8.2.2 Interagency and Other Review/Resource Agency Meetings

Beginning in 2013, Tennessee began contacting federal and state regulatory agencies in Pennsylvania, New York, Massachusetts, and New Hampshire with respect to the relevant permitting requirements for the Project. Contact with federal and state regulatory agencies in Connecticut began in October 2014 and is ongoing. Tennessee conducted several Project introduction meetings and provided the agencies with the Project Description, and advised these agencies of Tennessee's intent to use the Commission's NEPA pre-filing process. A list of the agency meetings conducted to date is provided in Table 1.8-3. A list of agencies contacted to date, as well as correspondence materials is provided in Volume II, Appendix A and Appendix B. Tennessee anticipates that it will file for the federal authorizations needed for the Project at or prior to the time that it submits the certificate application for the Project to the Commission, consistent with Commission Order No. 687.

TABLE 1.8-3
AGENCY MEETINGS CONDUCTED FOR THE PROJECT (AS OF NOVEMBER, 5 2014)

Agency	Meeting Date	Topic
New Hampshire Office of Energy Planning	5/2/2013	Project Introduction
New Hampshire Public Utilities	5/2/2013	Project Introduction
Massachusetts Department of Public Utilities	5/3/2013	Project Introduction
Maine Public Utilities Commission	6/4/2013	Project Introduction

TABLE 1.8-3
AGENCY MEETINGS CONDUCTED FOR THE PROJECT (AS OF NOVEMBER, 5 2014)

Agency	Meeting Date	Topic
Maine Office of the Public Advocate	6/4/2013	Project Introduction
Massachusetts agencies under Secretary of Massachusetts Office of Energy and Environmental Affairs	3/27/2014	Project Introduction
Massachusetts Department of Public Utilities	4/9/2014	Project introduction discussion and petition for land survey permission process
United States Army Corps of Engineers-New England District	4/9/2014	Project Introduction
Massachusetts Department of Environmental Protection	5/21/2014	Project Introduction
Massachusetts Natural Heritage and Endangered Species Program	5/21/2014	Project Introduction
Federal Energy Regulatory Commission	5/21/2014	Project Introduction
United States Army Corps of Engineers-New York and New England Districts	5/28/2014	Project Introduction
Massachusetts Department of Conservation and Recreation	6/10/2014	Project Introduction
Land Trust Coalition	6/25/2014	Project Introduction
New York Agencies-Department of Environmental Conservation, State Historic Preservation Office, Parks Recreation and Historic Preservation	6/27/2014	Project Introduction
Massachusetts Department of Transportation	7/9/2014	Project Introduction
Massachusetts Office of Energy and Environmental Affairs, Department of Conservation and Recreation, Fish and Game	7/10/2014	Secondary discussion
Massachusetts Department of Transportation	8/26/2014	Secondary discussion
Massachusetts Office of Energy and Environmental Affairs	8/27/2014	Project update discussion
Massachusetts Department of Transportation	10/1/2014	Project update discussion

TABLE 1.8-3
AGENCY MEETINGS CONDUCTED FOR THE PROJECT (AS OF NOVEMBER, 5 2014)

Agency	Meeting Date	Topic
Massachusetts Office of Energy and Environmental Affairs	10/1/2014	Project update discussion
United States Environmental Protection Agency	10/7/2014	Project Introduction
New York State Department of Environmental Conservation	10/28/2014	Project Introduction

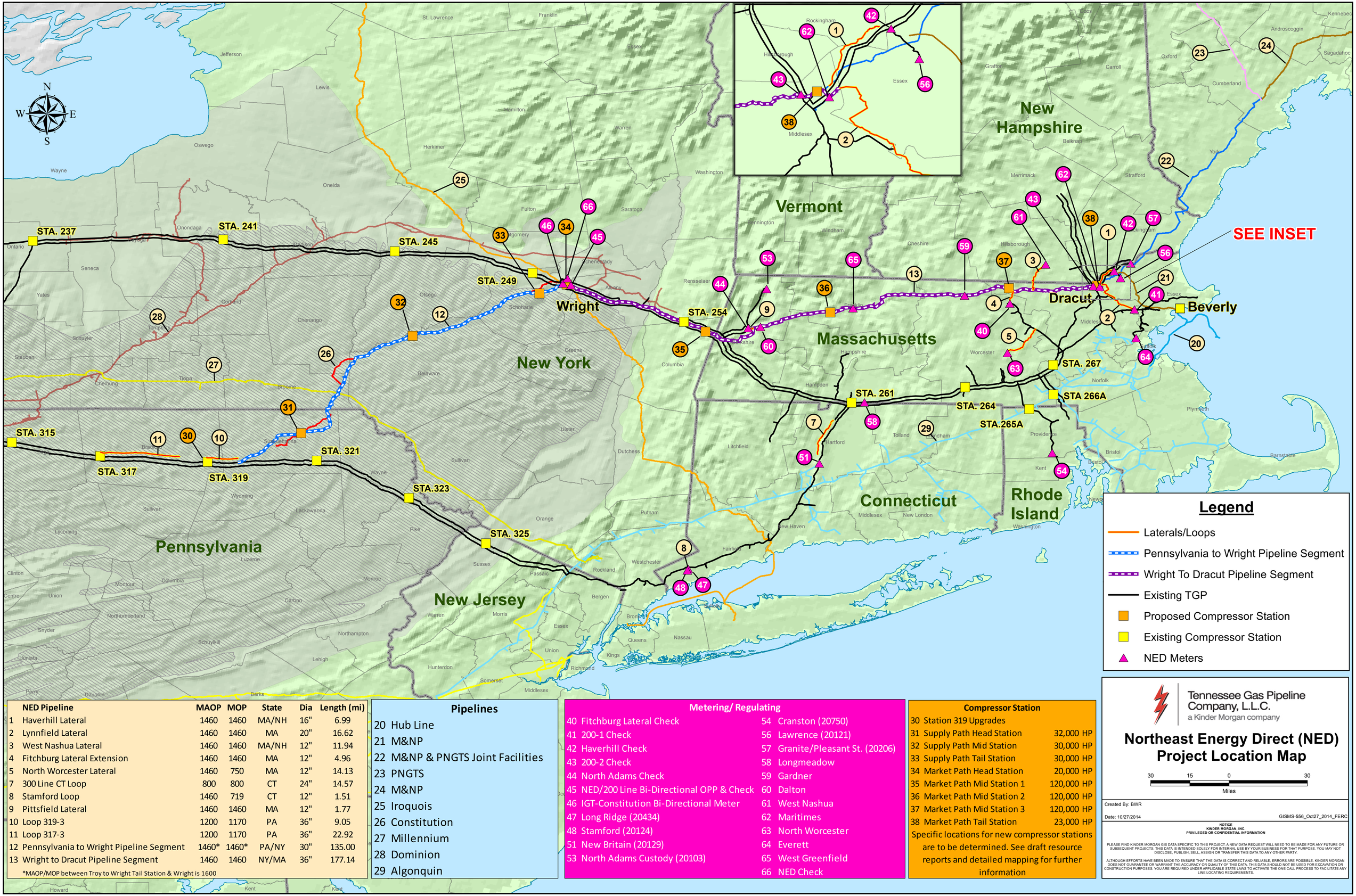
1.9 SUMMARY OF CUMULATIVE IMPACTS

Tennessee is in the process of assessing Project cumulative impact analyses, including the resource-specific temporal and geographic scope within which cumulative impacts may occur from the construction and operation of the Project. Tennessee will provide a discussion on cumulative impacts, by resource, in a subsequent filing of the ER. A summary of the Project's cumulative impacts will be provided in a revised Resource Report 1 to be submitted in a subsequent filing of the ER.

ATTACHMENT 1a

Figures

Project Location Map



	NED Pipeline	MAOP	MOP	State	Dia	Length (mi)
1	Haverhill Lateral	1460	1460	MA/NH	16"	6.99
2	Lynnfield Lateral	1460	1460	MA	20"	16.62
3	West Nashua Lateral	1460	1460	MA/NH	12"	11.94
4	Fitchburg Lateral Extension	1460	1460	MA	12"	4.96
5	North Worcester Lateral	1460	750	MA	12"	14.13
7	300 Line CT Loop	800	800	CT	24"	14.57
8	Stamford Loop	1460	719	CT	12"	1.51
9	Pittsfield Lateral	1460	1460	MA	12"	1.77
10	Loop 319-3	1200	1170	PA	36"	9.05
11	Loop 317-3	1200	1170	PA	36"	22.92
12	Pennsylvania to Wright Pipeline Segment	1460*	1460*	PA/NY	30"	135.00
13	Wright to Dracut Pipeline Segment	1460	1460	NY/MA	36"	177.14

*MAOP/MOP between Troy to Wright Tail Station & Wright is 1600

Pipelines

20 Hub Line
21 M&NP
22 M&NP & PNGTS Joint Facilities
23 PNGTS
24 M&NP
25 Iroquois
26 Constitution
27 Millennium
28 Dominion
29 Algonquin

Metering/ Regulating

40 Fitchburg Lateral Check
41 200-1 Check
42 Haverhill Check
43 200-2 Check
44 North Adams Check
45 NED/200 Line Bi-Directional OPP & Check
46 IGT-Constitution Bi-Directional Meter
47 Long Ridge (20434)
48 Stamford (20124)
51 New Britain (20129)
53 North Adams Custody (20103)
54 Cranston (20750)
56 Lawrence (20121)
57 Granite/Pleasant St. (20206)
58 Longmeadow
59 Gardner
60 Dalton
61 West Nashua
62 Maritimes
63 North Worcester
64 Everett
65 West Greenfield
66 NED Check

Compressor Station

30	Station 319 Upgrades	
31	Supply Path Head Station	32,000 HP
32	Supply Path Mid Station	30,000 HP
33	Supply Path Tail Station	30,000 HP
34	Market Path Head Station	20,000 HP
35	Market Path Mid Station 1	120,000 HP
36	Market Path Mid Station 2	120,000 HP
37	Market Path Mid Station 3	120,000 HP
38	Market Path Tail Station	23,000 HP

Specific locations for new compressor stations are to be determined. See draft resource reports and detailed mapping for further information

Legend

- Laterals/Loops
- Pennsylvania to Wright Pipeline Segment
- Wright To Dracut Pipeline Segment
- Existing TGP
- Proposed Compressor Station
- Existing Compressor Station
- NED Meters

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Northeast Energy Direct (NED) Project Location Map

30 15 0 30
Miles

Created By: BWR
Date: 10/27/2014
GISMS-556_Oct27_2014_FERC

USGS Topographic and Aerial Imagery Maps

Provided Under Separate Cover

NORTHEAST ENERGY DIRECT PROJECT
DOCKET NO. PF14-22-000

DRAFT
ENVIRONMENTAL REPORT

RESOURCE REPORT 10

ALTERNATIVES

PUBLIC

Submitted by:

Tennessee Gas Pipeline Company, L.L.C.
1001 Louisiana Street
Houston, Texas 77002

November 2014

RESOURCE REPORT 10 – ALTERNATIVES
SUMMARY OF FILING INFORMATION

INFORMATION	FOUND IN
Address the "no action" alternative (§ 380.12 (l)(1)).	Section 10.1
For large Projects, address the effect of energy conservation or energy alternatives to the Project (§ 380.12 (l)(1)).	Section 10.1.1 Section 10.1.2
Identify system alternatives considered during the identification of the Project and provide the rationale for rejecting each alternative (§ 380.12 (l)(1)).	Section 10.2
Identify major and minor route alternatives considered to avoid impact on sensitive environmental areas (e.g., wetlands, parks, or residences) and provide sufficient comparative data to justify the selection of the proposed route (§ 380.12 (l)(2)(ii)).	Section 10.3
Identify alternative sites considered for the location of major new aboveground facilities and provide sufficient comparative data to justify the selection of the proposed site (§ 380.12 (l)(2)(ii)).	Sections 10.4, 10.5, and 10.6

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ATTACHMENT 10a – FIGURES

10.0 INTRODUCTION

Tennessee Gas Pipeline Company, L.L.C. ("Tennessee" or "TGP") is filing an application seeking the issuance of certificate of public convenience and necessity from the Federal Energy Regulatory Commission ("Commission" or "FERC") for the construction and operation of the proposed Northeast Energy Direct Project ("NED Project" or "Project"). Tennessee proposes to expand and modify its existing pipeline system in Pennsylvania, New York, Massachusetts, Connecticut, and New Hampshire. Tennessee is requesting issuance of a certificate order for the NED Project in October 2016 and proposes to commence construction activities in January 2017, in anticipation of placing the Project facilities in-service by November 2018 (with the exception of two proposed pipeline looping segments in Connecticut, which would be placed in service by November 2019). Please refer to Resource Report 1 of this Environmental Report ("ER") for a complete description of the Project components.

Tennessee undertook an extensive needs and alternative routing analysis for the Project. The primary objective in performing this analysis was to develop a project that would accomplish Tennessee's objective to provide up to 2.2 billion cubic feet per day ("Bcf/day") of additional natural gas transportation capacity to meet the growing energy needs in the Northeast United States ("U.S."), particularly in New England, as discussed in more detail in the Purpose and Need section of Resource Report 1 of this filing, while working to avoid or minimize potential adverse environmental impacts to the greatest extent practicable. As discussed below, Tennessee evaluated pipeline routing options based on regional topography, environmental considerations, population density, existing land usage, and construction safety and feasibility considerations. Tennessee also considered route alternatives in conjunction with the Commission's routing guidelines as set forth in Section 380.15 of the Commission's regulations, 18 C.F.R. §380.15. Resource Report 10 describes the alternatives that have been considered as of the date of this Resource Report 10 in developing the Project and Attachment 10a includes Project Figures depicting those alternatives analyzed for the Project.

10.1 NO-ACTION ALTERNATIVE

The "no-action" alternative for the Project would avoid the temporary and permanent environmental impacts associated with construction and operation of the currently proposed Project. However, by not constructing the proposed Project, Tennessee would be unable to provide the necessary natural gas transportation service required to meet growing energy needs in the Northeast U.S., specifically New England. The Project, upon completion, will provide up to 2.2 Bcf/day of additional natural gas transportation capacity to meet the growing energy needs of local distribution companies ("LDCs"), gas-fired power generators, industrial plants, and other New England consumers. Tennessee has reached commercial agreement, subject to the customary approvals, for approximately 500,000 dekatherms per day ("Dth/d") of long-term firm transportation capacity on the Market Path Component of the proposed NED Project[1] with The Berkshire Gas Company, Columbia Gas of Massachusetts, Connecticut Natural Gas Corporation, Liberty Utilities (EnergyNorth Natural Gas) Corporation, National Grid, Southern Connecticut Gas Corporation, City of Westfield Gas and Electric Light Department, and two other LDCs.

[1] The Supply Path Component encompasses the portion of the proposed NED Project extending from Troy, Pennsylvania to Wright, New York, while the Market Path Component encompasses the portion of the proposed NED Project extending from Wright, New York to Dracut, Massachusetts.

This Project and its in-service date of November 2018 are supported by the Shippers committed to the Project's capacity. As discussed in the Purpose and Need section of Resource Report 1, the new transportation capacity to be created by the Project will help alleviate the natural gas pipeline capacity constraint in New England by increasing capacity in high-demand markets in New England.

Given the constrained pipeline transportation capacity situation in the Northeast U.S., without the proposed Project, other natural gas transmission companies would be required to increase their capacity and construct new facilities to meet the existing and growing demand for the additional natural gas transportation capacity. Such actions would only result in the transference of environmental impacts from one project to another but would not eliminate such impacts in their entirety.

If existing natural gas transmission systems are not enhanced or expanded, energy shortages in times of peak demand may occur, or users may consume different fuels, which would likely include oil and coal. The lack of a new pipeline with access to supply sources into the region will prolong the existing supply constraints in the proposed delivery areas, which will continue to contribute to winter-premium pricing and exacerbate price volatility for all natural gas users in the areas. The lack of adequate natural gas transportation capacity will also increase the difficulty for others, such as the operators of LDC distribution systems and gas-fired electric generating plants, in finding economical gas supplies. This in turn will lead to higher consumer gas and electric rates in a region which is already experiencing the highest rates in the country, and even energy shortages during times of winter peak demand.

Utilization of natural gas for residential and commercial heating, power generation, and industrial use offers the best alternative in terms of supply availability with the lowest environmental impact among available energy sources, particularly with regard to air quality impacts. Existing natural gas delivery systems may be readily expanded to meet increased demand, while minimizing impacts to the environment. The no-action alternative would not provide the potential economic benefits associated with the proposed Project, including increased jobs, secondary spending, and tax revenues during construction, as well as increased property tax revenues to local governments during operations. Further, the no-action alternative would not provide the additional natural gas required by LDCs to support the increased energy demand of consumers in Pennsylvania, New York, Massachusetts, Connecticut, New Hampshire and Rhode Island near the Project and/or consumers that do not currently have access to natural gas. The no-action alternative was not found to be a feasible alternative for the Project because that alternative would not satisfy the purpose and need for the Project and ultimately would result in other, more significant impacts to the environment.

10.1.1 Energy Conservation

Energy conservation measures have and will continue to play an important role in reducing energy demand in the U.S. The Energy Policy Act of 2005 ("EPAct 2005") includes guidelines to diversify America's energy supply and reduce dependence on foreign sources of energy, increase residential and commercial energy efficiency and conservation (e.g., EPA Energy Star Program), improve vehicular energy efficiency, and modernize domestic energy infrastructure (U.S. Congress 2005). While the EPAct 2005 and state and municipal programs promote increased energy efficiency and conservation by supporting new energy efficient technologies and increasing funds for energy efficiency research, and would most likely minimize energy use, they are not expected to eliminate the increasing demand for energy or natural gas. Additionally, the implementation and success of energy conservation in curtailing energy use is a long-term goal, extending well beyond the timeframe of the proposed Project.

Reducing the need for additional energy usage is the preferred option wherever possible. Conservation of energy reduces the demand for finite the limited and over-utilized fossil fuel reserves. Energy conservation is also advocated by both federal and state authorities. Tennessee presently has programs in place that strongly encourage energy conservation. Even with these programs, there remains an existing need for additional natural gas capacity that would be provided with the construction of this Project.[2] Energy conservation alone is not a viable alternative to the proposed Project. While energy conservation reduces demand for energy sources such as natural gas, and may be a long-term alternative or partial alternative for the Project, implementation of sufficient energy conservation measures to eliminate the need for the proposed Project is not feasible in the short-term.

10.1.2 Energy Alternatives

Use of alternative fuels to supply the needs of the market would potentially result in adverse environmental impacts due to increased air pollutant emissions that would be otherwise minimized through the use of natural gas. In general, alternative energy sources for natural gas consumers include oil, coal, biomass, and nuclear fuels. State and federal air pollution control regulations indirectly promote the use of clean fuels to minimize adverse air quality impacts. These regulations are intended to improve both air quality and the quality of life. Use of these alternative hydrocarbon energy sources would unnecessarily increase adverse air quality impacts, and these increased impacts would conflict with federal and state long-term energy environmental policies aimed toward attaining ambient air quality standards. While renewable alternative energy sources contribute to a diverse energy portfolio for users, they ultimately cannot provide for the immediate energy needs that the Project would support and supply to the Northeast U.S. market. In 2012, the ISO-New England identified likely retirements of older coal- and oil-fired power plants/generators located in New England as of 2020, representing approximately 8.3 MW of capacity, and the need for replacement of these resources to meet the needs of power generators, including natural gas generation.[3] Clean-burning natural gas will continue to be part of a diverse energy portfolio for users in the northeast region and also serves a bridge to renewables by providing a reliable energy supply while these alternative energy sources are further refined and developed.

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[2] See the U.S. Energy Information Administration's Annual Energy Outlook 2014 table data (Natural Gas Transmission and Distribution Model Regions), which projects sectors driving growth in U.S. natural gas consumption. U.S. total natural gas consumption grows from 25.6 trillion cubic feet (Tcf) in 2012 to 31.6 Tcf in 2040 in the AEO2014 Reference case. Natural gas production from the Marcellus Shale area is projected to grow from 1.9 Tcf in 2012 to a peak production volume of approximately 5.0 Tcf per year from 2022 through 2025. Natural gas produced from the Marcellus Shale area is projected to provide up to 39 percent of the natural gas needed to meet demand in markets east of the Mississippi River during that period (up from 16 percent in 2012). Although Marcellus Shale area production is projected to decline after 2024, it will provide enough natural gas to meet at least 31 percent of the region's total demand for natural gas through 2040. See U.S. Energy Information Administration, Annual Energy Outlook 2014, Report #DOE/EIA-0383 (2014), available at http://www.eia.gov/forecasts/aeo/ (DOE/DOA 2014). Even with energy conservation, additional natural gas pipeline capacity to transport gas in this region is needed.

[3] See ISO-New England, Strategic Transmission Analysis: Generation Retirements Study, dated December 13, 2012, available at http://www.iso-ne.com/static-assets/documents/committees/comm_wkgrps/prtcpnts_comm/pac/mtrls/2012/dec132012/retirements_redacted.pdf .

10.1.2.1 Wind Power

Wind power technology has experienced advancements over the last 20 years, including reductions in installation costs, improved turbine performance, and reduced maintenance costs. Although wind projects have no operational emissions, such developments can negatively affect wildlife (particularly birds and bats), visual resources, and other environmental resources. Onshore wind power generation requires large, permanent turbines and supporting facilities, as well as construction of electric transmission lines, to connect wind facilities to transport the wind energy to consumers. These facilities would have an impact on visual resources, because onshore wind turbines are constructed to capture wind high above the natural topography and could be constructed along highly visible ridge lines. Additionally, wind turbines would directly impact resident and migratory birds, bats, and other wildlife from collision mortality, and would indirectly impact wildlife as a result of habitat disturbance and loss. Construction of offshore wind power generation facilities may result in impacts on marine species. In contrast, the permanent right-of-way ("ROW") of the proposed pipeline area would be restored to pre-construction contours and maintained as herbaceous cover. Potential impacts on wildlife from the proposed Project are expected to be largely short-term and temporary, with the exception of habitat conversion in forested areas and the establishment of some aboveground facilities. Therefore, theoretical onshore wind generation facilities could result in greater impacts upon visual, vegetation, and wildlife resources than the proposed Project.

Wind power currently is not an option for providing the existing or projected power needs in the region where the Project is located. While there has been an increase in wind power capacity in Massachusetts, encouraged by streamlined siting and permitting, overall the capacity is slow to develop. As detailed above, wind power generation presents environmental issues and cannot be precisely scheduled based on demand. In addition, in the Project's general area, the sites with the highest wind velocities tend to be located along ridgelines in areas of steep slopes (National Renewable Energy Laboratory ["NREL"] 2010) which are challenging to access and generally highly visible. Further, wind power provides electrical output that is considered as an intermittent and non-dispatchable source of generation as it does not generate electricity when the wind is not blowing. Electricity demand also varies during the day in ways that the supply from wind and solar generation may not match, thus requiring the Independent System Operator ("ISO")-New England to balance the variable renewables by dispatching other wholly-dispatchable non-intermittent units, such as natural gas fired generating units. While renewable resources provide some level of energy supply diversity, they are weather dependent and require hydro or thermal resources to accommodate their variability, and pose both operational and interconnection challenges. Under these circumstances, wind energy would not be able to provide the projected needs for the region as reliably and in the quantity that would be provided by the proposed Project facilities.

10.1.2.2 Solar Power

Photovoltaic solar power systems convert sunlight directly into electricity. These systems generally are not well-suited for use as large-scale generation in the proposed Project area due to relatively low direct insolation, higher capital costs, potential reliability issues, and lower efficiencies. Solar power generation on an industrial scale requires large, permanent facilities with impervious cover and no shading to allow for photovoltaic panels and/or concentrated solar power ("CSP") to gather energy. These impacts are compared to a narrow permanent ROW that would be restored to pre-construction contours and maintained as herbaceous cover for the proposed Project facilities. In addition, the construction of a solar power generation facility also includes the construction of access roads and electric transmission lines necessary to transport the generated solar energy to consumers, resulting in additional environmental impacts. Further, solar power systems are not only among the highest cost renewable technologies, but

they also provide electrical output that is considered an intermittent and non-dispatchable source of generation as it does not generate electricity when there is insufficient sunlight. Electricity demand also varies during the day in ways that the supply from wind and solar generation may not match, thus requiring the ISO-New England to balance the variable renewables by dispatching other wholly-dispatchable, non-intermittent units, such as natural gas fired generating units. While renewable resources provide some level of energy supply diversity, they are weather dependent and require hydro or thermal resources to accommodate their variability, and pose both operational and interconnection challenges.

For these reasons, renewable resources, such as solar power, even with the efforts to increase solar power capacity in certain states impacted by the Project, are not being developed at a pace fast enough to provide for the projected energy needs in the region where the Project would provide service.

10.1.2.3 Geothermal Power

Large scale geothermal energy is available only at tectonic plate boundaries or at geothermally active hotspots. Due to a lack of these features in the Project area, geothermal energy would not be available for development as an alternative to natural gas.

10.1.2.4 Coal

Coal is used for energy generation and would function as an alternative to natural gas. However, relative to natural gas, the burning of coal results in greater emissions of pollutants such as nitrogen oxides ("NOx"), sulfur dioxide ("SO2"), greenhouse gases ("GHG"), and mercury (United States Environmental Protection Agency ["USEPA"] 2005). In 2010, coal comprised 46 percent of total U.S. electric power generation (U.S. Department of Energy/Energy Information Administration ["DOE/EIA"] 2011). Also, certain coal-fired power plants in the northeast region that have served as baseload generators for electric power were identified by the ISO-New England in 2012 as "at-risk" for retirement by 2020, including the Brayton Point Station located in southeast Massachusetts (this plant is coal- and oil-fired), the Mount Tom Station, located in Western Massachusetts, and the Salem Harbor Station, located in Northeast Massachusetts.[4] Due to the greater environmental impacts associated with emissions from coal-burning power generation, it is unlikely that coal would displace the need for natural gas in the target market areas in the foreseeable future. Therefore, coal does not represent a preferred alternative for replacing the natural gas to be supplied by the proposed Project.

10.1.2.5 Fuel Oil

Fuel oil is commonly transported by pipeline which may require construction of other pipeline systems to transport the fuel oil, which would likely have similar impacts as the proposed Project, but in a different location. Additionally, if increased fuel oil demand is met by foreign imports, additional development of bulk storage capacity, and refining facilities would be required. Reliance on fuel oil as an alternative to natural gas would increase the potential for environmental impacts such as oil spills; land development to construct or modify import, storage, and refining facilities; and pollution from air emissions.

[4] See ISO-New England, Strategic Transmission Analysis: Generation Retirements Study, dated December 13, 2012, available at, http://www.iso-ne.com/static-assets/documents/committees/comm_wkgrps/prtcpnts_comm/pac/mtrls/2012/dec132012/retirements_redacted.pdf.

Alternatively, natural gas burns cleaner than other fossil fuels, is relatively inexpensive compared to other fossil fuels, and is domestically produced. While fuel oil is an alternative energy source for meeting future power generation needs in the Project area, fuel oil has no advantage over natural gas, and fuel oil necessitates increased environmental impacts in transportation and at the burner. For these reasons, particularly for facilities designed to use natural gas, fuel oil would not be a preferable alternative to the natural gas to be supplied by the proposed Project.

10.1.2.6 Nuclear

Energy from nuclear power is important nationally and accounted for approximately 9 percent of annual energy consumption nationwide in 2011 (DOE/EIA 2013a). In New York, nuclear power currently accounts for about 14 percent of statewide generating capacity (New York Independent System Operator ["NYISO"] 2012). In New England (Massachusetts, Maine, New Hampshire, Vermont, Rhode Island, and Connecticut), nuclear energy accounted for approximately 12 percent of total energy consumption in 2012 (DOE/EIA 2013a). Although use of nuclear power may avoid GHG emissions that would otherwise occur with burning fossil fuels, the environmental and regulatory challenges concerning safety and security, the disposal and long-term storage of toxic and radioactive materials (i.e., spent fuel), and potential alterations to hydrological/biological systems would need to be addressed before any new nuclear power generation facilities could be constructed. Nuclear power remains problematic given these factors.

The use of nuclear energy is not considered to be an option for meeting the existing and projected demand for energy in the region where the Project is located. The Vermont Yankee nuclear power plant is scheduled to shut down at the end of 2014, further limiting the nuclear power available in the New England region (DOE/EIA 2013b). Due to the lengthy lead time to site a new nuclear facility and controversy with such projects; power generated from such a facility would not be available for development as an alternative to natural gas to be supplied by the proposed Project. The scheduled retirement of the 600 megawatt ("MW") Vermont Yankee plant in late 2014 will increase the reliance of this region on natural gas fired power generation and lead to higher gas and electricity prices absent the proposed Project.

10.1.2.7 Hydroelectric Power

It is Tennessee's understanding that hydroelectric generation is fully commercialized, both large impoundment-type and run-of-river type projects in the Northeast U.S. ranging from one MW to hundreds of MWs in capacity. There are a number of proposed hydroelectric import projects from Canada to New England that would require the construction of possibly three transmission lines linking Canadian hydroelectric generating facilities to southern New England load centers. These aboveground transmission line projects require extensive siting approval from northern New England states, such as New Hampshire and Maine. Historically, given the strong opposition to recently proposed electric transmission projects in New England, it is likely that a large hydroelectric import project would face similar siting difficulties. For this reason, use of proposed hydroelectric power projects is precluded from being a viable alternative to the natural gas to be supplied by the proposed Project.

10.1.2.8 Electric Generation

Electrical energy is a second-tier energy source, meaning that electrical energy is generated from first-tier energy sources, such as natural gas, coal, oil, biomass, nuclear, geothermal, hydraulic head, wind, and

solar radiation. For this reason, use of electrical energy is precluded from being a viable alternative to the natural gas to be supplied by the proposed Project.

10.1.2.9 Fuel Cells

Fuel cells are a developing alternative for generating electricity more directly and cleanly from fossil fuels or hydrogen however, fuel cell technology is in the early phases of development. Small-scale fuel cell research and development is active, but reliable fuel cell systems representing an equivalent magnitude to the proposed Project are not expected to be available or cost effective in the near future.

10.1.2.10 Other Energy Sources

Alternative fuel sources available include using Liquefied Natural Gas ("LNG") and propane/air storage and vaporization. Though both alternatives have the potential to meet the Project objectives, Tennessee determined that these alternatives were not viable due to such factors as siting constraints, increased environmental impacts, and the time required to develop these alternatives. Therefore, supplying adequate volumes of natural gas through the construction of the proposed Project is the preferred alternative.

10.1.2.11 Energy Alternatives Conclusion

As increasing demand for electricity continues to rise, energy efficiency and conservation measures, along with more diversified renewable energy portfolios, can reduce the need to meet the growing demand by fossil-fueled power plants. In recognition of the need to diversify, the states in the Project area have all adopted policies, programs and projects to reduce their state's dependence on fossil-fuel electric generation. While these measures could impact the overall demand for electricity from fossil fuel generation, the energy conservation and renewable alternative does not meet the needs of the Project, which will provide natural gas transportation service to LDCs to provide additional natural gas supplies to their customers for residential and commercial heating, drying and cooking, and industrial uses. Accordingly, energy conservation and renewable resources would not be an alternative to meet the purpose and needs of the Project.

10.2 SYSTEM ALTERNATIVES

System alternatives are alternatives to the proposed action that would make use of other existing, modified, or proposed natural gas pipeline systems or existing compression to meet the stated purpose and need for a proposed Project. System alternatives involve the transportation of the equivalent amount of incremental natural gas volumes by the expansion of existing pipeline systems or by the construction and operation of other new pipeline systems. A viable system alternative would make it unnecessary to construct all or part of the proposed Project, and would involve the transportation of all or a portion of the additional natural gas volumes by expansion of another existing pipeline system or construction of a new pipeline system. Such modifications or additions would result in environmental impacts; however, the impacts would in all likelihood be similar to, and potentially greater than that associated with construction of the proposed Project.

Although system alternatives that would result in less environmental impacts might be preferable to the proposed Project facilities, only those alternatives that are reasonable, consistent with existing law, and consistent with the underlying purpose and need of the Project are required to be considered for National

Environmental Policy Act ("NEPA") purposes. Consequently, a viable system alternative must be technically and economically feasible and practicable to satisfy the Project's purposes, including meeting the necessary contractual commitments made with Project Shippers supporting the development of the Project.

Technical and feasible system alternatives were evaluated in the Project area (Figure 10.2-1) in terms of their ability to meet the Project objectives, which were defined by the incremental level of firm transportation service contracted for the market, as will be described in the certificate application anticipated to be submitted in September 2015 and in Resource Report 1 of this filing. The facilities associated with the Project are necessary to provide the incremental firm transportation capacity to meet the growing energy needs in the Northeast U.S., specifically New England. The Project, upon completion, will provide up to 2.2 Bcf/day of additional natural gas transportation capacity to meet the growing energy needs of LDCs, gas-fired power generators, industrial plants, and other New England consumers. As discussed above, Tennessee has reached commercial agreement, subject to the customary approvals, for approximately 500,000 dekatherms per day Dth/d of long-term firm transportation capacity on the Market Path Component of the proposed NED Project. As discussed in the Purpose and Need section of Resource Report 1, the new transportation capacity to be created by the Project will help alleviate the natural gas pipeline capacity constraint in New England by increasing capacity in high-demand markets in New England. By constructing and placing the Project into service, additional natural gas quantities from prolific supply sources such as the Marcellus Shale formation can be readily delivered to meet the growing demand for natural gas service in the Northeast U.S. market area on both a seasonal and annual basis with detailed consideration given to providing such service economically, safely and with minimal impact to affected landowners and the environment. With its existing system in place, Tennessee is able to facilitate construction, operation, and maintenance of the Project through construction of the Project facilities outlined in Resource Report 1 of this filing.

10.2.1 Existing Systems

Tennessee has no available firm capacity on its existing 300 Line and 200 Line systems (Figure 10.2-2) from the anticipated Project receipt points along the Pennsylvania to Wright, New York Pipeline Segment (the Supply Path Component of the Project). Accordingly, there are no system alternatives available to Tennessee to provide the transportation service for this portion of the Project. Tennessee is however, proposing to utilize its existing system and corridors as much as possible by co-locating with its existing facilities or other utility corridors or looping its existing facilities in its design of the NED Project facilities from Pennsylvania to Wright, New York. Where Tennessee does not have an existing corridor, Tennessee is proposing to co-locate the pipeline with other utility corridors where practicable and feasible, and as legally permitted.

As part of the Supply Path Component of the Project, Tennessee is proposing two separate 36-inch diameter pipeline looping segments that will generally parallel Tennessee's existing 300 Line (referred to as Loop 317-3 and Loop 319-3 in Pennsylvania) to create additional transportation capacity from the anticipated receipt points to Tennessee's mainline valve ("MLV") 320. At that point, the Project as designed will deviate from Tennessee's existing 300 Line and will extend north to Wright, New York. The new pipeline looping segments are proposed to be located parallel and adjacent to Tennessee's existing 300 Line corridor in Pennsylvania. For the proposed pipeline that would extend north from the existing 300 Line to Wright, New York, Tennessee was unable to co-locate that segment with an existing utility corridor for the first thirteen miles of that pipeline. However, from that point north to Wright, New York, Tennessee is proposing to co-locate its proposed pipeline with the Constitution Pipeline Project

corridor proposed by the Constitution Pipeline Company, LLC in Docket No. CP13-499-000 ("Constitution").[5] The certificate application for Constitution is pending before the Commission, so the exact location of that Project's proposed pipeline facilities and the construction start date for those facilities is not known. Evaluation of this proposed route is ongoing; Tennessee will determine the final location of the segment of the pipeline that is proposed to be co-located with Constitution after the Commission's decision relative to the Constitution certificate application. Tennessee is proposing to deviate from Constitution's current proposed route for approximately 39 miles (from milepost ["MP"] 24.25 to 36.24, from MP 50.13 to 63.60, and from MP 123.63 to 134.99) due to Project Shipper needs, areas of steep terrain, and more optimal crossings for two large waterways. Locations where the proposed route for the Project deviates from Constitution's proposed alignment are identified as alternatives and discussed in Section 10.3 of this Resource Report 10. Tennessee continues to evaluate the portion of the pipeline route at MP 123.63 and may later propose to co-locate the pipeline in this area with the Constitution facilities.

Tennessee has no available firm capacity on its existing 200 Line system from Wright, New York to Dracut, Massachusetts for the Market Supply Component of the Project. When Tennessee evaluated the market need in New England and the facilities that would be required to provide the infrastructure that New England needs to reduce high energy costs and enhance electric reliability, it conducted extensive evaluation of options to either (1) loop the pipeline along its 200 Line pipeline corridor in southern Massachusetts, or (2) construct a new pipeline along a route across northern Massachusetts, utilizing existing transmission corridors where feasible. Tennessee determined that developing a route to parallel the entire length of its existing 200 Line would not be feasible, due to the level of urban congestion, constructability issues, environmental impact, and overall pipeline length. This route is examined as one of the alternative routes and is discussed below. Because the route paralleling Tennessee's entire existing 200 Line is not feasible, Tennessee is proposing the second option for the Market Path Component of the Project (referred to as Wright to Dracut Pipeline Segment), with a portion of the NED Project from Wright, New York to Dracut, Massachusetts (Wright to Dracut Pipeline Segment, New York Portion) making use of the existing system where practicable and feasible.

The Wright to Dracut Pipeline Segment begins in Wright, New York, and heads east where Tennessee is proposing to co-locate the pipeline along the existing corridor for the 200 Line for approximately 48 miles. Continuing to the east, Tennessee departs from its existing corridor and is proposing to parallel other existing electric transmission corridors for approximately 107 miles (approximately 84 percent) of the route into Dracut, Massachusetts.

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[5] Jointly owned by Williams Partners Operating, LLC; Cabot Pipeline Holdings, LLC; Piedmont Constitution Pipeline Company, LLC; and Capital Energy Ventures Corporation.

Information contained within this Resource Report 10 related to the Constitution Pipeline Project was based on the "*Draft Environmental Impact Statement: Constitution Pipeline and Wright Interconnect Projects,*" FERC EIS No. 0249D, Docket Numbers CP13-499-000, CP13-502-000, and PF12-9-000 ("Constitution DEIS") (FERC 2014a). Tennessee notes that the Commission, on October 24, 2014, issued the Final Environmental Impact Statement for the Constitution Pipeline Project "*Final Environmental Impact Statement: Constitution Pipeline and Wright Interconnect Projects,*" FERC EIS No. 0249F, Docket Numbers CP13-499-000, CP13-502-000, and PF12-9-000 ("Constitution FEIS") (FERC 2014b). At the time the Constitution FEIS was issued by the Commission, Tennessee was in the process of finalizing the drafts of Resource Reports 1 and 10 for filing with the Commission on November 5, 2014 and has not had an opportunity to finalize its review of the Constitution FEIS and incorporate any revisions to its proposed route based on that review. Tennessee will determine if any revisions to its proposed route are necessary after its review of the Constitution FEIS and incorporate any such revisions in subsequent filings of the ER.

As part of the Project, Tennessee is also proposing the construction of pipeline laterals and looping segments to accommodate delivery point requests of certain Project Shippers. The existing Haverhill Lateral, North Adams Lateral, the Fitchburg Lateral and the 200-1 system are proposed to be modified as part of the Project to accommodate the additional capacity.

A system analysis of the proposed Haverhill Lateral is ongoing to determine if all or portions of the proposed route could be replaced within the existing ROW by using the lift and lay method (remove the existing 10-inch diameter line and replacing with a 20-inch diameter line within the existing ROW).

10.2.2 Other Systems

In order to provide the necessary natural gas transportation service required to meet the growing energy needs in the Northeast U.S. that the proposed Project would otherwise provide, other pipeline systems in the vicinity of the Project area would need to be expanded and or modified to transport up to 2.2 Bcf/d from Troy, Pennsylvania to Dracut, Massachusetts. To be considered a viable system alternative to the proposed NED Project, expansions or modifications of those pipeline systems would need to serve the same purpose and demand of the Project and create less environmental impacts than anticipated from the proposed Project (Figure 10.2-1).

Tennessee does not have access to proprietary information concerning the flow characteristics of the existing interstate pipeline systems in the Pennsylvania, New York, and New England Project areas. However, based on publicly available information from open season notices and filings submitted to the Commission as well as through access to other publically available sources, Tennessee believes that these existing pipeline systems are at or near capacity. In particular, Tennessee relied on the following sources:

- Portland Natural Gas Transmission System's ("PNGTS") Open Season Notice for Firm Service from December 3, 2013 o January 24, 2014 for its proposed Continent-to-Coast ("C2C") Expansion Project.
- ICF International: Gas-Fired Power Generation in Eastern New York and its Impact on New England's Gas Supplies, submitted to ISO-New England, November 18, 2013.
- Competitive Energy Services: Assessing Natural Gas Supply Options for New England and their Impacts on Natural Gas and Electricity Prices.
- Filings made by Spectra Energy Partners in its Algonquin Incremental Market Project proceeding (Docket No. CP14-96-000), Resource Report 10 Alternatives, dated February 2014.
- Spectra Energy Partners' proposed Atlantic Bridge Project.
- Spectra Energy Partners' proposed Access Northeast Project.
- Filings made by Iroquois Gas Transmission System, L.P. ("Iroquois") in its Market Access Project proceeding (Docket Nos. CP07-457-000 et al.).

For the Supply Path Component of the NED Project (from Troy, Pennsylvania to Wright, New York), a few existing pipelines serve or traverse the region, including Tennessee (discussed above), Transcontinental Gas Pipe Line Company ("Transco"), Columbia Gas Transmission, Millennium Pipeline Company ("Millennium"), and Dominion Transmission ("Dominion"). Tennessee anticipates these systems are near or fully subscribed based on documents filed with the FERC for the two following pending projects; Dominion's "New Market Project" (Docket No. CP14-497-000) and the Constitution Pipeline Project (Docket No. CP13-499-000). These pipeline companies are proposing to expand their existing systems to provide additional transportation capacity to move gas production for shippers in the

Marcellus Shale area to markets north and east. However, based on the public information available about these pending projects, Tennessee would anticipate that significant looping or additional compression would need to be added to those pipeline systems in order to provide equivalent transportation capacity to that proposed to be created by the NED Project, likely resulting in similar, if not greater, environmental impacts than from the proposed Project. Transco has announced its proposed Diamond East Project to provide firm natural gas to markets in the northeast U.S., but that project is proposing to serve different markets in Pennsylvania, New Jersey, and New York than the proposed Project.

With regard to the Constitution Pipeline Project, Tennessee notes that the Commission, on October 24, 2014, issued the Constitution FEIS (FERC 2014b).[6] The Constitution FEIS contains a section in the Alternatives Section discussing Tennessee's NED Project, a portion of which is proposed to generally co-locate with the Constitution Pipeline Project from Susquehanna County, Pennsylvania and Wright, New York (as discussed in more detail in the draft of Resource Report 1 in this filing). In the Constitution FEIS, Commission Staff states that it considered the possibility of requiring Constitution and Tennessee to build one larger diameter pipeline to accommodate the objectives of both projects. The Constitution FEIS acknowledges that construction of one larger pipeline rather than two smaller pipelines would generally reduce long-term environmental impacts (assuming that both pipeline projects would cross the same resources), but that a larger pipeline would require a wider construction ROW and additional workspaces at resource crossings. Also, the Constitution FEIS discusses that if a larger pipeline was constructed, the extra capacity would not be immediately utilized, as sufficient takeaway capacity from Wright, New York does not exist currently (e.g. the proposed Wright to Dracut Pipeline Segment of the NED Project). This capacity would not be available to be used until Tennessee files the certificate application for the Project; the Project undergoes NEPA review, is approved, receives all other necessary federal approvals and is then constructed. The Constitution FEIS includes a discussion of the Commission's Certificate Policy Statement, under which the Commission applies a balancing test in reviewing proposals that weighs the environmental impacts of a project against purported benefits, noting that a project providing greater benefits could be approved with larger adverse or significant impacts to the environment. Commission Staff states that were it to recommend that Constitution construct a larger diameter pipeline, that recommendation would directly conflict the Commission's established policy on overbuilding. Also, based on available information, the Constitution Pipeline Project and the NED Project have different project objectives, different shippers, and different market-driven obligations that may not be met by a combined project. Commission Staff also acknowledges in the Constitution FEIS that given the timeframe for the proposed NED Project, recommending the single pipeline alternative would delay Commission review of the Constitution project significantly and would be inconsistent with EPAct 2005. See Constitution FEIS, Section 3.3.5, Northeast Energy Direct Single Pipeline Alternative, pp. 3-24 through 3-27, for the complete discussion.

Tennessee has designed the NED Project to meet the expressed needs of the Project Shippers, including requests to provide specific receipt points in Northeast Pennsylvania and specific delivery points to the Project Shippers' existing systems in New England that are already connected to Tennessee's system, as

[6] At the time the Constitution FEIS was issued, Tennessee was in the process of finalizing the drafts of Resource Reports 1 and 10 for filing with the Commission on November 5, 2014 when the Commission issued the Constitution FEIS and has not had an opportunity to finalize its review of the Constitution FEIS and incorporate any revisions to its proposed route based on that review. Tennessee will determine if any revisions to its proposed route are necessary after its review of the Constitution FEIS and incorporate any such revisions in a Revised Resource Report 10 to be submitted in a subsequent filing of the ER.

well as to new delivery points on Tennessee's system. The NED Project is independent from other proposed pipeline projects in the region and is designed to provide natural gas transportation service to the Project Shippers. The capacity to provide this transportation service must be available by November 2018 in order for the gas supply to be transported to the requested delivery points, which timing may not be able to be accommodated by expansions of pipeline systems that have not yet been proposed by other pipeline companies. Tennessee is not aware that the two pending projects, or other proposed projects in the region, would meet the Project's objectives, including meeting the November 1, 2018 in-service date.

For the Market Path Component of the NED Project (extending from Wright, New York to Dracut, Massachusetts), six interstate pipelines, including Tennessee, serve the New England natural gas supply and delivery infrastructure (Figures 10.2-1 through 10.2-5):

1. Tennessee owns and operates an interstate natural gas transmission system that extends from the states of Texas, Louisiana, and the Gulf of Mexico area, through the states of Texas, Louisiana, Arkansas, Mississippi, Alabama, Tennessee, Kentucky, West Virginia, Ohio, Pennsylvania, New Jersey, New York, Connecticut, Massachusetts, Rhode Island, and New Hampshire.

2. Spectra Energy's Algonquin Gas Transmission Pipeline ("AGT") originates from southern New Jersey, Connecticut and Massachusetts. The AGT System's proposed Atlantic Bridge Project and Access Northeast Project would provide more transportation capacity on the AGT Systems, but, based on the limited public information about this project, would not be capable of providing service to Tennessee's Project Shippers in New York, Massachusetts, northern Connecticut, and New Hampshire, unless AGT were to build an entirely new pipeline system that would essentially duplicate the Tennessee system. Such a project, would involve the construction of hundreds of miles of new pipeline facilities, presumably resulting in significantly greater environmental impacts than the proposed NED Project facilities, which includes pipeline looping and co-location with existing facilities to the extent practicable and feasible.

3. The PNGTS originates from Eastern Canada and provides Canadian supplies to the Boston, Massachusetts region**.** The PNGTS System's proposed C2C Expansion Project would provide additional transportation capacity on the TransCanada/Trans-Québec and Maritimes and Northeast pipelines, but the PNGTS system is not capable of serving Tennessee's Project Shippers in New York, Massachusetts, northern Connecticut, Rhode Island, New Hampshire, Maine, and Atlantic Canada without building an entirely new pipeline resulting in significantly greater environmental impacts than the proposed Project.

4. The Iroquois project originates from Waddington, New York delivering Canadian supplies to the New York City, New York region. The Iroquois system currently serves southwestern Connecticut and Long Island, New York, but is not capable of serving Tennessee's Project Shippers in New York, Massachusetts, northern Connecticut, New Hampshire, Rhode Island, Maine, and Atlantic Canada, without significant expansions or constructing new pipeline facilities.

5. The Maritimes and Northeast Pipeline originates from the Atlantic Canada provinces and delivers Canadian production and LNG imports from Repsol Canaport LNG in New Brunswick to the Boston, Massachusetts, region. The Canaport Terminal has the option of delivering natural gas to New England from the offshore natural gas production fields of the Sable Offshore Energy Project ("SOEP") and Deep Panuke in Nova Scotia, Canada. However, bringing the Marcellus gas supplies to the Project's markets would necessitate the construction of an entirely new pipeline that would essentially duplicate the Tennessee system from east to west. Such a project

would involve the construction of hundreds of miles of new pipeline facilities, presumably resulting in significantly greater environmental impacts than the proposed NED Project facilities, which includes pipeline looping and co-location with existing facilities to the extent practicable and feasible

6. The Granite State Gas Transmission ("GSGT") system is located in New Hampshire and does not transport natural gas from supply areas outside New England into New England. Therefore, in order to serve the Project Shippers, the GSGT would be required to construct an entirely new pipeline. Such a project would involve the construction of hundreds of miles of new pipeline facilities, presumably resulting in significantly greater environmental impacts than the proposed NED Project facilities, which includes pipeline looping and co-location with existing facilities to the extent practicable and feasible.

Other pipeline operators in the Project area have marketed transportation service moving natural gas into eastern New York and New England, including AGT, Iroquois, and Millennium, who have each offered projects for shippers to consider through open seasons. Based on publicly available information, AGT's Incremental Market ("AIM") Project was successful in attracting binding shipper commitments and is moving forward in the regulatory process. A certificate application for the AIM Project is pending at the Commission in Docket No. CP14-96-000. It is Tennessee's understanding that other similar projects, such as AGT's Atlantic Bridge Project (discussed above), Iroquois' Coast to Coast Project (linked with the PNGTS C2C Expansion Project) and Millennium's Marcellus to Manhattan Project have not been successful in securing sufficient shipper interest to move forward at the time of filing this Resource Report 10.

While the projects identified above apparently share a common goal with Tennessee's NED Project of transporting Marcellus Shale gas production to Northeast U.S. markets, including New England, there are significant differences. While Tennessee's market area does partially overlap with AGT's and Millennium's market areas (for example in southeastern New York), there are also many other areas where only one or two of the pipeline systems have existing infrastructure, or where one pipeline can offer a more economical solution for transporting incremental gas supplies. In general, Tennessee's existing system serves more of western and northern Massachusetts, while AGT serves southeast Massachusetts. While either pipeline company could serve growing markets in Massachusetts, each company is typically better positioned to serve certain geographic areas due to the location of each company's existing pipeline infrastructure. However, the NED Project uniquely enables service to all areas of Massachusetts given its ability to serve the Tennessee 200 Line System as well as various markets on the AGT system. This Project has the potential to provide high pressure volumes to AGT's through the Joint Facilities, Maritimes & Northeast Pipeline, AGT's HubLine Pipeline System, which are needed to replace the rapidly declining imports from Canada. Additionally, via a backhaul, the Project significantly increases the capacity of Tennessee's 200 Line system and will increase deliverability at an important supply feed to AGT's system via an existing Tennessee-AGT interconnect at Mendon, Massachusetts.

Tennessee believes that the NED Project is the only proposed pipeline Project that can provide the transformative solution that New England needs to reduce energy costs and enhance electric reliability. The NED Project is designed to provide New England with direct access to low-cost gas supplies in the "scale" necessary to significantly lower energy costs. Further, the NED Project will provide electric generation facilities with access to low-cost gas supplies and enable New England to sustain its electric grid, and reduce air emissions.

10.3 ROUTE ALTERNATIVES

Several alternatives to the proposed NED Project pipeline facilities were evaluated as part of the planning and design process for this Project. Alternatives still under evaluation and consideration along with additional information will be provided to FERC in a revised Resource Report 10 to be submitted in a subsequent filing of the ER. The alternatives analysis for the pipeline routes was based on environmental and land use impacts as well as permanent easement acquisitions, and overall Project costs. A route alternative is a linear segment of pipeline that deviates from the routing of the proposed pipeline facilities for the Project. Tennessee has analyzed (and will continue to analyze) three types of route alternatives.

a) Major route alternatives significantly deviate in both length and distance from the proposed route of the pipeline facilities (Section 10.3.1).

b) Minor route alternatives deviate from the proposed route of the pipeline facilities in the same general area as the proposed route (Section 10.3.2).

c) Minor deviations involve minor adjustments to the proposed route to avoid specific features (e.g., topography, sensitive habitat, and structures) or to address landowner or agency requests (Section 10.3.3).

Tennessee evaluated ten major alternative routes (Figures 10.3-1 to 10.3-10), two minor alternative routes (Figures 10.3-11 and 10.3-12), and over 100 minor deviations. Of these minor deviations, three representative landowner requests are presented in Section 10.3.3. These comparisons of alternatives to the proposed route for the Project pipeline facilities are detailed in Tables 10.3-1 to 10.3-7 (major route alternatives), Tables 10.3-8 and 10.3-9 (minor route alternatives), and Table 10.3-10 (minor deviations-landowner deviations).

Tennessee performed an analysis using desktop data to compare the proposed route for the Project's pipeline facilities against alternative routes. Although environmental survey data is currently being collected for the entire proposed route of the Project's pipeline facilities, this data did not allow for consistent, comparative assessments among the alternatives. Therefore, desktop data was utilized for the alternative analysis to present a more comprehensive, reliable, and consistent data set for alternatives analysis.

The factors considered by Tennessee in its selection of the proposed route for the Project's pipeline facilities rather than the alternative routes and deviations include landowner concerns, minimization of the number of affected landowners, minimization of adverse environmental impacts, ensuring constructability, promoting safety, and meeting Tennessee's goal to minimize the extent of potential disruption to communities during construction. Existing information sources such as field reconnaissance, aerial photography, topographic maps from the U.S. Geological Survey ("USGS"), and National Wetland Inventory ("NWI") maps were used during the route identification and evaluation processes.

When evaluating the routing options for the Project's pipeline facilities, Tennessee attempted to co-locate with its own existing pipeline facilities and ROW, other existing utility ROWs, to the extent practicable, feasible, and consistent with existing law. The use of co-location as a principle design element by Tennessee is necessitated not only by Commission guidelines which stress the corridor concept, but also due to the existing land use characteristics in the areas of the pipeline system. The utility corridor created

by Tennessee's existing pipeline or other utilities or pipelines minimizes further environmental impacts and public disturbance, as well as construction costs. Siting pipeline facilities along existing corridors reduces the establishment of new corridors in previously undisturbed areas, while limiting environmental impacts and the number of affected landowners.

The selection of the major route alternatives discussed in Section 10.3.1 below was dictated by several factors:

- determination of the most cost-effective technical solution (i.e., looping or co-location versus addition of compression);
- development of routing criteria;
- identification of potential routing alternatives;
- collection of data relative to each alternative;
- evaluation of potential environmental and land use impacts; and
- evaluation of routing alternatives against routing criteria.

The main determinants used to select the proposed route for the Project's pipeline facilities rather than the other alternative routes that were evaluated, pertained to minimizing the number of affected landowners, constructability issues, and Tennessee's goal to limit the extent of disruption on the communities to potentially be affected during construction.

10.3.1 Major Route Alternatives

Major route alternatives include those that deviate from the proposed route for the Project's pipeline facilities for a significant distance (often a majority or more of the proposed route's length for a specific pipeline facility), and which provide a substantially different pathway from the supply area to the delivery area. In lieu of the proposed Project facilities that were selected to meet the Project objectives, Tennessee evaluated the alternative of constructing a new pipeline along with ten other alternative alignments as detailed below.

During the early pipeline routing and design stages, Tennessee, in order to evaluate and determine the best viable route, completed a detailed routing analysis of the proposed route of the pipeline facility extending from Wright, New York to Dracut, Massachusetts as compared to three major route alternatives: (1) the co-location with the existing 200 Line; (2) co-location with Route 2; and (3) co-location with the Mass Turnpike ("Mass Pike" also known as Interstate-90). These alternative routes considered are located entirely within the Commonwealth of Massachusetts and the State of Connecticut. The analysis was completed using geographic information system ("GIS") data sets tied to specific data available at the state level. This review and data is summarized in Sections 10.3.1.3 through 10.3.1.5 and Tables 10.3-3 to 10.3-5. The remaining sections and tables provide details for the remaining seven major alternatives (New Hampshire, Massachusetts and New York powerline alternatives, the Article 97 Avoidance and Co-location alternatives, and the Pennsylvania to Wright Pipeline Segment alternatives), which were compiled utilizing publically available, federal and other GIS data set sources.

10.3.1.1 Pennsylvania to Wright Pipeline Segment Alternatives

Tennessee evaluated a total of five major alternatives along its proposed Pennsylvania to Wright Pipeline Segment. These alternatives consist of three areas in which the proposed route for the Pennsylvania to Wright Pipeline Segment deviates from the proposed route for the Constitution project, one alternative

route along the Interstate 88 ("I-88") corridor and one alternative previously evaluated as part of Tennessee's contemplated Northeast Exchange ("NEEX") project. The information detailed below pertains to the proposed Constitution pipeline route evaluated within the Constitution DEIS (FERC 2014a). As discussed above, the Commission issued the Constitution FEIS on October 24, 2014. Tennessee will determine if any revisions to its proposed route and alternatives discussion are necessary after a thorough review of the Constitution FEIS, and incorporate any such revisions in subsequent filings of the ER.

10.3.1.1.1 Constitution Route Alternatives

The following details three locations along the proposed Pennsylvania to Wright Pipeline Segment where the proposed route deviates from the proposed Constitution alignment[7] for various engineering constraints, which are still under evaluation (Figure 10.3-1).

Tennessee's Constitution Route 1 Alternative deviates from the proposed Constitution alignment within Pennsylvania at MP 24.25 of the Pennsylvania to Wright Pipeline Segment and returns to the proposed Constitution alignment at MP 36.24. This is an approximate 9.57 mile deviation. The proposed alternative route will provide access to the Project for a potential Project Shipper and would be co-located with an existing powerline easement for approximately 5.70 miles. Tennessee's proposed route in this location also provides for a more constructible crossing of Starrucca Creek, including the potential to cross the creek with a horizontal direction drill ("HDD") to minimize impacts to the creek. As of the filing date of this Resource Report 10, Tennessee continues to evaluate this alternative in comparison with the proposed route for the Pennsylvania to Wright Pipeline Segment. Additional information and consideration of this alternative will be provided to in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

Tennessee's Constitution Route 2 Alternative route deviates from the proposed Constitution alignment within New York at MP 50.13 of the Pennsylvania to Wright Pipeline Segment and returns to proposed Constitution alignment at MP 63.60. This is an approximate 13 mile deviation. In Susquehanna County, Pennsylvania Tennessee's proposed route travels in a northeasterly direction and is approximately four miles shorter than the proposed Constitution alignment, resulting in less environmental resources and landowners that would be impacted. In addition the proposed route eliminates areas of steep terrain present along this portion of the proposed Constitution alignment. As of the filing date of this Resource Report 10, Tennessee continues to evaluate this alternative in comparison with the proposed route for the Pennsylvania to Wright Pipeline Segment. Additional information and consideration of this alternative will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

Tennessee's Constitution Route 3 Alternative deviates from the proposed Constitution alignment within New York at MP 123.63 of the Pennsylvania to Wright Pipeline Segment and returns to the proposed route at the Wright Meter Station at MP 134.99. This is an approximate 11.59 mile deviation. Routing considerations in this vicinity includes overall environmental impacts, particularly, especially to the multiple waterbodies in the area. Also known to be an area where hills and karst terrain are prevalent, construction feasibility and safety to personnel and equipment are significant considerations in routing

[7] As discussed above, the Commission issued the Constitution FEIS on October 24, 2014. Tennessee will determine if any revisions to its proposed route and alternatives discussion are necessary after a thorough review of the Constitution FEIS, and incorporate any such revisions in subsequent filings of the ER.

evaluations. Attempts are made to avoid unnecessary traversing of steep hills while maintaining minimal impacts to land owners and the surrounding environment. As of the filing date of this Resource Report 10, Tennessee continues to evaluate this alternative in comparison with the proposed route for the Pennsylvania to Wright Pipeline. Additional information and consideration of this alternative will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

TABLE 10.3-1
COMPARISON OF THE PROPOSED ROUTE OF THE PENNSYLVANIA TO WRIGHT PIPELINE SEGMENT TO CONSTITUTION MAJOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Corresponding Route Segment								
	Pennsylvania to Wright Pipeline Segment			Constitution Alternative Routes			Difference (if applicable)[1]		
	1	2	3	Route 1	Route 2	Route 3	1	2	3
Length of Corresponding Segment (miles)	11.99	13.47	11.37	9.57	17.48	11.59	+2.42	-4.01	-0.22
Type of Right-of-Way (ROW)									
New ROW (miles)	7.51	10.80	3.28	0.00	0.00	8.62	+7.51	+10.80	-5.34
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	4.48	2.67	8.09	9.57	17.48	2.97	-5.09	-6.90	+5.12
ROW Requirements									
Pipeline Construction Requirements (acres)[2]	145.32	163.28	137.82	116.00	211.88	140.48	+29.32	-48.60	-2.66
Pipeline Operation Requirements (acres)[2]	72.66	81.64	68.91	58.00	105.94	70.24	+14.66	-24.30	-1.33
Wetlands									
Total Wetland Complexes Crossed (number)	6	3	0	3	3	0	+3	0	0
Total Wetland Crossed (linear ft)	1,443.58	404.69	0.00	537.53	739.13	0.00	+906.05	-334.44	0.00

TABLE 10.3-1
COMPARISON OF THE PROPOSED ROUTE OF THE PENNSYLVANIA TO WRIGHT PIPELINE SEGMENT TO CONSTITUTION MAJOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Corresponding Route Segment								
	Pennsylvania to Wright Pipeline Segment			Constitution Alternative Routes			Difference (if applicable)[1]		
	1	2	3	Route 1	Route 2	Route 3	1	2	3
Palustrine Forested Wetland Complexes Crossed (construction/operation acres) (miles)	1.60/0.80 (0.13)	0.66/0.33 (0.05)	0.00/0.00 (0)	0.56/0.28 (0.05)	0.00/0.00 (0.00)	0.00/0.00 (0.00)	+1.04/+0.52 (+0.08)	+0.66/+0.33 (+0.05)	+0.66/+0.33 (+0.05)
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation acres) (miles)	1.26/0.63 (0.10)	0.26/0.13 (0.02)	0.00/0.00 (0)	0.00/0.00 (0.00)	0.87/0.43 (0.07)	0.00/0.00 (0.00)	+1.26/+0.63 (+0.10)-	0.61/-0.03 (-0.05)	0.00
Palustrine Emergent Wetland Impacts (construction/operation acres) (miles)	0.46	0.23/ (0.04)	0.00	0.68/0.34 (0.06)	0.82/0.41 (0.07)	0.00/0.00 (0.00)	-0.22/-0.11 (-0.02)	-0.82/-0.41 (-0.07)	0.00
Waterbodies									
Waterbodies Crossed (number)	12	11	8	8	15	7	+4	-4	+1
Perennial Waterbodies (number)	3	5	8	3	10	7	0	+2	+1
Major River Crossings (number >100 ft)	0	0	0	0	1	0	0	-1	0
Designated natural and scenic rivers (number)	0	0	0	0	0	0	0	0	0

TABLE 10.3-1
COMPARISON OF THE PROPOSED ROUTE OF THE PENNSYLVANIA TO WRIGHT PIPELINE SEGMENT TO CONSTITUTION MAJOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Corresponding Route Segment								
	Pennsylvania to Wright Pipeline Segment			Constitution Alternative Routes			Difference (if applicable)[1]		
	1	2	3	Route 1	Route 2	Route 3	1	2	3
Significant fisheries (number)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Federal Listed Endangered or Threatened Species									
Habitat (miles)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Species (number)	TBD			TBD	TBD	TBD	TBD	TBD	TBD
Cultural Resources									
National Historic Landmarks (number)	0	0	0	0	0	0	0	0	0
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	0	0	2	0	0	1	0	0	+1
Unlisted/potentially eligible properties	0	0	0	0	0	0	0	0	0
Land Use									
Forested Land Crossed (miles)	8.24	8.24	5.17	8.05	10.48	5.28	+0.19	-2.24	-0.11
Agricultural Land Crossed (miles)	2.89	4.08	5.65	1.13	5.80	5.72	+1.79	-1.72	-0.07
Open (meadow, recreation, historic districts, etc.) (miles)	0.86	1.02	0.47	0.38	1.19	0.46	+0.48/	-0.17	+0.01

TABLE 10.3-1
COMPARISON OF THE PROPOSED ROUTE OF THE PENNSYLVANIA TO WRIGHT PIPELINE SEGMENT TO CONSTITUTION MAJOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Corresponding Route Segment								
	Pennsylvania to Wright Pipeline Segment			Constitution Alternative Routes			Difference (if applicable)[1]		
	1	2	3	Route 1	Route 2	Route 3	1	2	3
Residential (miles)	0.00	0.04	0.07	0.00	0.00	0.06	0.00	+0.04	+0.01
Commercial/Industrial (miles)	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	-0.03
Property Owners									
Residences located within 50 ft of the construction work area (number)	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Federal & State Land									
Federal Lands Crossed (number/miles)	0	0	0	0	0	0	0	0	0
State Forest/Parks (number/miles)	(0) 0.00	(1) 0.26	(0) 0.00	(0) 0.00	(1) 0.06	(0) 0.00	(0) 0.00	(0) +0.20	(0) 0.00
Wildlife Management Areas (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trails									
National and State Trails (number)	0	1	0	0	1	0	0	0	0
Other Environmental Features									
Landfills, quarries (count w/in 0.50 mile)	14	2	0	18	2	1	-4	0	-1

TABLE 10.3-1
COMPARISON OF THE PROPOSED ROUTE OF THE PENNSYLVANIA TO WRIGHT PIPELINE SEGMENT TO CONSTITUTION MAJOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Corresponding Route Segment								
	Pennsylvania to Wright Pipeline Segment			Constitution Alternative Routes			Difference (if applicable)[1]		
	1	2	3	Route 1	Route 2	Route 3	1	2	3

[1] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[2] Construction ROW impacts calculated using a 100-foot-wide corridor. Permanent ROW acreages assumed a 50-foot-wide permanent ROW. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.1.1.2 Interstate-88 Alternative

The I-88 Alternative to the proposed route of the Pennsylvania to Wright Pipeline Segment was discussed in detail in the Commission's Constitution DEIS (FERC 2014a), and in the Commission's Constitution FEIS (FERC 2014b), issued October 24, 2014 (referred to as "Alternative M" in the Constitution FEIS). The section below references the discussion of the I-88 Alternative based on the Constitution DEIS analysis. Tennessee will review the Alternative M discussion in the recently issued Constitution FEIS and update the discussion in this section in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

In the Constitution DEIS for the proposed Constitution Pipeline Project, the Commission evaluated an alternative within the I-88 ROW (Figure 10.3-2). This alternative evaluated the possibility of co-locating with Constitution's proposed route from Pennsylvania to Wright, New York within or adjacent to the I-88 corridor, thereby reducing the need for disturbance in new areas. I-88 originates near Binghamton, New York, which is located to the north of the Susquehanna County, Pennsylvania supply area, and proceeds approximately 118 miles to the northeast near Schenectady, New York. Constitution's proposed route and I-88 are located in the same general vicinity, both trending northeast-southwest. The I-88 corridor is managed by the New York State Department of Transportation ("NYSDOT"), with funding and oversight provided by the Federal Highway Administration ("FHWA").

As a result of the Commission's review, several potential construction and/or engineering issues were identified regarding this alternative route in the Constitution proceeding:

- blasting near the roadway would be required;
- use of two-tone construction techniques on side slopes would be necessary to install the pipeline;
- disruption of interstate traffic flow during blasting would likely occur;
- delays caused by slow moving, heavy construction equipment operating near the roadway were likely; and
- limited areas where the pipeline could be safely installed relative to the roadway.

The Commission's review of this alternative in their Constitution DEIS included a number of comments from the NYSDOT. Among other things, the Commission noted that the NYSDOT, for safety of both motorists and construction workers, would not allow access to the construction workspace directly from I-88; rather, access would have to be obtained from adjacent private properties. In addition, Constitution would not be allowed access to the permanent ROW from I-88 during operations and placement of the pipeline within the controlled access area managed by the NYSDOT would obstruct pipeline construction as well as inspections and maintenance during pipeline operations (FERC 2014a). The NYSDOT had commented that the proposed pipeline would be required to comply with FHWA policy, (23 CFR 645, Subpart B) which states that "an applicant would be required to show that no feasible alternative routes exist to obtain approval of the I-88 route from NYSDOT and FHWA," of which the proposed Constitution route would be considered a feasible alternative. Further, because the easements along I-88 are federally managed, Constitution would be required to successfully negotiate an easement for any portion of its project located within or crossing these access areas. If the NYSDOT refused to grant an easement or if a mutually agreeable easement could not otherwise be negotiated in these areas and the Commission were to grant a certificate order authorizing the Constitution Pipeline Project, it would essentially be approving a non-buildable project, as federally-managed lands cannot be acquired through the power of eminent domain.

As noted above, the Commission evaluated the I-88 major route alternative in its review of the proposed Constitution route and determined it did not offer major environmental advantages over the proposed Constitution route and therefore, this alternative route was eliminated from further consideration and was rejected in the Commission's DEIS for the Constitution Project. After reviewing this information as part of its evaluation of major route alternatives, including the Commission's findings that the I-88 corridor is not a viable alternative, Tennessee has eliminated this alternative from further evaluation as a possible alternative for the NED Project. As a result, the proposed Pennsylvania to Wright Pipeline Segment of the NED Project has been co-located with the proposed Constitution alignment in this area, as it represents the most environmentally sound route.

Because this alternative has already received an extensive review by the Commission, a comparison table to the proposed route has not been provided in this Resource Report 10.

10.3.1.1.3 Northeast Exchange (NEEX) Alternative

The NEEX Alternative was originally proposed by Tennessee as a competing pipeline to the proposed Constitution route, extending from Tennessee's existing Station 321 in Pennsylvania and traveling north and east to Wright, New York (Figure 10.3-3). The Commission's analysis of the proposed Constitution route deemed that its proposed alignment is the most viable route in this area. With this analysis and with Constitution's certificate application pending at the Commission, Tennessee does not consider the NEEX route to be a viable alternative for this area and in fact, Constitution adopted a majority of the NEEX route originally developed by Tennessee. As a result, the proposed Pennsylvania to Wright Pipeline Segment has been generally co-located with the preferred Constitution alignment, except as discussed above in Section 10.3.1.1.1.

Because this alternative has already been determined as a non-viable route, a comparison table to the proposed route has not been provided within this Resource Report 10.

10.3.1.2 New York Powerline Alternative

Tennessee is evaluating the New York Powerline Alternative as an alternative to the proposed route for the Wright to Dracut Pipeline Segment. This alternative routing would co-locate the Wright to Dracut Pipeline Segment with an existing New York powerline corridor (Figure 10.3-4). This alternative would begin at approximately MP 34.13 of the Wright to Dracut Pipeline Segment in New York, travel in a north/northeast direction, eventually turning east/southeast to interconnect with the mainline proposed route at approximately MP 69.91 in Massachusetts.

The advantages of this alternative route include co-location with an existing utility corridor, and the avoidance of the congested populated areas of Pittsfield and Dalton, Massachusetts. However, in Massachusetts, the alternative route would traverse state-owned lands. The co-location of the pipeline with the powerline corridor in these areas, however, would lessen the environmental impacts and avoid habitat fragmentation. This alternative route for the Wright to Dracut Pipeline Segment continues to be evaluated by Tennessee and additional information about the alternative analysis will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

TABLE 10.3-2
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO NEW YORK POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	New York Powerline Alternative	Difference (if applicable)[1]
Length of Corresponding Segment (miles)	35.77	34.42	+1.35
Type of Right-of-Way (ROW)			
New ROW (miles)	12.46	0.00	+12.46
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	23.31	34.42	-11.11
ROW Requirements			
Pipeline Construction Requirements (acres)[2]	433.58	417.22	+16.36
Pipeline Operation Requirements (acres)[2]	216.79	208.61	+8.18
Wetlands			
Total Wetland Complexes Crossed (number)	39	37	+2
Total Wetland Crossed (linear ft)	8,528.61	10,542.62	-2,014.01
Palustrine Forested Wetland Complexes Crossed (construction/operation acres) (miles)	15.08/7.54 (1.24)	6.60/3.30 (0.54)	+8.48/+4.27 (+0.70)
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation acres) (miles)	2.04/1.02 (0.17)	6.00/3.00 (0.50)	-3.96/-1.98 (-0.33)
Palustrine Emergent Wetland Impacts (construction/operation acres) (miles)	7.08/3.54 (0.58)	6.98/3.49 (0.58)	+0.10/+0.05 (0.00)
Waterbodies			
Waterbodies Crossed (number)	33	38	-5
Perennial Waterbodies (number)	28	28	0
Major River Crossings (number >100 ft)	1	16	-15
Designated natural and scenic rivers (number)	0	0	0
Significant fisheries (number)	TBD	TBD	TBD

TABLE 10.3-2
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO NEW YORK POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	New York Powerline Alternative	Difference (if applicable)[1]
Federal Listed Endangered or Threatened Species			
Habitat (miles)	TBD	TBD	TBD
Species (number)	TBD	TBD	TBD
Cultural Resources			
National Historic Landmarks (number)	0	0	0
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	3	0	+3
Land Use			
Forested Land Crossed (miles)	21.58	17.64	+3.94
Agricultural Land Crossed (miles)	6.18	6.19	-0.01
Open (meadow, recreation, historic districts, etc.) (miles)	7.83	10.12	-2.29
Residential (miles)	0.18	0.31	-0.13
Commercial/Industrial (miles)	0.00	0.02	-0.02
Property Owners			
Residences located within 50 ft of the construction work area (number)	TBD	TBD	TBD
Federal & State Land			
Federal Lands Crossed (number/miles)	1/1.08	1/0.42	0/+0.66
State Forest/Parks (number/miles)	1/1.24	1/1.61	0/-0.37
Wildlife Management Areas (miles)	0.00	0.00	0.00
Trails			
National Trails (number)	1	1	0

TABLE 10.3-2
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO NEW YORK POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	New York Powerline Alternative	Difference (if applicable)[1]
Other Environmental Features			
Landfills, quarries (count w/in 0.50 mile)	7	4	+3

[1] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[2] Construction ROW impacts calculated using a 100-foot-wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.1.3 Existing 200 Line Alternative

Co-locating a pipeline with Tennessee's existing 200 Line was considered as a major alternative to the Wright to Dracut Pipeline Segment proposed as part of the Project. Tennessee evaluated an alternative pipeline route that would be co-located with Tennessee's existing 200 Line beginning at the New York/Massachusetts border to Dracut, Massachusetts, approximately 151 miles in length (Figure 10.3-5). This alternative would deviate from the proposed route of the Wright to Dracut Pipeline Segment at MP 52.80 and extend southeast, crossing the Connecticut border, and rejoin the proposed route at MP 176.08. Although the existing 200 Line Alternative would be largely co-located, this route is longer and traverses significantly more densely populated areas. The alternative route along the existing pipeline system would also require the reroute of the proposed market delivery laterals through highly populated areas which would significantly increase environmental impacts and potentially lower the number of markets Tennessee could reach. The proposed route for the Wright to Dracut Pipeline Segment results in shorter market deliver laterals that would disturb significantly fewer stakeholders and environmental resources than if Tennessee were to route the pipeline along its existing 200 Line system corridor.

Tennessee did not select this alternative because, when compared to the proposed route for the Wright to Dracut Pipeline Segment, this alternative would have: (1) a much longer overall route length and land requirements for construction ROW; (2) significantly more extensive cultural and environmental impacts; (3) greater number of stream and wetland crossings and (4) greater impacts to residences and developed areas.

TABLE 10.3-3
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO EXISTING 200 LINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	200 Line Alternative	Difference (if applicable)[2]
Length of Corresponding Segment (miles)	128.20	151.12	-22.92
Type of Right-of-Way (ROW)			
Length New ROW (miles)	91.01	5.94	+85.07
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	37.19	147.90	-110.71
ROW Requirements			
Pipeline Construction Requirements (acres)[3]	1,553.81	2,215.08	-661.27
Pipeline Operation Requirements (acres)[3]	780.64	586.87	+193.77
Wetlands			
Total Wetland Complexes Crossed (number)	231	646	-415
Palustrine Forested Wetland Complexes Crossed (construction/operation acres)	46.16/30.28	63.80/24.63	-17.64/-5.65
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation acres)	17.99/11.59	42.11/15.18	-24.12/-3.59
Palustrine Emergent Wetland Impacts (construction/operation acres)	20.44/12.94	58.51/19.21	-38.07/-6.27
Waterbodies			
Waterbodies Crossed (number)	118	191	-73
Perennial Waterbodies Crossed (number)	88	102	-14
Intermittent Waterbodies Crossed (number)	29	80	-51
Major River Crossings (number >100 ft)	3	3	0
Designated natural and scenic rivers (number)	1	0	+1
Significant fisheries (number)	TBD	TBD	TBD
Ponds/Lakes (number)	1	9	-8

TABLE 10.3-3
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO EXISTING 200 LINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	200 Line Alternative	Difference (if applicable)[2]
Federal Listed Endangered or Threatened Species			
Habitat (construction/operation acres)	357.11/176.46	430.03/111.11	-72.92/+65.35
Species (number)	TBD	TBD	TBD
Cultural Resources			
National Historic Landmarks (number)	No Data Available	1	-1
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	No Data Available	9	-9
Land Use			
Forested Land Crossed (construction/operation) (acres)	1,138.69/581.40	915.71/318.75	+222.98/+262.65
Agricultural Land (construction/operation) (acres)	117.28/57.49	235.17/59.25	-117.89/-1.76
Open (meadow, recreation, historic districts, etc.) (construction/operation) (acres)	262.52/112.19	874.61/153.83	-612.09/-41.61
Residential (construction/operation) (acres)	21.37/9.07	111.16/30.08	-89.79/-21.01
Commercial/Industrial (includes Transportation) (construction/operation) (acres)	5.77/2.76	65.07/19.77	-59.30/-17.01
Other (construction/operation) (acres)	0.39/0.18	6.62/2.01	-6.23/-1.83
Property Owners			
Residences located within 50 ft of the construction work area (number)	144	707	-563
Federal & State Land			
Federal Lands Crossed (construction/operation) (acres)	29.52/14.74	54.16/14.04	-24.64/+0.70
State Forest/Parks (construction/operation) (acres)	106.65/53.64	167.17/42.82	-60.52/+10.82
Wildlife Management Areas (construction/operation) (acres)	52.39/26.12	45.86/11.03	+6.53/+15.09

TABLE 10.3-3
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO EXISTING 200 LINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	200 Line Alternative	Difference (if applicable)[2]
Trails			
National Trails (number)	1	0	+1
Other Environmental Features			
Recreational Areas (ballfields, campgrounds, landfills, quarries, etc.) (construction/operation) (acres)	6.84/3.44	16.05/4.50	-9.21/-1.06

[1] Review of this alternative was completed using Massachusetts and Connecticut state specific GIS data sets.

[2] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[3] Construction ROW impacts calculated using a 100-foot wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW where not co-located with an existing Tennessee pipeline; where located within 60 feet of a Tennessee pipeline a 30-feet-wide corridor was used. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.1.4 Massachusetts Route 2 Alternative

Co-locating with Route 2 is considered a major alternative to the Wright to Dracut Pipeline Segment. Tennessee evaluated an alternative pipeline route that would co-locate the Wright to Dracut Pipeline Segment of NED Project adjacent to existing Route 2 within Massachusetts (Figure 10.3-6). This alternative deviates from the proposed route for the Wright to Dracut Pipeline Segment at MP 52.80 and travels north of the proposed route, before rejoining into the proposed route at MP 177.16.

The proposed route of the Wright to Dracut Pipeline Segment compared to the Route 2 Alternative shows that it is approximately 16 miles shorter in length, which subsequently results in significantly less construction and operation impacts. While the proposed route traverses a greater amount of palustrine forested wetland than the alternative, it has significantly less impact to palustrine scrub-shrub and emergent wetlands and crosses a total of 35 fewer streams than the alternative. As a result of the shorter length the amount of land uses traversed and impacted and residencies within the 50 feet of the construction work area, is far fewer than the Route 2 alternative. In addition, constructing and operating a pipeline co-located with roadway presents challenges both during installation of the pipeline and maintenance. Working within or adjacent to a state roadway easement poses potential traffic management and access issues and additional coordination with a state agency.

Tennessee did not select this alternative because, when compared to the proposed route for the Wright to Dracut Pipeline Segment, this alternative has: (1) a much longer overall route length and land requirements for construction ROW, (2) significantly more extensive cultural and environmental impacts; (3) greater number of stream and wetland crossings and (4) impacts a greater number of residences and developed areas.

TABLE 10.3-4
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASSACHUSETTS ROUTE 2 MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	Route 2 Alternative	Difference (if applicable)[2]
Length of Corresponding Segment (miles)	128.20	144.53	-16.33
Type of Right-of-Way (ROW)			
Length New ROW (miles)	91.01	51.48	+39.53
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	37.19	93.05	-55.86
ROW Requirements			
Pipeline Construction Requirements (acres)[3]	1,553.81	1,784.10	-230.29
Pipeline Operation Requirements (acres)[3]	780.64	885.68	-105.04
Wetlands			
Total Wetland Complexes Crossed (number)	231	336	-105
Palustrine Forested Wetland Complexes Crossed (construction/operation) (acres)	46.16/30.28	47.78/30.34	-1.62/-+0.06
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation) (acres)	17.99/11.59	43.62/28.90	-25.63/-17.31
Palustrine Emergent Wetland Impacts (construction/operation) (acres)	20.44/12.94	34.81/22.34	-14.37/-9.40
Waterbodies			
Waterbodies Crossed (number)	118	153	-35
Perennial Waterbodies Crossed (number)	88	100	-12
Intermittent Waterbodies Crossed (number)	29	50	-21
Major River Crossings (number >100 ft)	3	5	-2
Designated natural and scenic rivers (number)	1	0	+1
Significant fisheries (number)	TBD	TBD	TBD
Ponds/Lakes (number)	1	3	-2

TABLE 10.3-4
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASSACHUSETTS ROUTE 2 MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	Route 2 Alternative	Difference (if applicable)[2]
Federal Listed Endangered or Threatened Species			
Habitat (miles)	357.11/176.46	384.08/185.95	-26.97/-9.49
Species (number)	TBD	TBD	TBD
Cultural Resources			
National Historic Landmarks (number)	No Data Available	No Data Available	0
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	No Data Available	9	-9
Land Use			
Forested Land Crossed (construction/operation) (acres)	1,138.69/581.40	1,041.45/516.04	+97.00/+65.36
Agricultural Land (construction/operation) (acres)	117.28/57.49	132.09/65.57	-14.81/-8.08
Open (meadow, recreation, historic districts, etc.) (construction/operation) (acres)	262.52/112.19	446.59/223.29	-184.07/-111.10
Residential (construction/operation) (acres)	21.37/9.07	45.46/21.28	-24.09/-12.21
Commercial/Industrial (includes Transportation) (construction/operation) (acres)	5.77/2.76	108.39/44.17	-102.62/-41.41
Other (construction/operation) (acres)	0.39/0.18	0.26/0.00	+0.13/+0.18
Property Owners			
Residences located within 50 ft of the construction work area (number)	144	360	-216
Federal & State Land			
Federal Lands Crossed (construction/operation) (acres)	29.52/14.74	7.82/4.17	+21.70/+10.57
State Forest/Parks (construction/operation) (acres)	106.65/53.64	130.39/65.02	-23.74/-11.38

TABLE 10.3-4
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASSACHUSETTS ROUTE 2 MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	Route 2 Alternative	Difference (if applicable)[2]
Wildlife Management Areas (construction/operation) (acres)	52.39/26.12	15.57/7.78	+36.82/+18.34
Trails			
National Trails (number)	1	1	0
Other Environmental Features			
Recreational Areas (ballfields, campgrounds, landfills, quarries, etc.) (construction/operation acres) (acres)	6.84/3.44	9.44/4.48	-2.60/-1.04

[1] Review of this alternative was completed using Massachusetts and Connecticut state specific GIS data sets.

[2] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[3] Construction ROW impacts calculated using a 100-foot wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW where not co-located with an existing Tennessee pipeline; where located within 60 feet of a Tennessee pipeline a 30-feet-wide corridor was used. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.1.5 Mass Turnpike Alternative

Co-locating with the existing Mass Pike is considered a major alternative to the Wright to Dracut Pipeline Segment of the proposed Project. Tennessee evaluated co-locating the Wright to Dracut Pipeline Segment adjacent to this highway within Massachusetts (Figure 10.3-7). This alternative leaves the proposed route at MP 52.80 and travels south of the Proposed Route within the southern tier of the state and ties back into the proposed route at MP 177.16.

The proposed route of the Wright to Dracut Pipeline Segment compared to the Mass Pike Alternative shows that it is approximately 24 miles shorter in length, which subsequently results in significantly less construction and operation impacts. While the proposed route traverses a greater amount of palustrine forested wetland than the alternative, it has significantly less impact to palustrine scrub-shrub and emergent wetlands and crosses a total of 36 fewer streams than the alternative. As a result of the shorter length the amount of land uses traversed and impacted and residences within the 50 feet of the construction work area for the proposed route are fewer than the Mass Pike alternative. In addition, constructing and operating a pipeline co-located with roadway presents challenges both during installation of the pipeline and maintenance. Working within or adjacent to a state roadway easement poses potential traffic management and access issues and additional coordination with a state agency.

Tennessee did not select this alternative because, when compared to the proposed route for the Wright to Dracut Pipeline Segment, this alternative has: (1) a much longer overall route length and land

requirements for construction ROW, (2) significantly more extensive cultural and environmental impacts; (3) greater number of stream and wetland crossings and (4) impacts a greater number of residences and developed areas.

TABLE 10.3-5
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASS TURNPIKE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	Mass Turnpike Alternative	Difference (if applicable)[2]
Length of Corresponding Segment (miles)	128.20	152.02	-23.82
Type of Right-of-Way (ROW)			
Length New ROW (miles)	91.01	10.20	+80.81
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	37.19	141.82	-104.63
ROW Requirements			
Pipeline Construction Requirements (acres)[3]	1,553.81	1,931.42	-377.61
Pipeline Operation Requirements (acres)[3]	780.64	904.32	-123.68
Wetlands			
Total Wetland Complexes Crossed (number)	231	303	-72
Palustrine Forested Wetland Complexes Crossed (construction/operation) (miles)	46.16/30.28	36.99/23.39	+9.17/+6.89
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation) (miles)	17.99/11.59	24.55/15.92	-6.56/-4.33
Palustrine Emergent Wetland Impacts (construction/operation) (miles)	20.44/12.94	32.43/20.14	-11.99/-7.20
Waterbodies			
Waterbodies Crossed (number)	118	154	-36
Perennial Waterbodies Crossed (number)	88	92	-4
Intermittent Waterbodies Crossed (number)	29	61	-32
Major River Crossings (number >100 ft)	3	5	-2
Designated natural and scenic rivers (number)	1	1	0

TABLE 10.3-5
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASS TURNPIKE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	Mass Turnpike Alternative	Difference (if applicable)[2]
Significant fisheries (number)	TBD	TBD	TBD
Ponds/Lakes (number)	1	1	0
Federal Listed Endangered or Threatened Species			
Habitat (miles)	357.11/176.46	192.75/86.45	+164.36/+90.01
Species (number)	TBD	TBD	TBD
Cultural Resources			
National Historic Landmarks (number)	No Data Available	1	-1
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	No Data Available	8	-8
Land Use			
Forested Land Crossed (construction/operation) (acres)	1,138.69/581.40	1,171.27/612.76	-32.58/-31.36
Agricultural Land (construction/operation) (acres)	117.28/57.49	48.98/18.22	+68.30/+39.27
Open (meadow, recreation, historic districts, etc.) (construction/operation) (acres)	262.52/112.19	308.32/143.16	-45.80/-30.97
Residential (construction/operation)(acres)	21.37/9.07	32.36/12.76	-10.99/-3.69
Commercial/Industrial (includes Transportation) (construction/operation) (acres)	5.77/2.76	269.09/94.92	-263.32/92.16
Other (construction/operation) (acres)	0.39/0.18	1.34/0.00	-0.95/+0.18
Property Owners			
Residences located within 50 ft of the construction work area (number)	144	425	-281
Federal & State Land			
Federal Lands Crossed (construction/operation) (acres)	29.52/14.74	0.00	+29.52/+14.74
State Forest/Parks (construction/operation) (acres)	106.65/53.64	26.93/12.63	+79.72/+41.01

TABLE 10.3-5
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASS TURNPIKE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor[1]	Proposed Route Wright to Dracut Pipeline Segment	Mass Turnpike Alternative	Difference (if applicable)[2]
Wildlife Management Areas (construction/operation) (acres)	52.39/26.12	2.93/1.43	+49.46/++24.69
Trails			
National Trails (number)	1	1	0
Other Environmental Features			
Recreational Areas (ballfields, campgrounds, landfills, quarries, etc.) (construction/operation) (acres)	6.84/3.44	3.46/1.43	+3.38/+2.01

[1] Review of this alternative was completed using Massachusetts and Connecticut state specific GIS data sets.

[2] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[3] Construction ROW impacts calculated using a 100-foot-wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW where not co-located with an existing Tennessee pipeline; where located within 60 feet of a Tennessee pipeline a 30-feet-wide corridor was used. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.1.6 Massachusetts Powerline Alternative

Tennessee has evaluated the Massachusetts Powerline Alternative to the proposed route of the Wright to Dracut Pipeline Segment. This alternative route would be co-located with an existing Massachusetts powerline corridor (Figure 10.3-8). The alternative for the Wright to Dracut Pipeline Segment would begin at approximately MP 91.44, returning to the proposed route at MP 95.23, and then leaving again at MP 102.09 and returning at MP 176.80, where it deviates to the south, and then heads southeast paralleling along an existing powerline easement. Eventually, the co-location of the pipeline along the powerline corridor would take a more northeasterly turn and terminate in Dracut, Massachusetts.

The proposed route of the Wright to Dracut Pipeline Segment compared to the Massachusetts Powerline Alternative shows that it is approximately 11 miles shorter in length, which subsequently results in significantly less construction and operation impacts. The proposed route traverses less palustrine forested, scrub-shrub, and emergent wetlands and crosses a total of 30 fewer streams than the alternative. As a result of the shorter length, the amount of land uses traversed by the proposed route is far fewer than the Mass Pike alternative.

This alternative was not selected by Tennessee as it does not avoid the sensitive land features that the Commonwealth of Massachusetts has requested be avoided (state-owned lands and land with conservation restrictions). This alternative route would also cross numerous areas of congested construction and difficult construction. Furthermore, this alternative would move the Wright to Dracut Pipeline Segment mainline further from the service areas of the Project Shippers, which would necessitate

construction of longer laterals to provide service to the Project Shippers, resulting in additional environmental and landowner impacts.

TABLE 10.3-6
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASSACHUSETTS POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	Massachusetts Powerline Alternative	Difference (if applicable)[1]
Length of Corresponding Segment (miles)	124.35	136.03	-11.68
Type of Right-of-Way (ROW)			
New ROW (miles)	70.11	21.31	+52.87
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	54.24	114.72	-64.55
ROW Requirements			
Pipeline Construction Requirements (acres)[2]	1,507.26	1,648.84	-141.58
Pipeline Operation Requirements (acres)[2]	753.63	824.42	-70.79
Wetlands			
Total Wetland Complexes Crossed (number)	155	266	-111
Total Wetland Crossed (linear ft)	36,229.86	60,695.53	-24,465.67
Palustrine Forested Wetland Complexes Crossed (construction/operation acres) (miles)	49.80/24.90 (4.11)	51.78/25.89 (4.27)	-1.98/-0.99 (-0.16)
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation acres) (miles)	13.20/6.60 (1.09)	34.30/17.15 (2.83)	-21.10/-10.55 (-1.74)
Palustrine Emergent Wetland Impacts (construction/operation acres) (miles)	20.18/10.09(1.66)	55.36/27.68 (4.39)	-35.18/-17.59 (-2.73)
Waterbodies			
Waterbodies Crossed (number)	116	129	-13
Perennial Waterbodies (number)	87	87	0
Major River Crossings (number >100 ft)	18	85	-67
Designated natural and scenic rivers (number)	0	0	0

TABLE 10.3-6
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASSACHUSETTS POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	Massachusetts Powerline Alternative	Difference (if applicable)[1]
Significant fisheries (number)	TBD	TBD	TBD
Federal Listed Endangered or Threatened Species			
Habitat (miles)	TBD	TBD	TBD
Species (number)	TBD	TBD	TBD
Cultural Resources			
National Historic Landmarks (number)	0	0	0
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	4	12	-8
Land Use			
Forested Land Crossed (miles)	85.07	68.07	+17.00
Agricultural Land Crossed (miles)	9.18	13.78	-4.60
Open (meadow, recreation, historic districts, etc.) (miles)	25.98	43.64	-17.66
Residential (miles)	2.70	6.09	-3.39
Commercial/Industrial (miles)	0.78	3.36	-2.58
Property Owners			
Residences located within 50 ft of the construction work area (number)	TBD	TBD	TBD
Federal & State Land			
Federal Lands Crossed (number/miles)	1/1.08	1/1.08	0/0.00
State Forest/Parks (number/miles)	11/8.14	5/4.56	+6/+3.58
Wildlife Management Areas (miles)	0.00	0.00	0.00
Trails			
National and State Trails (number)	32	21	+11

TABLE 10.3-6
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO MASSACHUSETTS POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	Massachusetts Powerline Alternative	Difference (if applicable)[1]
Other Environmental Features			
Landfills, quarries (count w/in 0.50 mile)	33	22	+11

[1] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[2] Construction ROW impacts calculated using a 100-foot-wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.1.7 Article 97 Avoidance and Co-location Alternatives

Within the Commonwealth of Massachusetts, the Wright to Dracut Pipeline Segment crosses a significant number of open space Article 97 properties, which are under the ownership and control of the Commonwealth of Massachusetts or its political subdivisions.[8] Tennessee is evaluating two alternatives for the proposed route of the Wright to Dracut Pipeline Segment to determine if it can avoid, minimize or mitigate crossing Article 97 properties. One of the alternative routes would avoid crossing Article 97 properties identified as of the date of filing of this Resource Report 10 (Article 97 Avoidance Route Alternative) and the other alternative route would significantly avoid crossing such properties and would be co-located within or adjacent to existing utility corridors (Article 97 Co-location Route Alternative). Tennessee is continuing to coordinate with the Massachusetts Department of Environmental Protection ("MassDEP") and the Massachusetts Department of Conservation and Recreation ("MassDCR") regarding the Project and alternative routing to avoid, minimize or mitigate impacts to Article 97 properties. Tennessee will update the Commission on the steps taken to avoid, minimize or mitigate crossing of Article 97 properties and keep the Commission updated on its discussions with the MassDEP and MassDCR in revised Resource Report 10 to be submitted in a subsequent filing of the ER.

[8] Article 97 references to Article 97 of the Articles of Amendment to the Constitution of the Commonwealth of Massachusetts. This constitutional provision requires that any disposition or change in use of lands held for certain public purposes must first be approved by a two-thirds vote from both houses of the Legislature. In accordance with the Commonwealth of Massachusetts Office of Environmental Affairs policy

"…[A]n Article 97 land disposition is defined as a) any transfer or conveyance of ownership or other interests;

b) any change in physical or legal control; and

c) any change in use, in and to Article 97 land or interests in Article 97 land owned or held by the Commonwealth or its political subdivisions, whether by deed, easement, lease or any other instrument effectuating such transfer, conveyance or change."

10.3.1.7.1 Article 97 Avoidance Route

For the Article 97 Avoidance Route Alternative, Tennessee attempted to avoid the identified Article 97 properties known to exist at the time based on the route submitted to FERC by using GIS-based resource modeling to locate a route that would avoid crossing the Article 97 properties. GIS modeling was utilized to formulate and produce a route that would avoid the identified properties. Figure 10.3-9 provides detail on the GIS route modeling. This alternative route would require a major shift from locating the proposed route in rural/forested areas (which areas include the majority of Article 97 state or its political subdivisions-owned lands or lands with conservation easements) to urban areas, which are more congested (Figure 10.3-9). Avoiding the Article 97 properties would also create a route with constructability issues, as the alternative route would be located in highly developed areas. Also, the GIS-modeled Article 97 Avoidance Route Alternative is approximately 9.30 miles longer than the proposed route. Tennessee is continuing to review this alternative and will provide further information after discussions with the Commonwealth of Massachusetts MassDEP and MassDCR and in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

10.3.1.7.2 Article 97 Co-location Route Alternative

The Article 97 Co-location Route Alternative within the Commonwealth of Massachusetts significantly avoids identified Article 97 properties and, where feasible, co-locates with existing powerline easements where traversing identified properties. By locating this alternative adjacent to an existing utility corridor, impacts to the environment will be minimized. In western Massachusetts, this alternative route utilizes approximately 6.50 miles of existing powerline easements which cross Article 97 properties. This Article 97 Co-location Route Alternative does not entirely avoid all Article 97 properties and would be approximately 7.40 miles longer as compared to the proposed route. The alternative route would also cross more densely developed urban areas, increasing construction difficulties. Further review of this alternative route will be discussed in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

10.3.1.8 New Hampshire Powerline Alternative

Tennessee is evaluating the New Hampshire Powerline Alternative for the Wright to Dracut Pipeline Segment of the Project. This alternative would involve co-locating the pipeline along an existing electric transmission line corridor in southern New Hampshire, parallel and very near the border with Massachusetts (Figure 10.3-10).

This alternative would deviate from the proposed route in Massachusetts at approximately MP 108.64, and travels in a northerly direction into New Hampshire. At that point, the pipeline would be co-located with an existing powerline corridor and travel in an easterly direction, before turning south and then re-entering Massachusetts near Dracut, Massachusetts and rejoining the proposed route at MP 175.34.

Although the New Hampshire powerline alternative route would cross certain Massachusetts state-owned properties, the pipeline would be co-located with an existing corridor through these areas, thus minimizing impacts and avoiding habitat fragmentation. This alternative route for the Wright to Dracut Pipeline Segment continues to be evaluated by Tennessee and additional information will be provided to FERC in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

TABLE 10.3-7
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO NEW HAMPSHIRE POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	New Hampshire Powerline Alternative	Difference (if applicable)[1]
Length of Corresponding Segment (miles)	68.52	80.03	-11.51
Type of Right-of-Way (ROW)			
New ROW (miles)	58.66	7.82	+49.62
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	9.86	72.21	-61.13
ROW Requirements			
Pipeline Construction Requirements (acres)[2]	830.54	970.06	-139.52
Pipeline Operation Requirements (acres)[2]	415.27	485.03	-69.76
Wetlands			
Total Wetland Complexes Crossed (number)	91	76	+15
Total Wetland Crossed (linear ft)	23,399.11	21.020.46	+2,378.65
Palustrine Forested Wetland Complexes Crossed (construction/operation acres) (miles)	34.54/17.27 (2.85)	20.56/10.28 (1.70)	+13.98/+6.99 (+1.15)
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation acres) (miles)	8.64/4.32 (0.71)	14.86/7.43 (1.23)	-6.22/-3.11 (-0.52)
Palustrine Emergent Wetland Impacts (construction/operation acres) (miles)	10.54/5.27 (0.86)	12.80/6.40 (1.06)	-2.26/-1.13 (0.20)
Waterbodies			
Waterbodies Crossed (number)	65	66	-1
Perennial Waterbodies (number)	56	40	+16
Major River Crossings (number >100 ft)	11	42	-32
Designated natural and scenic rivers (number)	0	0	0
Significant fisheries (number)	TBD	TBD	TBD

TABLE 10.3-7
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO NEW HAMPSHIRE POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	New Hampshire Powerline Alternative	Difference (if applicable)[1]
Federal Listed Endangered or Threatened Species			
Habitat (miles)	TBD	TBD	TBD
Species (number)	TBD	TBD	TBD
Cultural Resources			
National Historic Landmarks (number)	0	0	0
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	3	1	+2
Land Use			
Forested Land Crossed (miles)	50.23	15.44	+34.79
Agricultural Land Crossed (miles)	3.06	4.14	-1.08
Open (meadow, recreation, historic districts, etc.) (miles)	12.19	21.23	-9.04
Residential (miles)	1.99	2.24	-0.25
Commercial/Industrial (miles)	0.79	0.43	+0.36
Property Owners			
Residences located within 50 ft of the construction work area (number)	TBD	TBD	TBD
Federal & State Land			
Federal Lands Crossed (number/miles)	0	0	0
State Forest/Parks (number/miles)	10/6.90	31/6.46	-21/ +0.44
Wildlife Management Areas (miles)	0	1/0.71	-1/-0.71
Trails			
National and State Trails (number)	32	2	+30

TABLE 10.3-7
COMPARISON OF THE PROPOSED ROUTE OF THE WRIGHT TO DRACUT PIPELINE SEGMENT TO NEW HAMPSHIRE POWERLINE MAJOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed Route Wright to Dracut Pipeline Segment	New Hampshire Powerline Alternative	Difference (if applicable)[1]
Other Environmental Features			
Landfills, quarries (count w/in 0.50 mile)	21	1	+20

[1] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[2] Construction ROW impacts calculated using a 100-foot-wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.2 Minor Route Alternatives

Minor route alternatives deviate from the proposed route less substantially than major route alternatives, are often designed to avoid significant environmental resources or alleviate engineering constraints, and typically remain within the same general area as the proposed route. Two minor route alternatives were considered for two of the proposed laterals in Massachusetts.

10.3.2.1 West Nashua Route 13 Lateral Alternative

The West Nashua Route 13 Lateral Alternative was evaluated as an alternative to the West Nashua Lateral proposed as part of the Project (Figure 10.3-11). The majority of this 14.42 mile alternative proposed to be co-located with Route 13 and a powerline corridor near the town of Brookline, New Hampshire. This alternative alignment avoids traversing Beaver Brook Association compared to the proposed route of the lateral. Discussions with the Massachusetts DOT and the New Hampshire DOT have elicited positive responses regarding this alternative route and the alternative route would require approval to co-locate with this state roadway from both agencies.

As of the date of submitting this Resource Report 10, Tennessee continues to evaluate this alternative in comparison with the proposed route for the lateral. Addition information and consideration of this alternative will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

TABLE 10.3-8
COMPARISON OF THE PROPOSED WEST NASHUA LATERAL TO MINOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed West Nashua Lateral	West Nashua Route 13 Lateral Alternative	Difference (if applicable)[1]
Length of Corresponding Segment (miles)	11.94	14.42	-2.48
Type of Right-of-Way (ROW)			
New ROW (miles)	11.94	2.08	+9.85
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	0.00	12.34	-12.34
ROW Requirements			
Pipeline Construction Requirements (acres)[2]	144.72	174.66	-29.94
Pipeline Operation Requirements (acres)[2]	72.36	87.33	-14.97
Wetlands			
Total Wetland Complexes Crossed (number)	11	6	+5
Total Wetland Crossed (linear ft)	2,523.81	1,615.37	+908.44
Palustrine Forested Wetland Complexes Crossed (construction/operation acres) (miles)	4.02/2.01 (0.33)	0.28/0.14 (0.02)	+3.74/+1.87 (+0.31)
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation acres) (miles)	1.64/0.82 (0.14)	2.42/1.21 (0.20)	-0.78/-0.39 (-0.06)
Palustrine Emergent Wetland Impacts (construction/operation acres) (miles)	0.12/0.06 (0.01)	16.00/4.00 (0.08)	-15.88/-3.94 (-0.07)
Waterbodies			
Waterbodies Crossed (number)	3	14	-11
Perennial Waterbodies (number)	2	7	-5
Major River Crossings (number >100 ft)	0	0	0
Designated natural and scenic rivers (number)	0	0	0
Significant fisheries (number)	TBD	TBD	TBD

TABLE 10.3-8
COMPARISON OF THE PROPOSED WEST NASHUA LATERAL TO MINOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed West Nashua Lateral	West Nashua Route 13 Lateral Alternative	Difference (if applicable)[1]
Federal Listed Endangered or Threatened Species			
Habitat (miles)	TBD	TBD	TBD
Species (number)	TBD	TBD	TBD
Cultural Resources			
National Historic Landmarks (number)	0	0	0
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	0	0	0
Land Use			
Forested Land Crossed (miles)	8.58	4.07	+4.51
Agricultural Land Crossed (miles)	2.21	0.76	+1.45
Open (meadow, recreation, historic districts, etc.) (miles)	0.98	2.17	-1.19
Residential (miles)	0.17	4.30	-4.13
Commercial/Industrial (miles)	0.00	3.08	-3.08
Property Owners			
Residences located within 50 ft of the construction work area (number)	TBD	TBD	TBD
Federal & State Land			
Federal Lands Crossed (number/miles)	0/0.00	0/0.00	0/0.00
State Forest/Parks (number/miles)	6/2.09	4/0.66	+2/+1.43
Wildlife Management Areas (miles)	0/0.00	0/0.00	0/0.00
Trails			
National and State Trails (number)	0	0	0

TABLE 10.3-8
COMPARISON OF THE PROPOSED WEST NASHUA LATERAL TO MINOR ROUTE ALTERNATIVE FOR THE PROJECT

Factor	Proposed West Nashua Lateral	West Nashua Route 13 Lateral Alternative	Difference (if applicable)[1]
Other Environmental Features			
Landfills, quarries (count w/in 0.50 mile)	2	0	+2

[1] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[2] Construction ROW impacts calculated using a 100-foot-wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.2.2 Andover Lateral Alternative – Proposed Lynnfield Lateral

The Andover Lateral Alternative is comprised of three minor route alternatives to the proposed Lynnfield Lateral that are situated to the east and west of the proposed route (Figure 10.3-12).

Alternative Route 1 leaves the proposed Lynnfield Lateral route at MP 1.15 and returns at MP 8.53 situated east of the proposed route traveling primarily west of and adjacent to Interstate 93. This alternative presents several obstacles including a large wetland complex located between Interstate 495 and Lowell Street, limited room between existing buildings, parking lots and the interstate, and limited access for construction and operation of the lateral. Due to these issues this alternative was not selected over the proposed Lynnfield Lateral route.

Alternative Route 2 leaves the proposed Lynnfield Lateral route where it commences at MP 0.00 and returns at MP 10.70, situated west of the proposed route paralleling a high power electric transmission line ROW. This alternative travels through a highly developed area and there is limited room between the powerline easement and commercial and residential buildings to accommodate a new pipeline ROW. Due to these space constraints, the alternative route would require several shifts across the powerline easement in order to route the pipeline in this area. In addition, this alternative contains an approximate 2,000 foot crossing of a large inundated wetland complex that presents construction challenges. Tennessee is still evaluating the northern portion of this alternative.

Alternative Route 3 leaves the proposed Lynnfield Lateral route where it commences at MP 0.00 and returns at MP 10.70, situated west of the proposed alignment traveling through undeveloped areas situated between dense developments before tying into the powerline easement. This alternative also faces spacing restrictions between housing developments and several large wetland crossings including an approximate 1,000 foot crossing of an inundated wetland complex. Alternative Route 3 contains a crossing of Interstate 495 and shares the same constraints as Alternative Route 2, discussed above, where it ties into the powerline easement. Due to these issues, this alternative was not selected over the proposed Lynnfield Lateral Route.

TABLE 10.3-9
COMPARISON OF THE PROPOSED LYNNFIELD LATERAL TO MINOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Lynnfield Lateral	Andover Lateral Alternative Route 1	Andover Lateral Alternative Route 2	Andover Lateral Alternative Route 3	Difference (if applicable)[1]		
					1	2	3
Length of Corresponding Segment (miles)	16.62	15.58	17.33	18.11	+1.04	-0.71	/-1.49
Type of Right-of-Way (ROW)							
New ROW (miles)	9.90	10.37	2.68	1.99	-0.47	+7.22	+7.91
Length Existing Utility ROW (electric/pipeline/road/rail) (miles)	6.72	5.21	14.65	16.12	+1.51	+1.51	-9.40
ROW Requirements							
Pipeline Construction Requirements (acres)[2]	201.44	188.84	210.06	219.52	+12.60	-8.62	-18.08
Pipeline Operation Requirements (acres)[2]	100.72	94.42	105.03	109.76	+6.30	-4.31	-9.04
Wetlands							
Total Wetland Complexes Crossed (number)	50	42	60	59	+8	-10	-9
Total Wetland Crossed (linear ft)	16,138.66	15,929.92	21,734.65	24,607.29	+208.74	-5,595.99/	-8,468.63

TABLE 10.3-9
COMPARISON OF THE PROPOSED LYNNFIELD LATERAL TO MINOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Lynnfield Lateral	Andover Lateral Alternative Route 1	Andover Lateral Alternative Route 2	Andover Lateral Alternative Route 3	Difference (if applicable)[1]		
					1	2	3
Palustrine Forested Wetland Complexes Crossed (construction/operation acres) (miles)	21.78/10.89 (1.80)	21.20/10.60 (1.75)	23.76/11.88 (1.96)	22.68/11.34 (1.89)	+0.58/+0.29 (+0.05)	-1.98/-0.99 (-0.16)	-0.90/-0.45 (-0.09)
Palustrine Scrub-Shrub Wetland Complexes Crossed (construction/operation acres) (miles)	4.34/2.17 (0.36)	2.90/1.45 (0.24)	8.30/4.15 (0.69)	15.94/7.97 (1.32)	+1.44/+0.72 (+0.12)	-3.96/-1.98 (-0.33)	-11.60/-5.80 (-0.96)
Palustrine Emergent Wetland Impacts (construction/operation acres) (miles)	10.90/5.45 (0.90)	12.44/6.22 (1.03)	17.84/8.92 (1.47)	17.64/8.82 (1.46)	-1.21/-0.77 (-0.13)	-6.94/-3.47 (-0.57)	-6.74/-3.37 (-0.56)
Waterbodies							
Waterbodies Crossed (number)	20	17	19	19	+3	+1	+1
Perennial Waterbodies (number)	7	6	8	9	+1	-1	-2
Major River Crossings (number >100 ft)	4	3	4	5	+1	0	-1
Designated natural and scenic rivers (number)	0	0	0	0	0	0	0

TABLE 10.3-9
COMPARISON OF THE PROPOSED LYNNFIELD LATERAL TO MINOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Lynnfield Lateral	Andover Lateral Alternative Route 1	Andover Lateral Alternative Route 2	Andover Lateral Alternative Route 3	Difference (if applicable)[1]		
					1	2	3
Significant fisheries (number)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Federal Listed Endangered or Threatened Species							
Habitat (miles)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Species (number)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cultural Resources							
National Historic Landmarks (number)	0	0	0	0	0	0	0
National Register of Historic Places (NRHP) Eligible or Potentially Eligible Cultural Resources Sites crossed (number)	1	6	2	4	-5	-1	-3
Land Use							
Forested Land Crossed (miles)	2.42	3.25	3.75	3.75	-0.83	-1.33	-1.33
Agricultural Land Crossed (miles)	0.15	0.11	0.47	0.82	+0.04	-0.32	-0.67
Open (meadow, recreation, historic districts, etc.) (miles)	2.13	5.10	8.85	8.05	-2.97	-6.72	-5.92

TABLE 10.3-9
COMPARISON OF THE PROPOSED LYNNFIELD LATERAL TO MINOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Lynnfield Lateral	Andover Lateral Alternative Route 1	Andover Lateral Alternative Route 2	Andover Lateral Alternative Route 3	Difference (if applicable)[1]		
					1	2	3
Residential (miles)	1.43	3.05	2.03	2.83	-1.62	-0.60	-1.40
Commercial/Industrial (miles)	1.56	3.92	2.11	2.52	-2.36	-0.55	-0.96
Property Owners							
Residences located within 50 ft of the construction work area (number)	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Federal & State Land							
Federal Lands Crossed (number/miles)	0/0.00	0/0.00	0/0.00	0/0.00	0/0.00	0/0.00	0/0.00
State Forest/Parks (number/miles)	1/0.01	0/0.00	0/0.00	0/0.00	+1/+0.01	+1/+0.01	+1/+0.01
Wildlife Management Areas (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trails							
National and State Trails (number)	0	0	0	0	0	0	0

TABLE 10.3-9
COMPARISON OF THE PROPOSED LYNNFIELD LATERAL TO MINOR ROUTE ALTERNATIVES FOR THE PROJECT

Factor	Proposed Lynnfield Lateral	Andover Lateral Alternative Route 1	Andover Lateral Alternative Route 2	Andover Lateral Alternative Route 3	Difference (if applicable)[1]		
					1	2	3
Other Environmental Features							
Landfills, quarries (count w/in 0.50 mile)	7	8	11	8	-1	-4	-1

[1] Details the difference of the proposed route compared to the alternative. + = the proposed route contains an increase from the alternative. - = the proposed route contains a decrease from the alternative.

[2] Construction ROW impacts calculated using a 100-foot-wide corridor. Permanent ROW acreages based on a 50-foot-wide permanent ROW. These acreages are overestimates as reduced construction ROWs widths in areas of wetlands and waterbodies were not incorporated.

TBD – To be determined

10.3.3 Minor Route Deviations

A minor route deviation makes minor adjustments to the proposed route of the pipeline facilities to avoid minor issues such as topographic and man-made features. Because route deviations are considered to resolve localized resource issues (e.g., wetlands, residence, cultural resource sites), they are normally much shorter than major route alternatives or deviations. As proposed, the pipeline route minimizes impacts to the environment and optimizes Project constructability and economics.

10.3.3.1 Landowner Requested Minor Route Deviations

Tennessee has been reviewing, considering, and incorporating landowner requests as the proposed route is further evaluated and refined and will continue to assess requests as they are received. Table 10.3-10 provides an example of the type of requests and deviations being evaluated and incorporated into the proposed route. These deviations address property owner access issues, and requests to avoid coming into close proximity to residences and recreational hunting camps. Numerous similar changes (over 100 changes) have already been incorporated into the proposed alignment as of the date of this draft Resource Report 10. Evaluations of requested deviations will be ongoing and additional deviations reviewed and either approved or denied and will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

TABLE 10.3-10
EXAMPLE LANDOWNER REQUESTED MINOR ROUTE DEVIATIONS FOR THE PROJECT

Minor Route Deviation ID	Affected Parcel Numbers	MP From/To	Length (ft)	Status	Reason for Minor Deviation
05-WOR-0029.001-001	TBD	2.1 – 2.4 (North Worcester Lateral)	1,789	To be incorporated	Landowner requested a line change in this area to ensure that one parcel can be kept as a future house lot.
02-MID-0789.00-01	TBD	149.4 – 149.7 (Wright to Dracut Pipeline Segment, Massachusetts Portion)	2,076	To be incorporated	Proposed deviation to avoid a subdivision.
07-ESS-0039.00-01	TBD	1.3-1.7 (Haverhill Lateral)	1,455	To be incorporated	Landowner requests that the proposed route be adjusted to minimize the bisecting of undeveloped land which is intended to be subdivided in the future.

TBD – To be determined

10.3.3.2 Agency Requested Minor Route Deviations

Within Massachusetts, Tennessee is evaluating routes which avoid or minimize traversing Areas of Critical Environmental Concern ("ACECs") located either within or adjacent to Article 97 properties, which are under the ownership and control of the Commonwealth and its political subdivisions, or which have conservation easements in place. Tennessee is working with Massachusetts agencies to identify and evaluate these alternatives. Tennessee will work with Pennsylvania, New York, Connecticut, and New Hampshire to evaluate other agency-requested alternatives.

10.4 ALTERNATIVE SITES FOR NEW COMPRESSOR STATIONS

Tennessee is still evaluating locations for new compressor stations, as well as the modifications proposed at existing Station 319 in Pennsylvania, including what additional footprint, if any, will be required at that existing compressor station. Tennessee is completing the necessary hydraulic analyses to determine the optimum horsepower and compression to provide the increased volumes of natural gas necessary to meet market demand for the Project. The following factors will be considered when selecting the proposed locations for new compressor stations required for the NED Project:

- Engineering design and construction;
- System design limitations;
- Land/workspace requirements;
- Site elevation;
- Road access;
- Interconnecting pipe;
- Land availability; and
- Environmental Impacts including:
  - Agricultural areas;
  - Federal and state-listed threatened and endangered species;
  - Cultural resource sites listed or eligible for listing on the NRHP;
  - Wetlands and waterbodies;
  - Noise Sensitive Areas ("NSAs"); and
  - Emissions.

Once Tennessee selects the locations for the new compressor stations, it will provide that information to the Commission, as well as a discussion of alternatives for those compressor station locations. This information will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

10.5 ALTERNATIVE SITES FOR NEW METER STATIONS

The location of proposed meter stations is under review and pending final selection. A discussion of alternatives for the new meter station locations will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

10.6 ALTERNATIVE SITES FOR PIPEYARDS AND CONTRACTOR YARDS

The location of proposed pipeyards and contractor yards is under review and pending final selection. Once Tennessee selects the locations for the pipeyards and contractor yards, it will provide that

information to the Commission, as well as a discussion of alternatives for those locations. This information will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

10.7 ALTERNATIVES SUMMARY

After review of all construction, fuel source, system, and the No-Action alternatives, it is evident that the proposed Project is the preferred alternative. If the proposed Project is not constructed to help meet the growing market needs in the Northeast U.S. (i.e., the No-Action Alternative is selected), the Northeast markets may experience energy shortages in times of peak demand or users may revert to the consumption of alternative fuels including oil and coal. Use of alternative fuels to supply the energy needs in the Northeast U.S. is not the best practicable alternative as compared to the use of cleaner-burning natural gas. In addition, although energy conservation is a valuable measure as part of an overall energy plan, energy conservation alone is not a solution to the current energy demand to be served by this Project.

As discussed herein, Tennessee conducted a route alternative analysis to assess various routes for the purpose of avoiding and minimizing impacts to environmental, socioeconomic, cultural/archeological, and other sensitive resources to the extent feasible and practicable, while at the same time ensuring that a constructible Project design could be accomplished. Other potential alternative routes were identified using stakeholder input, environmental survey information, engineering/design criteria, and existing GIS resource mapping. Each alternative has the potential to be viable, though many alternatives were deemed obsolete due to their lack of connectivity with the proposed route and some alternatives were deemed less desirable than others based on environmental and land use impacts, need for agency coordination, and constructability issues.

Tennessee is continuing to review major and minor route alternatives to the proposed Project facilities, and will use field surveys, engineering constructability design assessments, and stakeholder involvement to determine the appropriate routing and location for the Project facilities. The evaluation of alternatives is an on-going process and additional alternative identification, review, analysis, and supporting information will be provided in a revised Resource Report 10 to be submitted in a subsequent filing of the ER.

10.8 REFERENCES

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ATTACHMENT 10a

Figures

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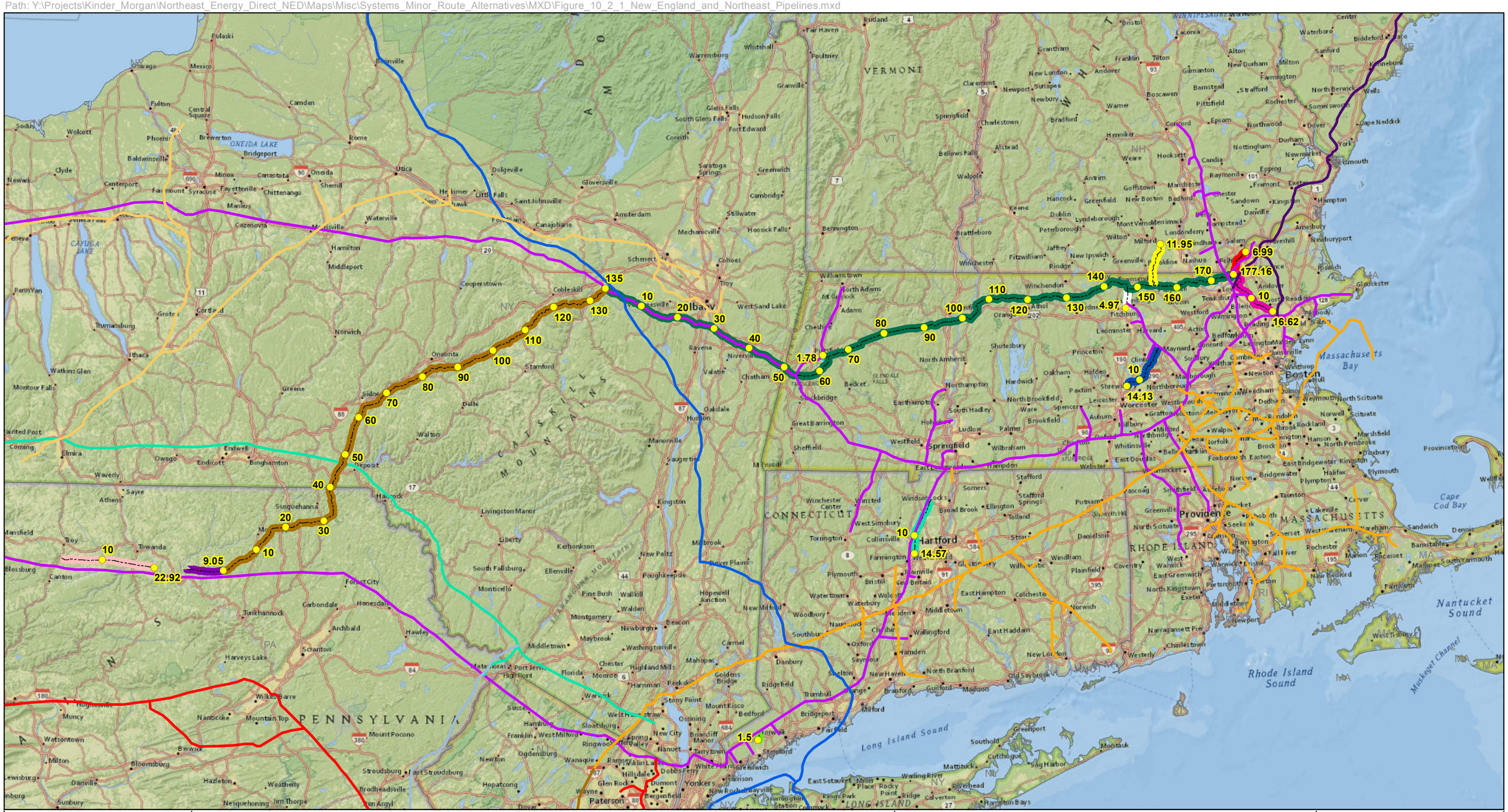

Site Location

Legend

- NED West Nashua Lateral
- NED Stamford Loop
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- Loop 317-3
- Loop 319-3
- PA to Wright Pipeline Segment
- Columbia Gas
- Dominion
- Iroquois
- Maritimes & Northeast
- Millenium
- Spectra Algonquin
- TGP 300L and 200L
- Texas Eastern
- Transcontinental
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

System Alternatives

New England and Northeast Natural Gas Pipelines System
Figure 10.2-1

0 5 10 20 Miles

1 inch = 120,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

AECOM

November 2014

FIGURE 10.2

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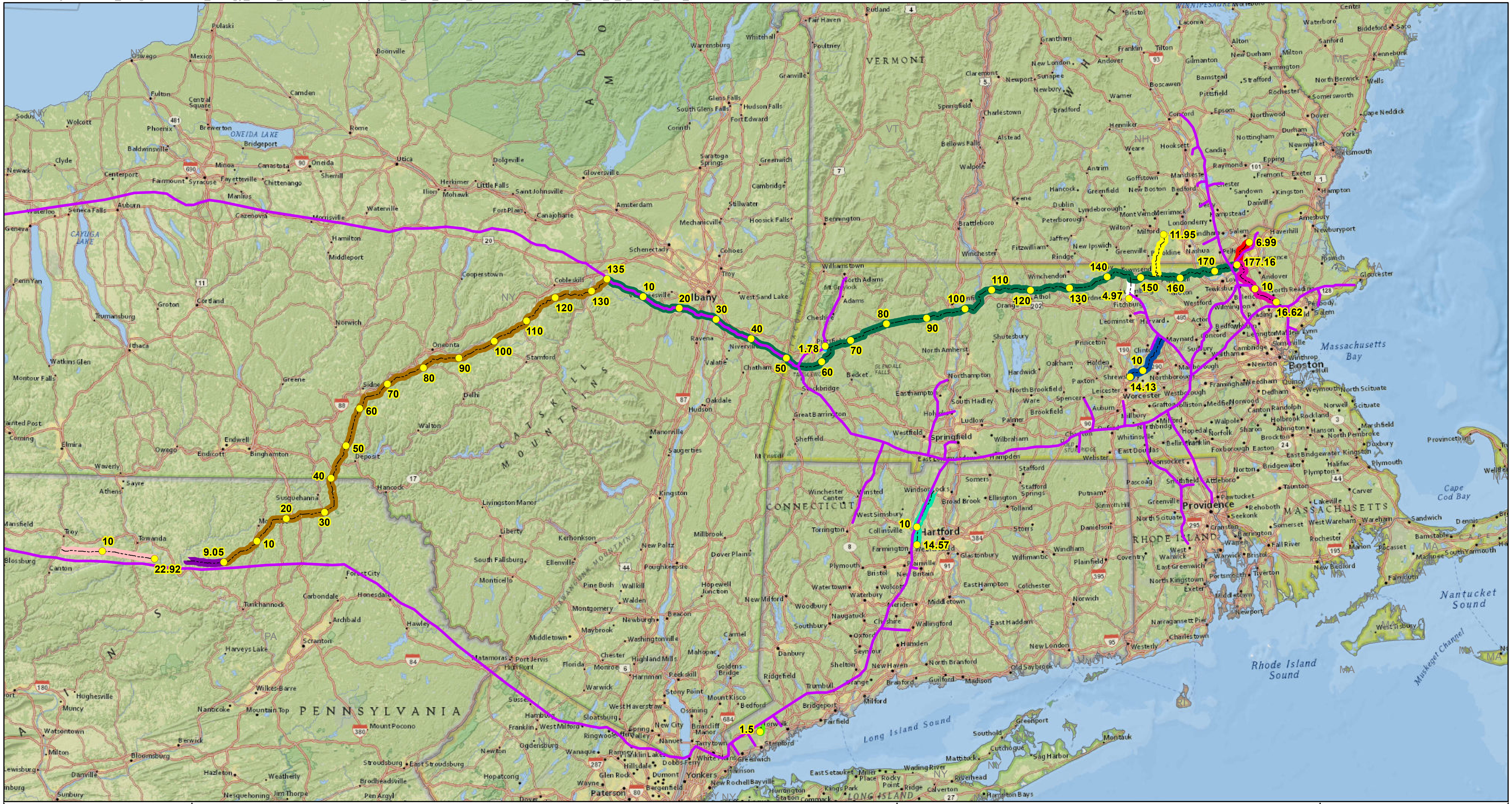

Site Location

Legend

- NED West Nashua Lateral
- NED Stamford Loop
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- Loop 317-3
- Loop 319-3
- PA to Wright Pipeline Segment
- TGP 300 Line and 200 Line
- Mileposts

N E S W

0 5 10 20 Miles

1 inch = 120,000 feet

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

System Alternatives

TGP 300 Line and 200 Line System
Figure 10.2-2

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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November 2014

FIGURE 10.2

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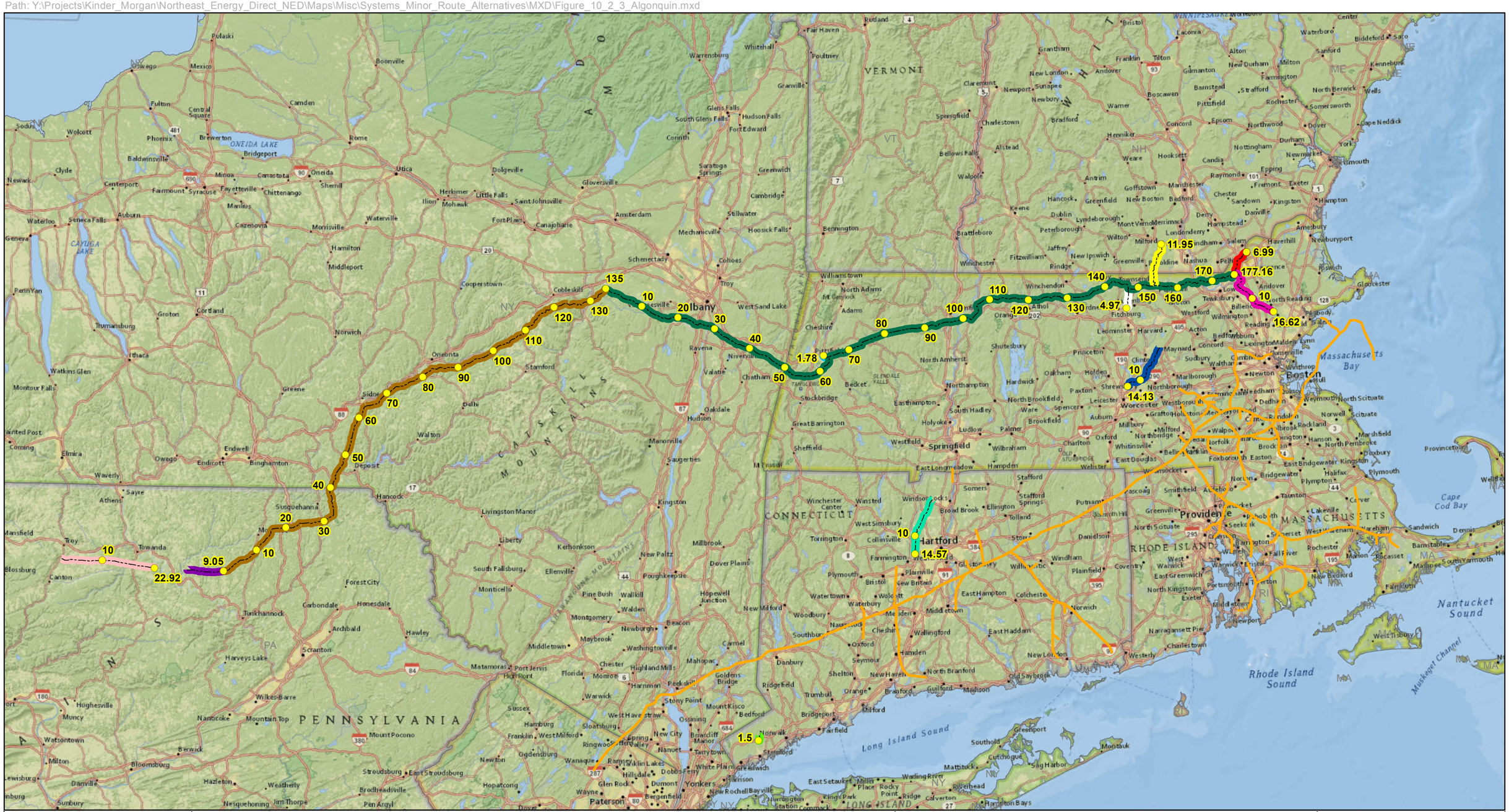
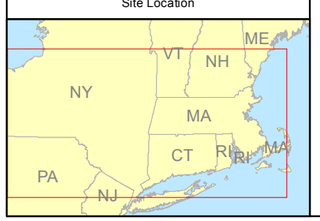


Site Location



Legend

- NED West Nashua Lateral
- NED Stamford Loop
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- Loop 317-3
- Loop 319-3
- PA to Wright Pipeline Segment
- Spectra Algonquin
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

System Alternatives

Algonquin System
Figure 10.2-3

0 5 10 20 Miles

1 inch = 120,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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November 2014

FIGURE 10.2

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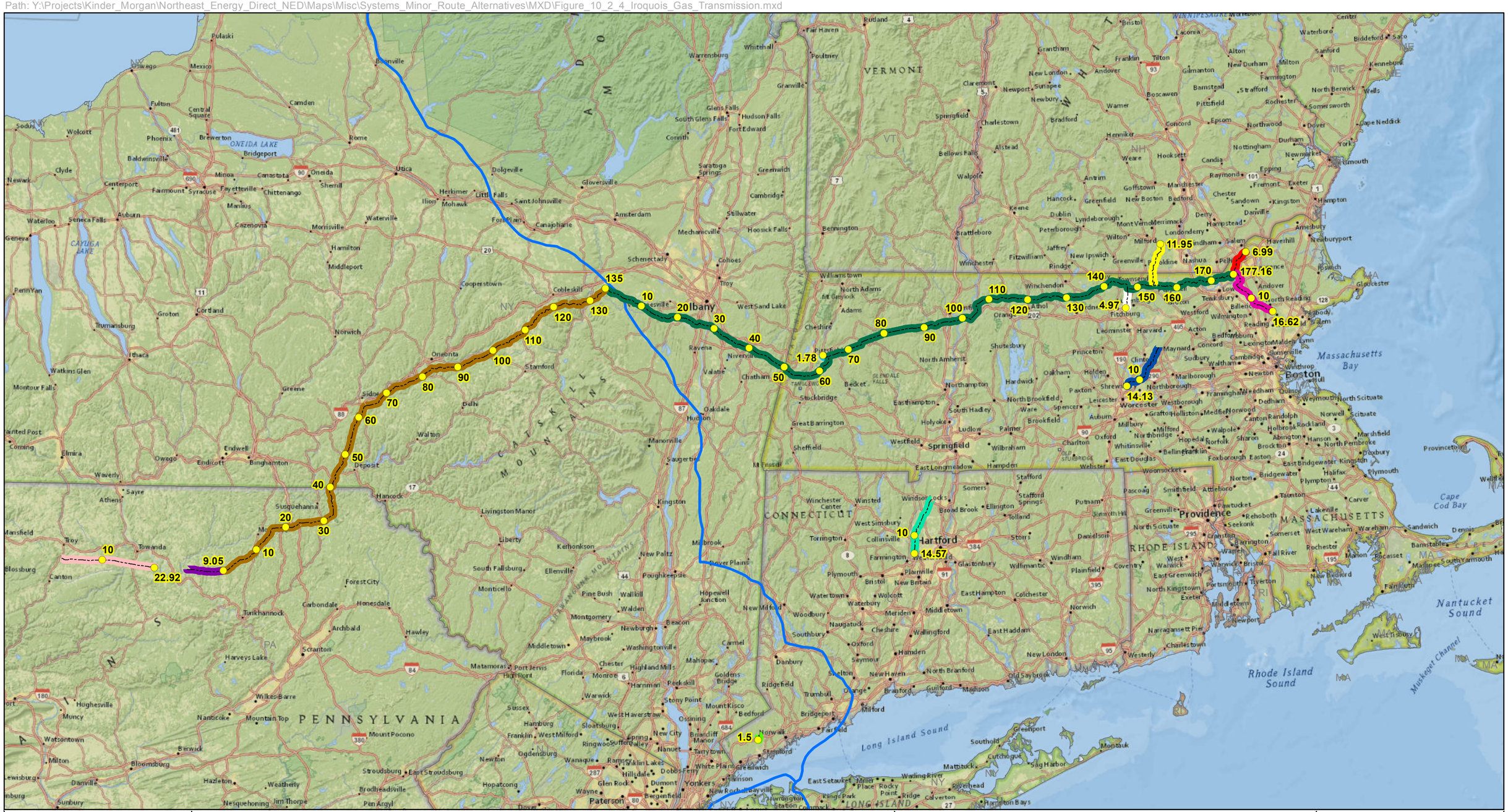
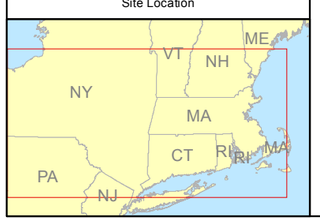


Site Location



Legend

NED West Nashua Lateral	Haverhill Lateral	Loop 317-3
NED Stamford Loop	NED Fitchburg Lateral Extension	Loop 319-3
NED Pittsfield Lateral	Wright to Dracut Pipeline Segment	PA to Wright Pipeline Segment
NED North Worcester Lateral	NED 300 Line CT Loop	Iroquois
NED Lynnfield Lateral		● Mileposts

N
W E
S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

System Alternatives

Iroquois Gas Transmission System
Figure 10.2-4

0 5 10 20
Miles

1 inch = 120,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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November 2014

FIGURE 10.2

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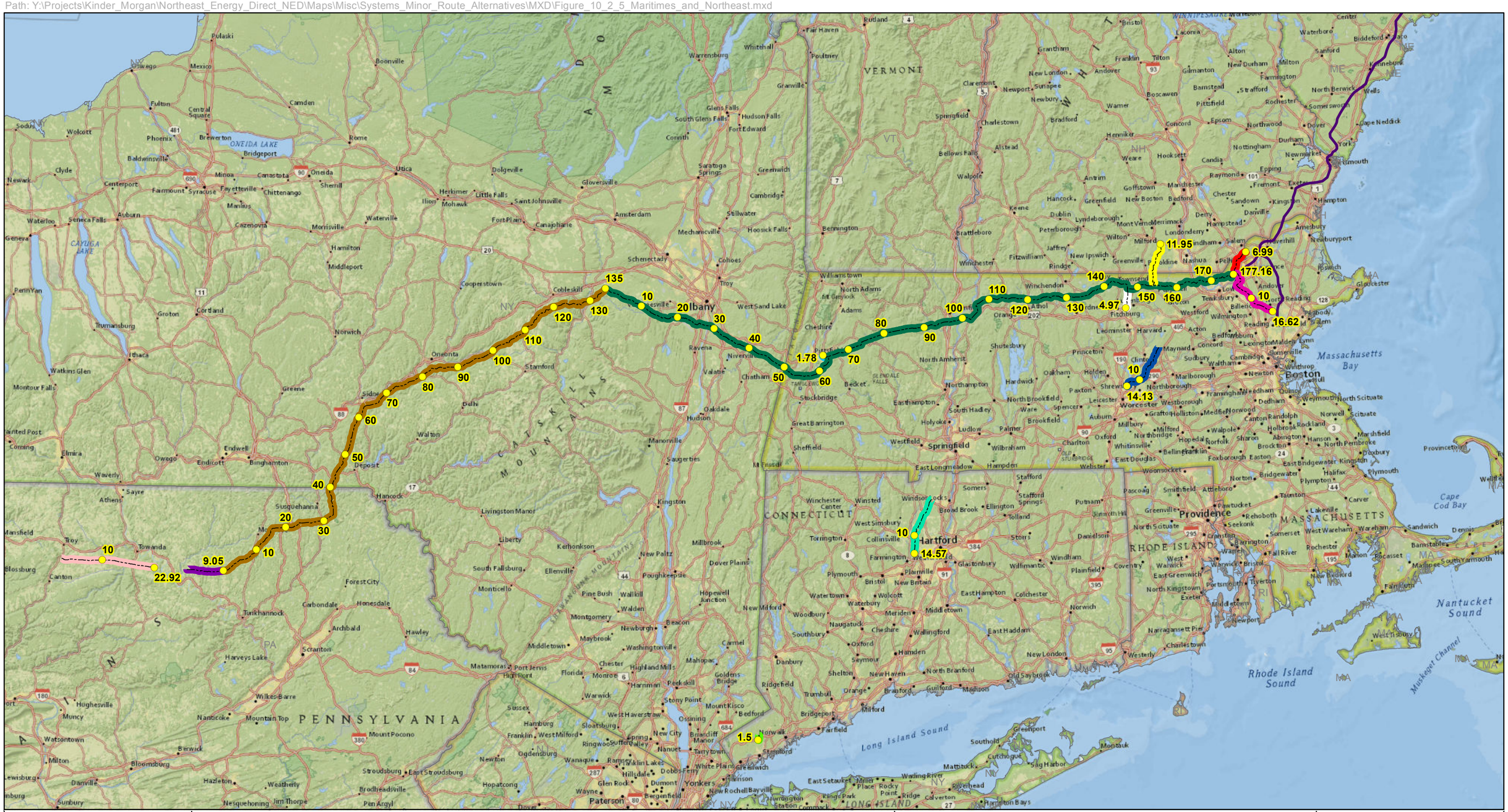

Site Location

Legend

- NED West Nashua Lateral
- NED Stamford Loop
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- Loop 317-3
- Loop 319-3
- PA to Wright Pipeline Segment
- Maritimes & Northeast
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

System Alternatives

Maritimes & Northeast and Portland Natural Gas System
Figure 10.2-5

0 5 10 20 Miles

1 inch = 120,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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November 2014

FIGURE 10.2

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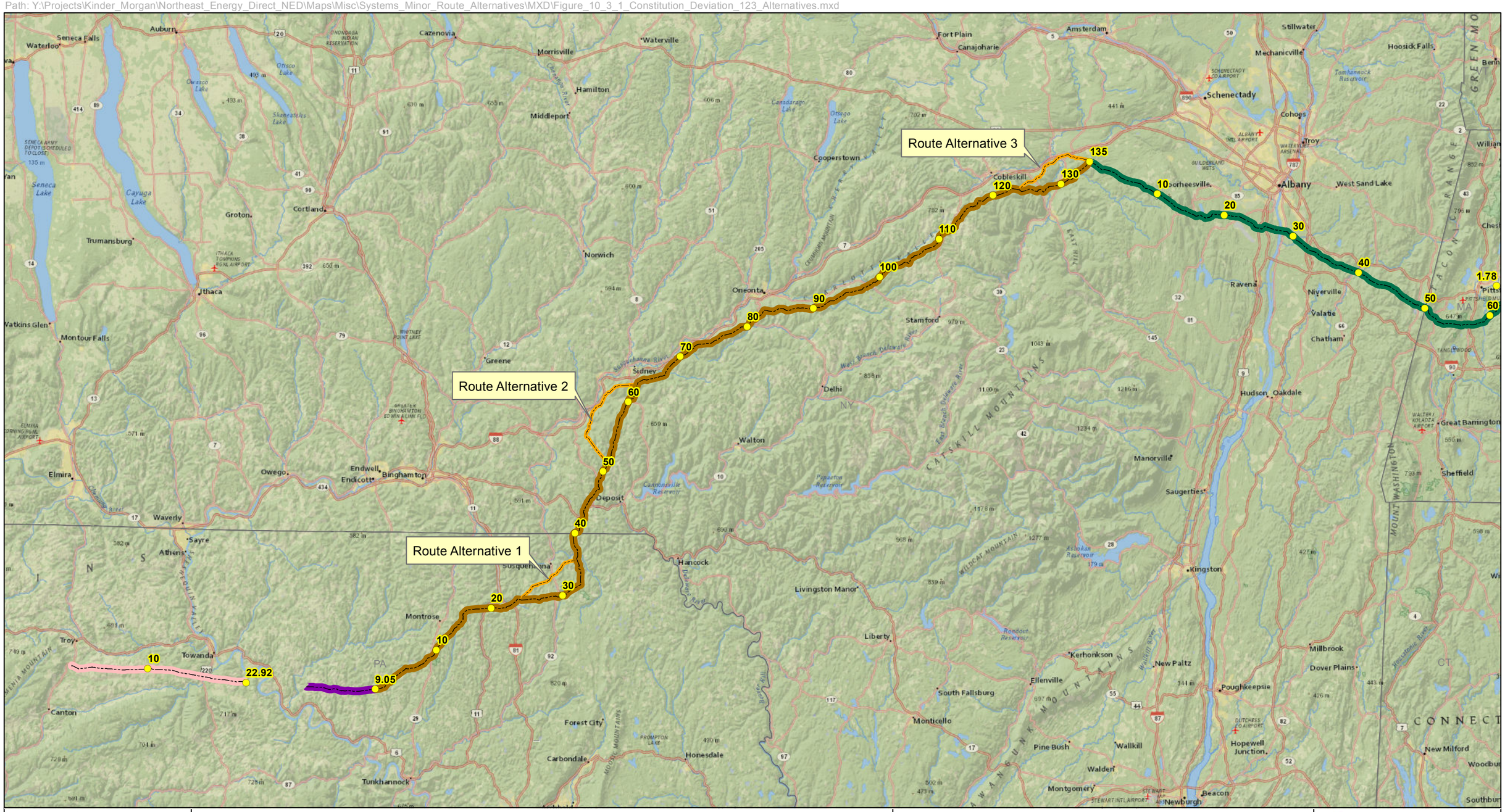
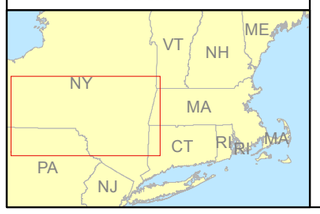


Site Location



Legend

- Loop 317-3
- Loop 319-3
- PA to Wright Pipeline Segment
- Wright to Dracut Pipeline Segment
- Constitution Pipeline Company, LLC Route Alternative
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

Constitution Pipeline Company, LLC
Route 1 Alternative, Route 2 Alternative, Route 3 Alternative
Figure 10.3-1

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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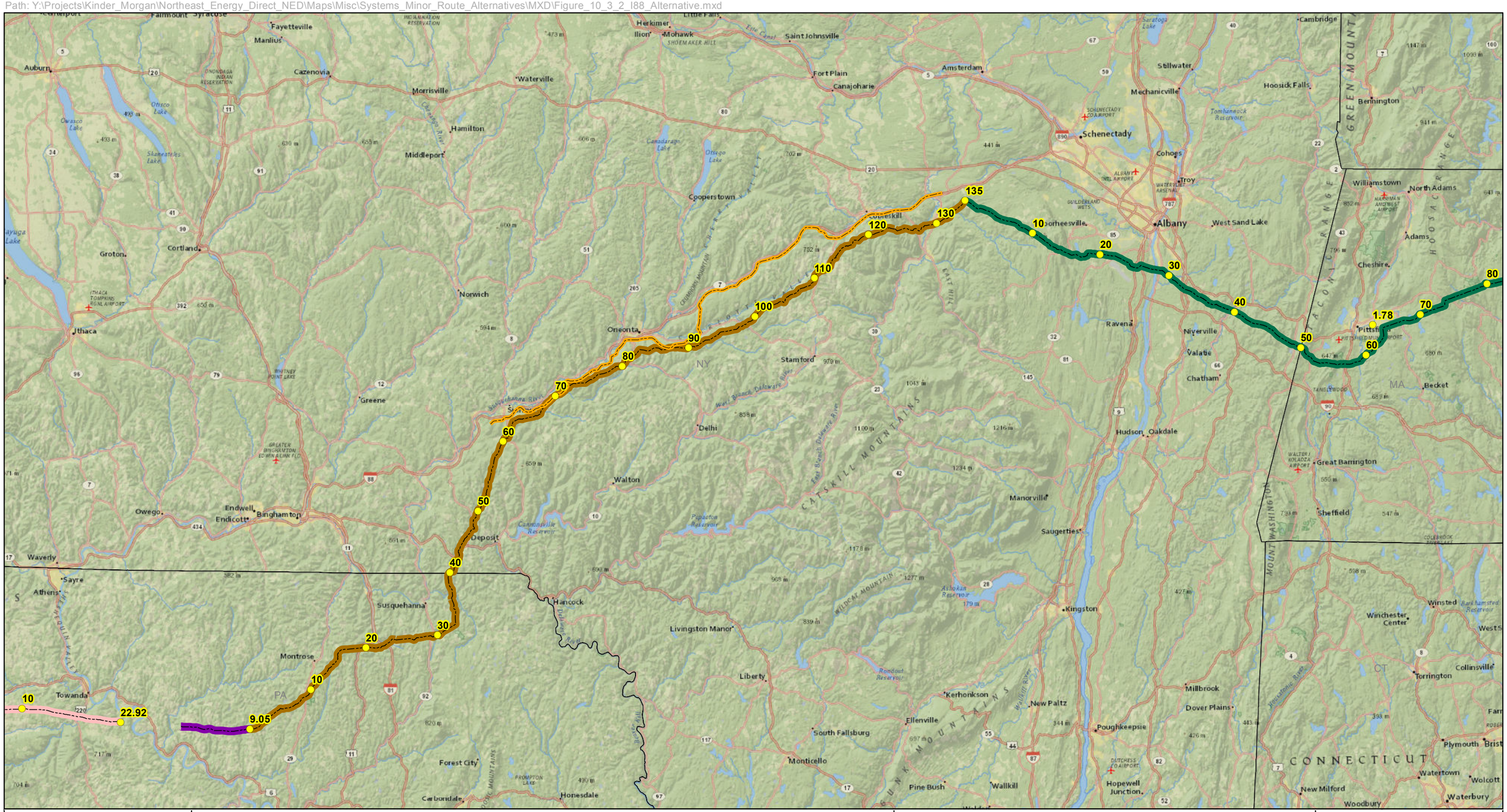
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_2_I88_Alternative.mxd



Site Location

Legend

- Wright to Dracut Pipeline Segment
- Loop 317-3
- Loop 319-3
- PA to Wright Pipeline Segment
- Interstate 88 Alternative
- Mileposts

N
W E
S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

Interstate 88 Alternative
Figure 10.3-2

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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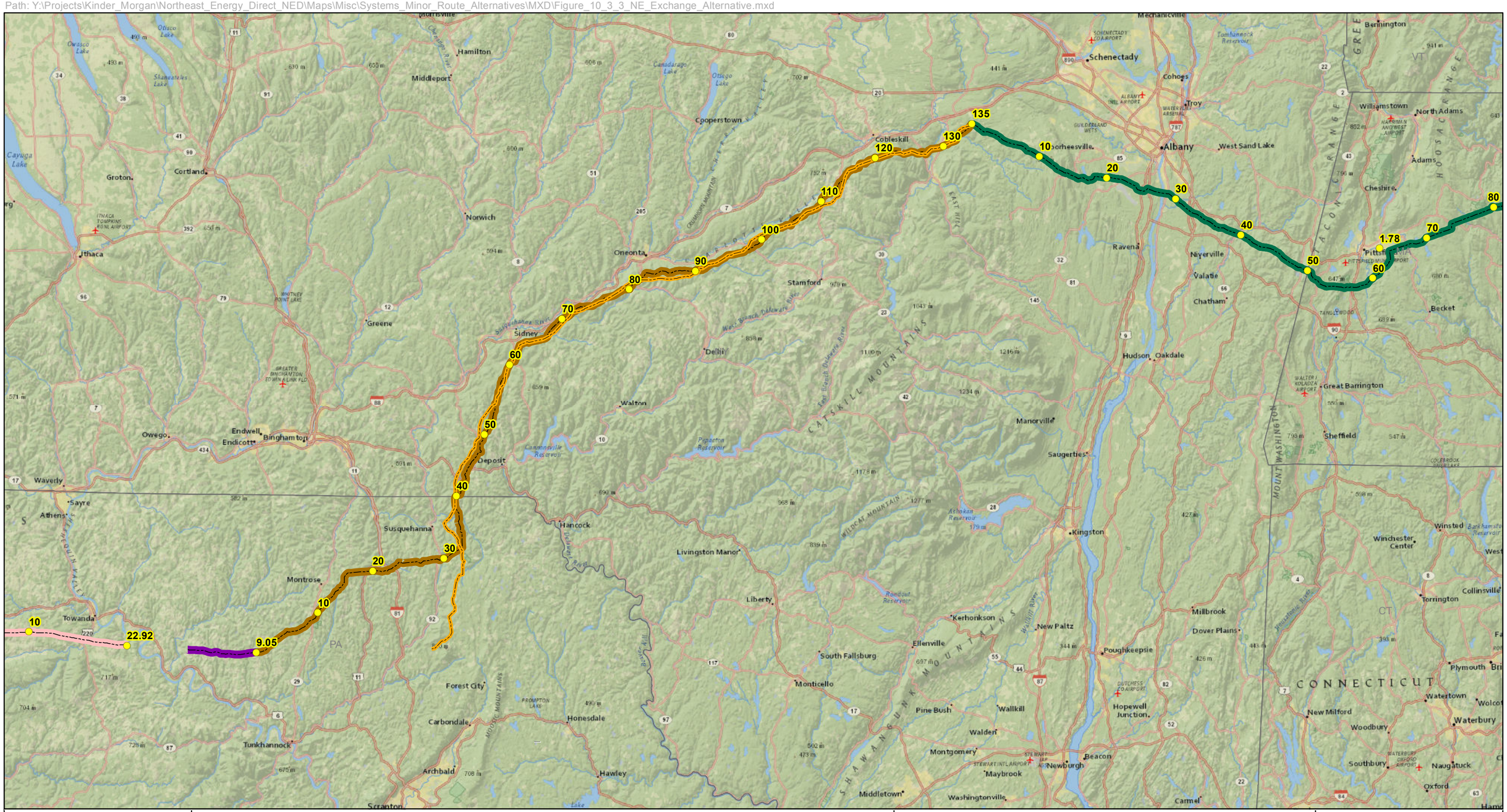
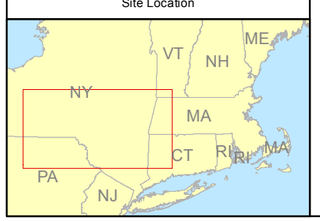
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_3_NE_Exchange_Alternative.mxd



Site Location



Legend

- Loop 317-3
- Loop 319-3
- PA to Wright Pipeline Segment
- Wright to Dracut Pipeline Segment
- Northeast Exchange (NEEX) Alternative
- Mileposts

N
W E
S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

Northeast Exchange (NEEX) Alternative
Figure 10.3-3

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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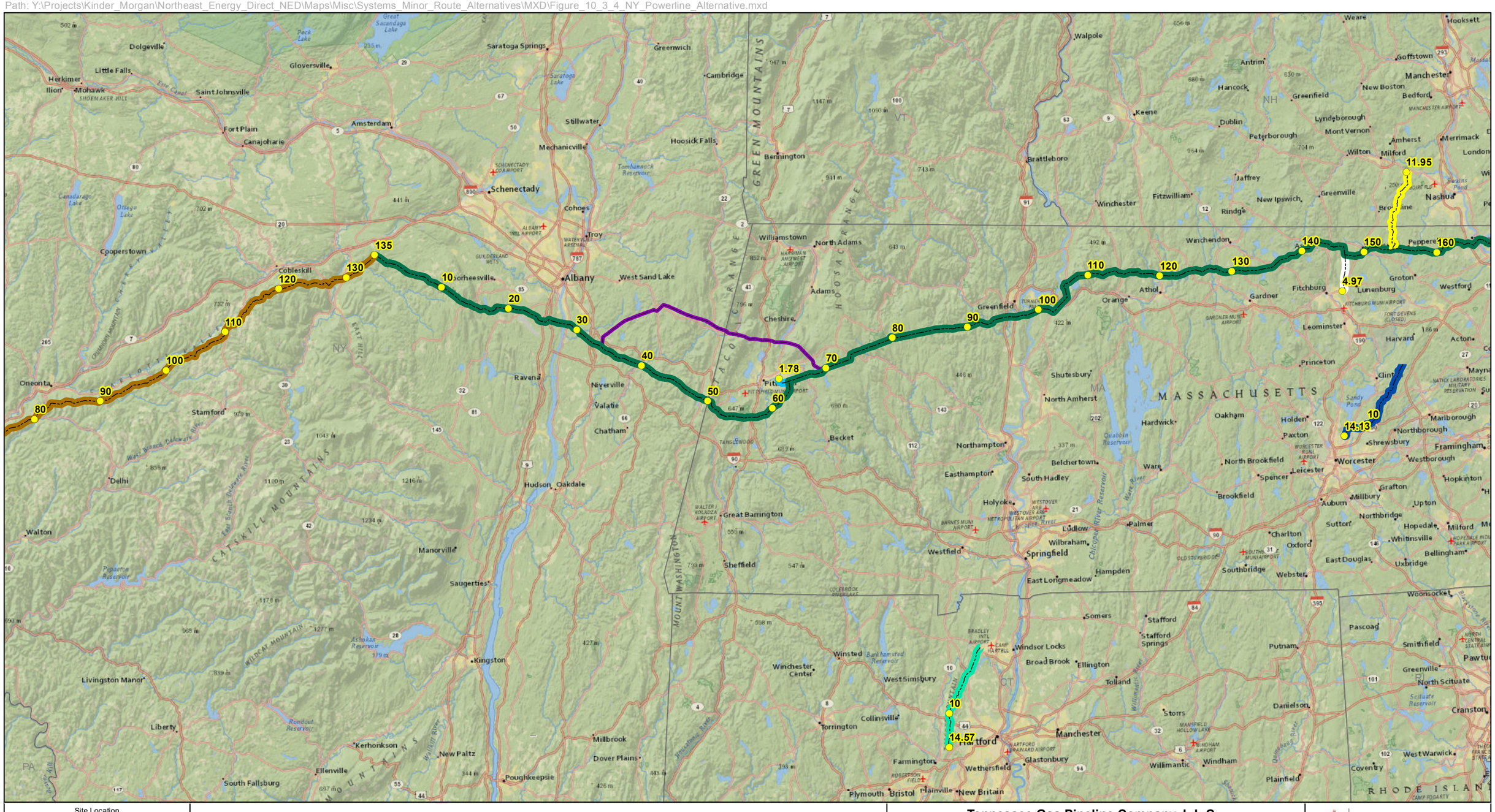
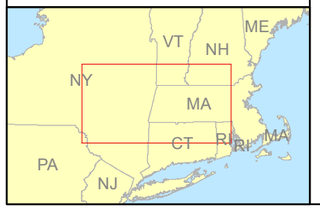
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_4_NY_Powerline_Alternative.mxd



Site Location



Legend

- NED West Nashua Lateral
- PA to Wright Pipeline Segment
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- New York Powerline Alternative
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

NY Powerline Alternative
Figure 10.3-4

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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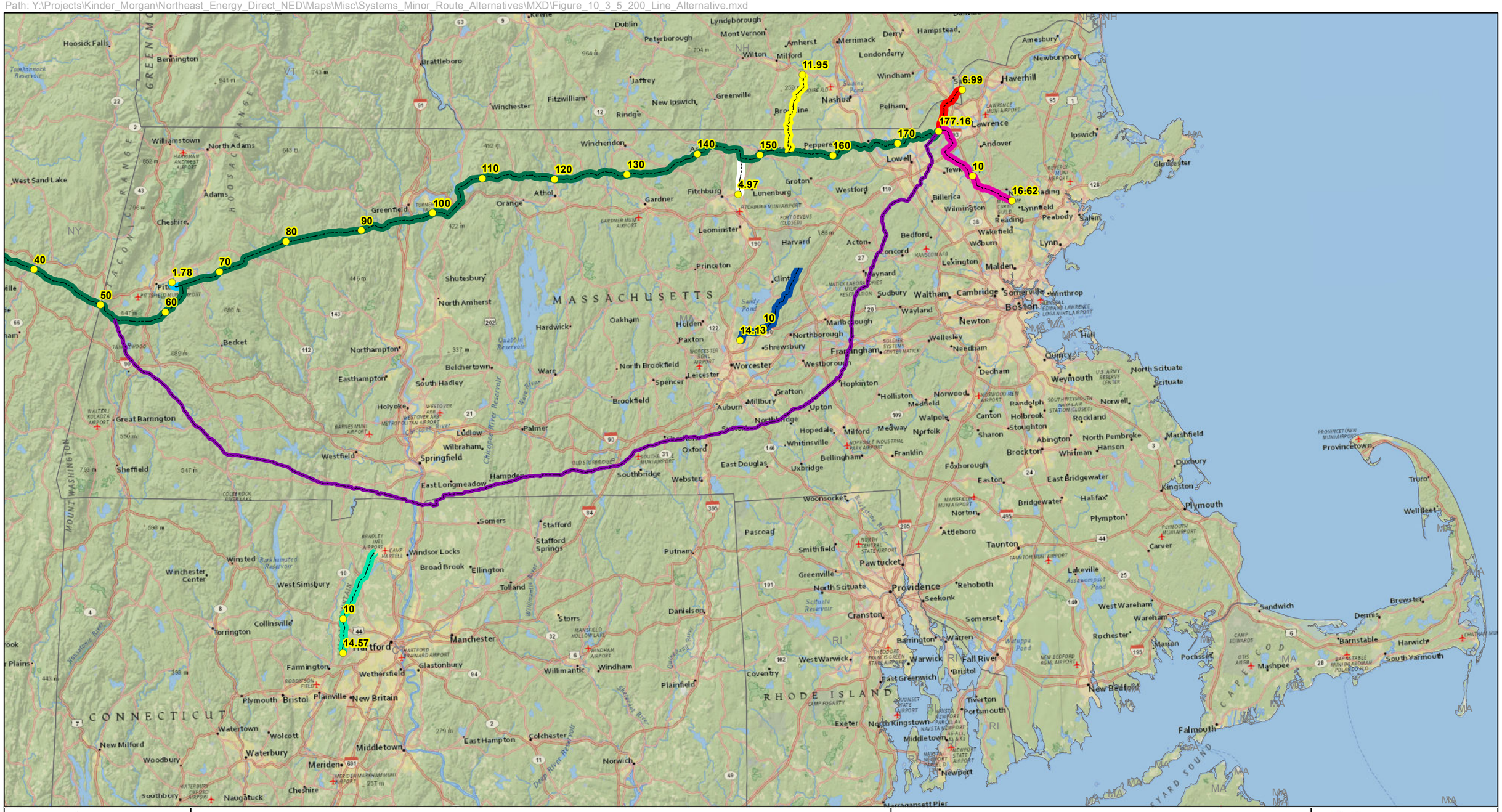
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_5_200_Line_Alternative.mxd



Site Location

Legend

- NED West Nashua Lateral
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- NED Connecticut Lateral
- NED Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- 200 Line Alternative
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

200 Line Alternative
Figure 10.3-5

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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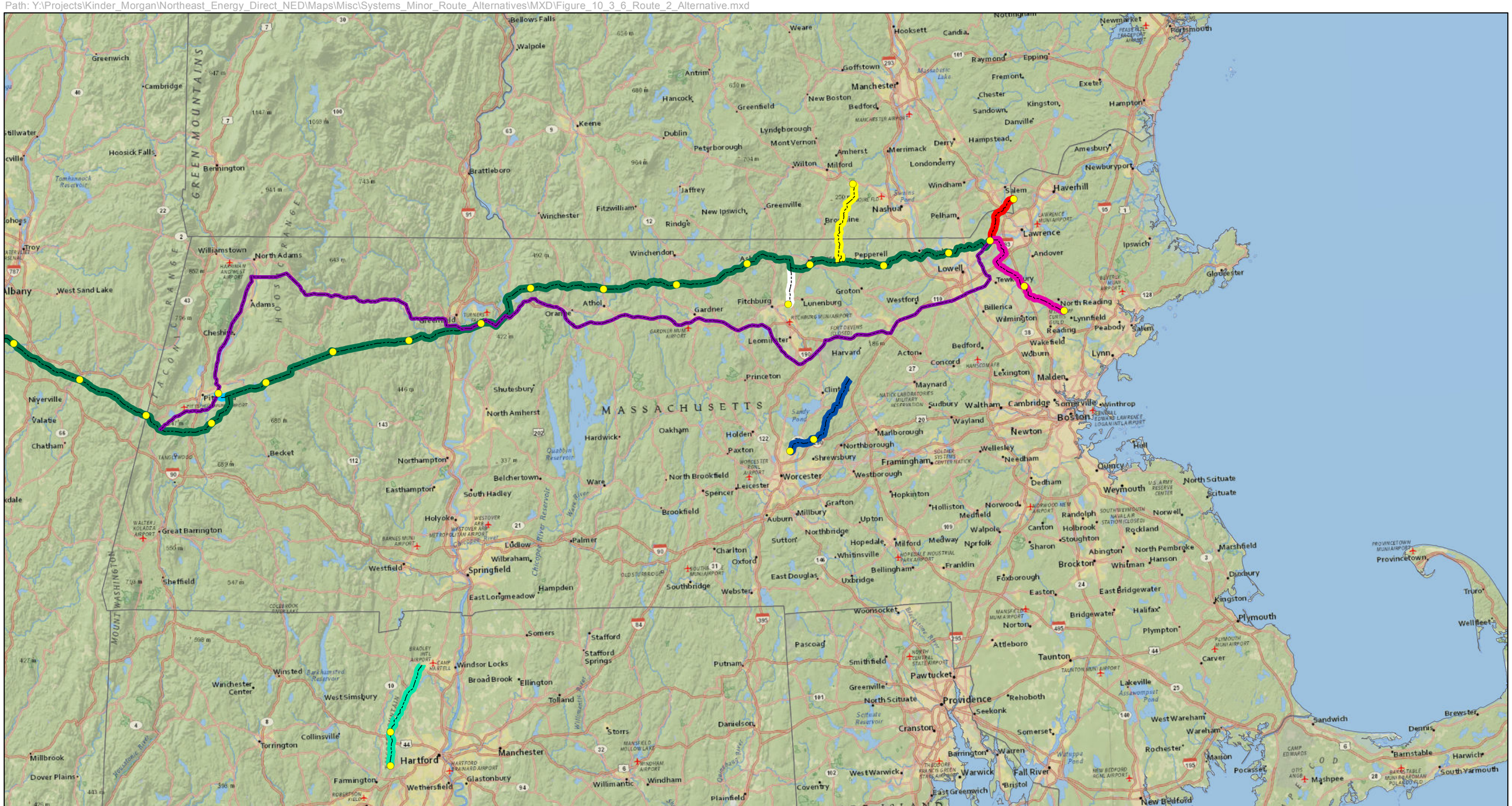
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_6_Route_2_Alternative.mxd



Site Location

Legend

- NED West Nashua Lateral
- NED Stamford Loop
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- NED Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- Route 2 Alternative
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

Route 2 Alternative
Figure 10.3-6

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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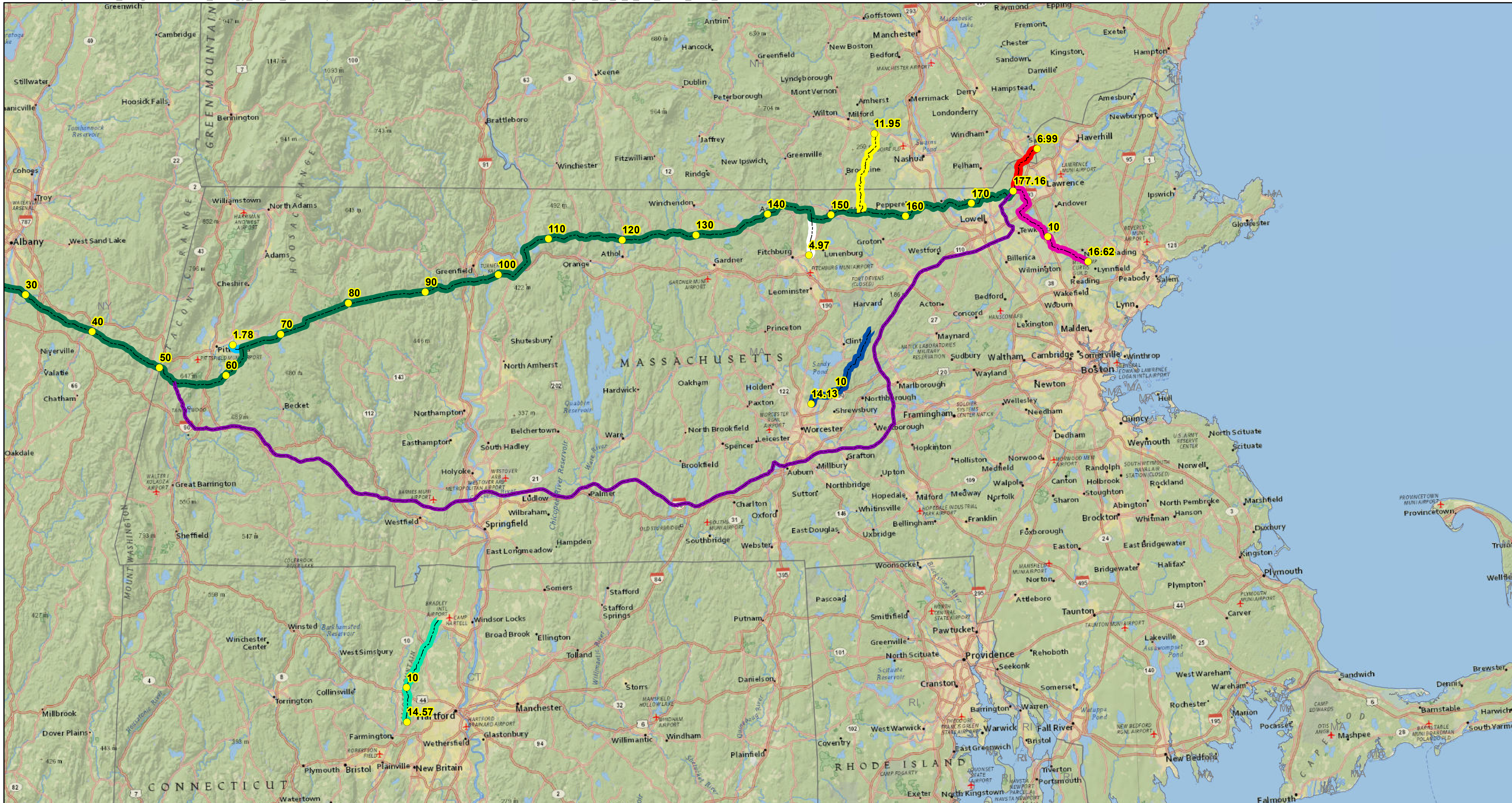
November 2014

FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_7_I90_Mass_TPK_Alternative.mxd



Site Location

Legend

- NED West Nashua Lateral
- NED Stamford Loop
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- NED Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- Mass Turnpike Alternative
- Mileposts

N
W E
S

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

Mass Turnpike Alternative
Figure 10.3-7

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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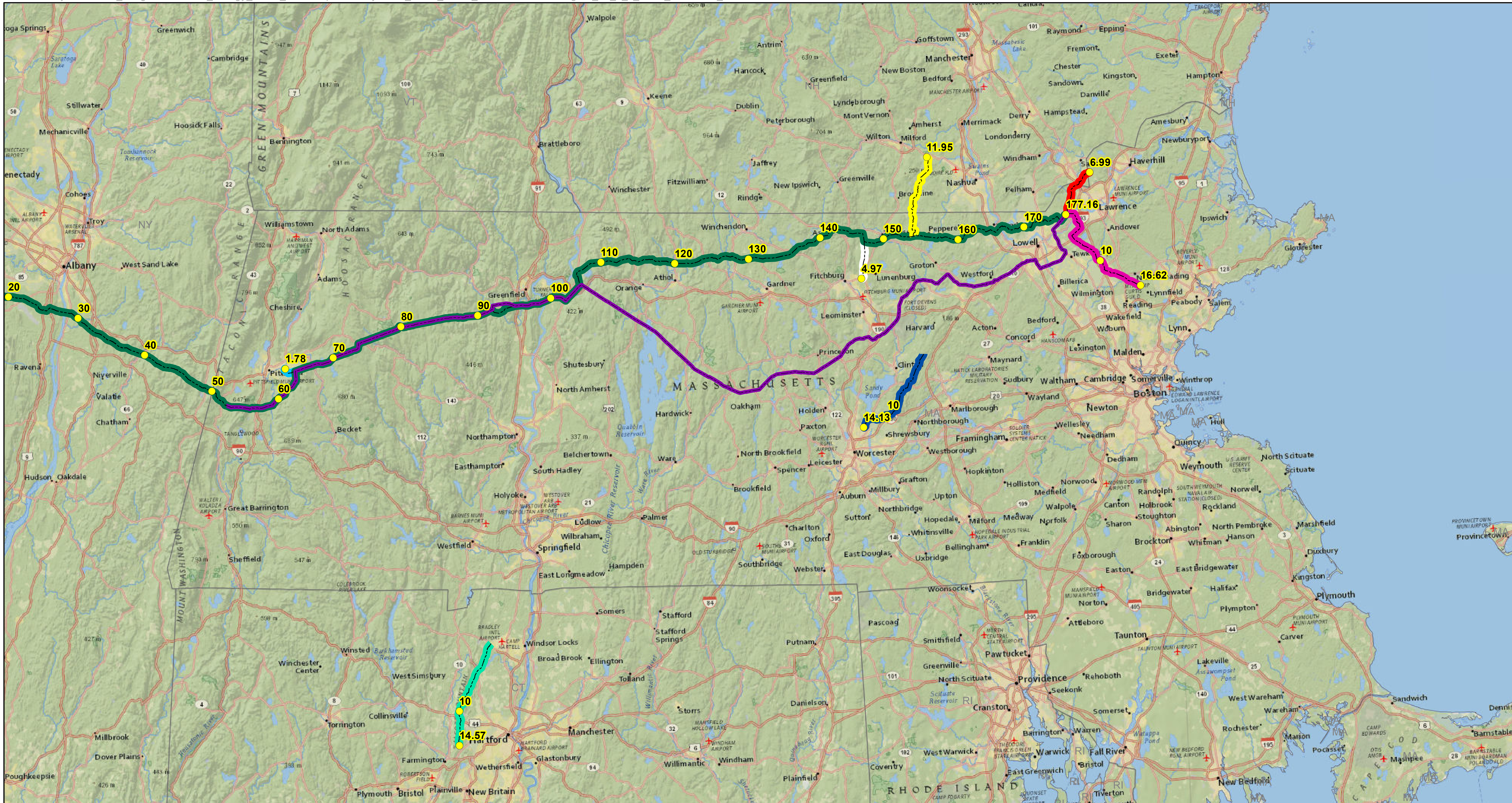
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_8_Mass_Powerline_Alternative.mxd



Site Location

Legend

- NED West Nashua Lateral
- NED Stamford Loop
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- NED Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- NED 300 Line CT Loop
- Massachusetts Powerline Alternative
- Mileposts

N E S W

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

Mass Powerline Alternative
Figure 10.3-8

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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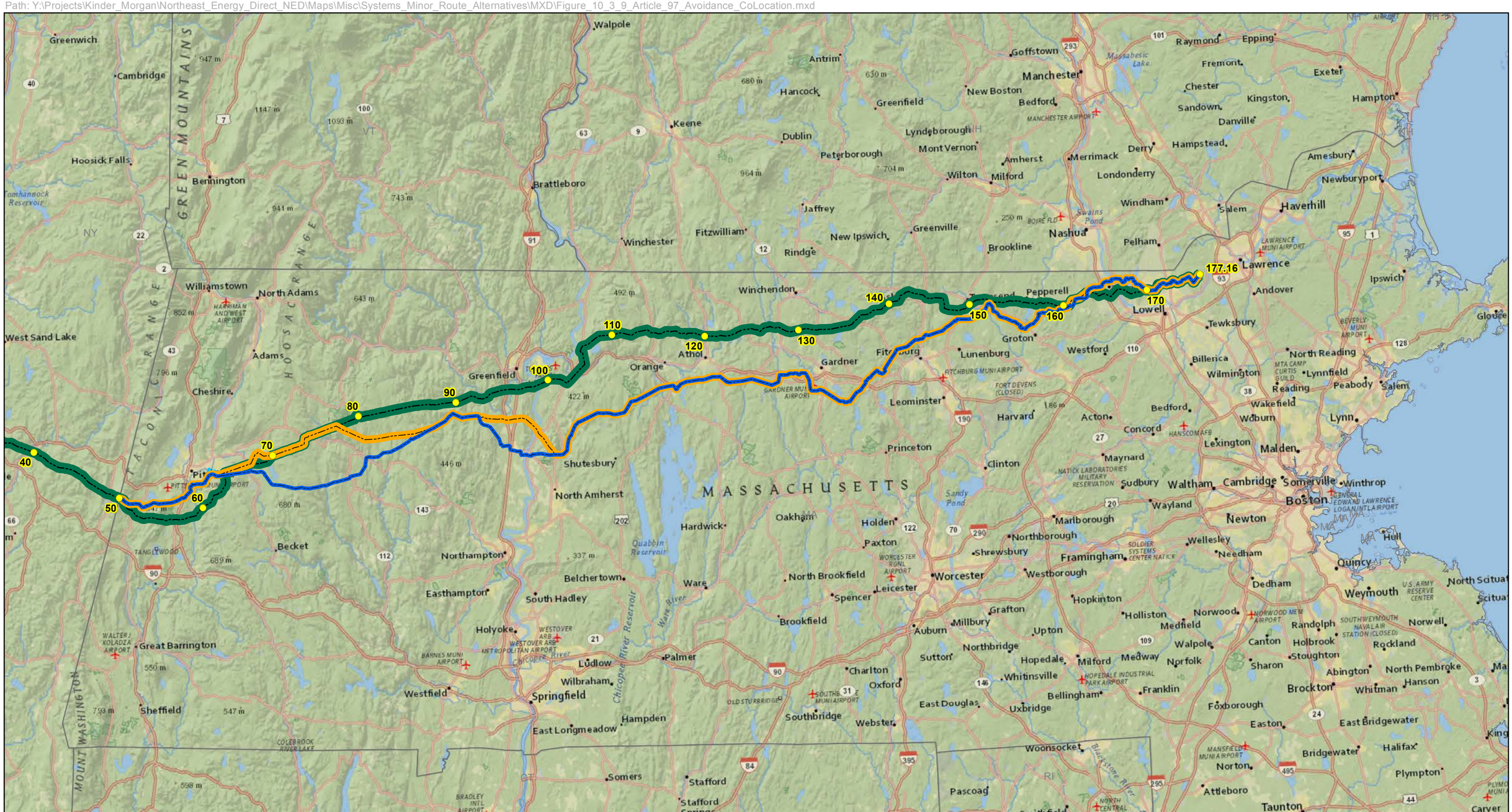
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_9_Article_97_Avoidance_CoLocation.mxd



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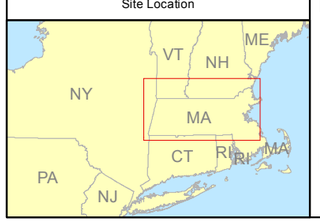


Legend

- Article97 Co-Located Route
- Article97 Avoidance Route
- NED Pittsfield Lateral
- Wright to Dracut Pipeline Segment
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

Article 97 Avoidance and Co-located Alternative Routes
Figure 10.3-9

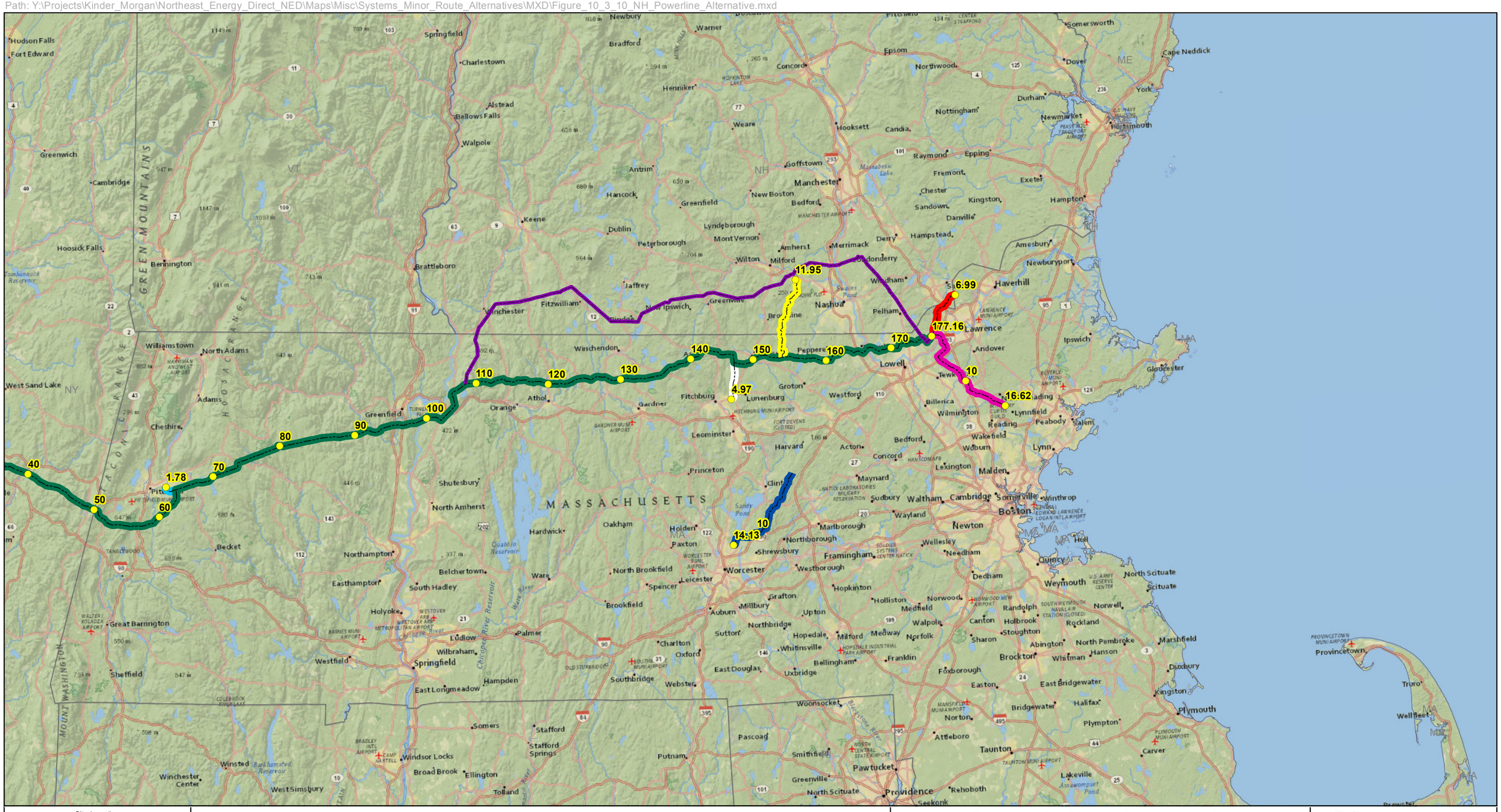
0 2.5 5 10 Miles

1 inch = 50,000 feet

November 2014

FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_10_NH_Powerline_Alternative.mxd



Site Location

Legend

- NED West Nashua Lateral
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- NED Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- New Hampshire Powerline Alternative
- Mileposts

N W E S

0 2.5 5 10 Miles

1 inch = 64,000 feet

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Major Route Alternatives

NH Powerline Alternative
Figure 10.3-10

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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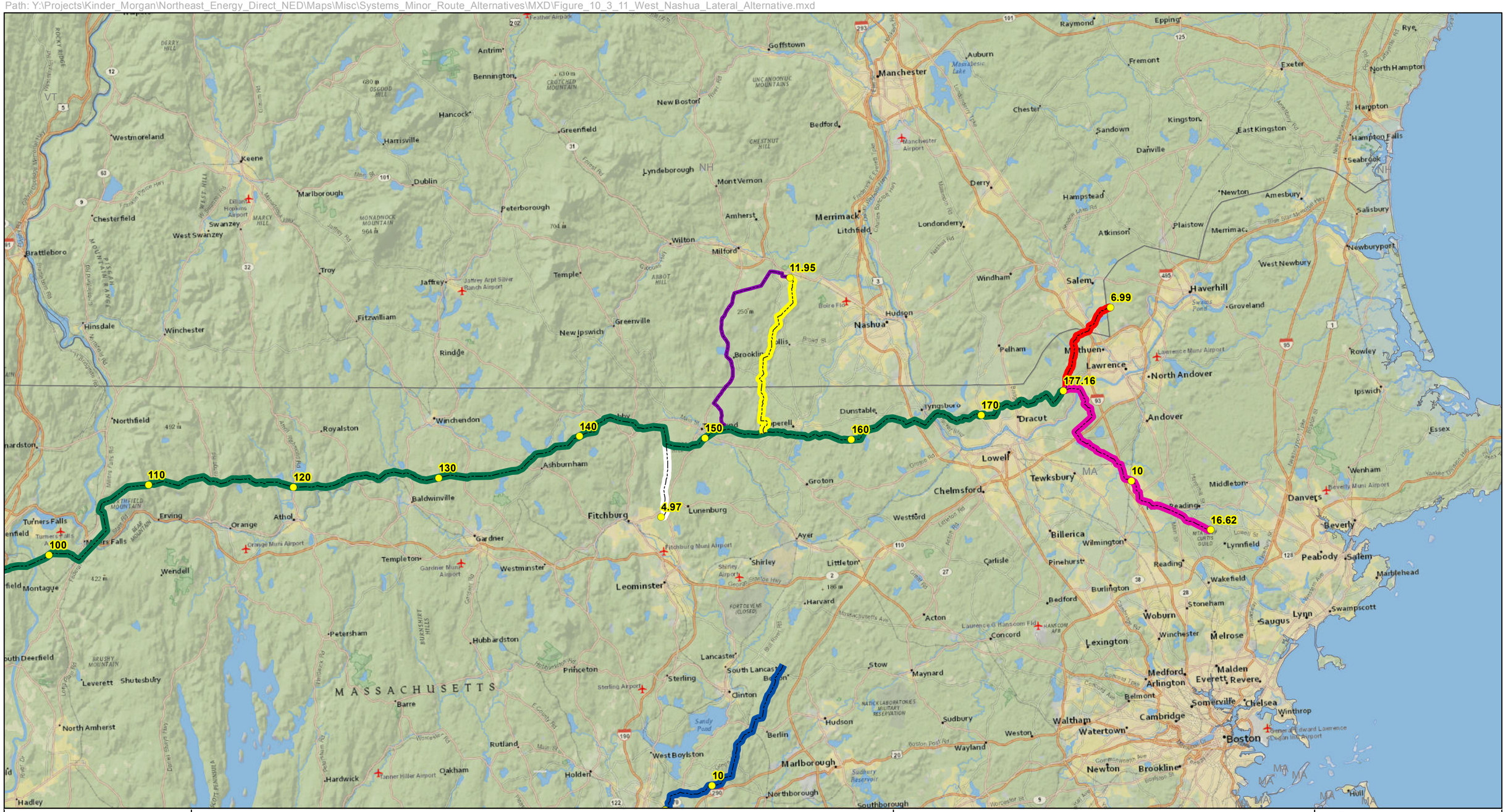
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_11_West_Nashua_Lateral_Alternative.mxd



Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Minor Route Alternatives

West Nashua Lateral Alternative
Figure 10.3-11

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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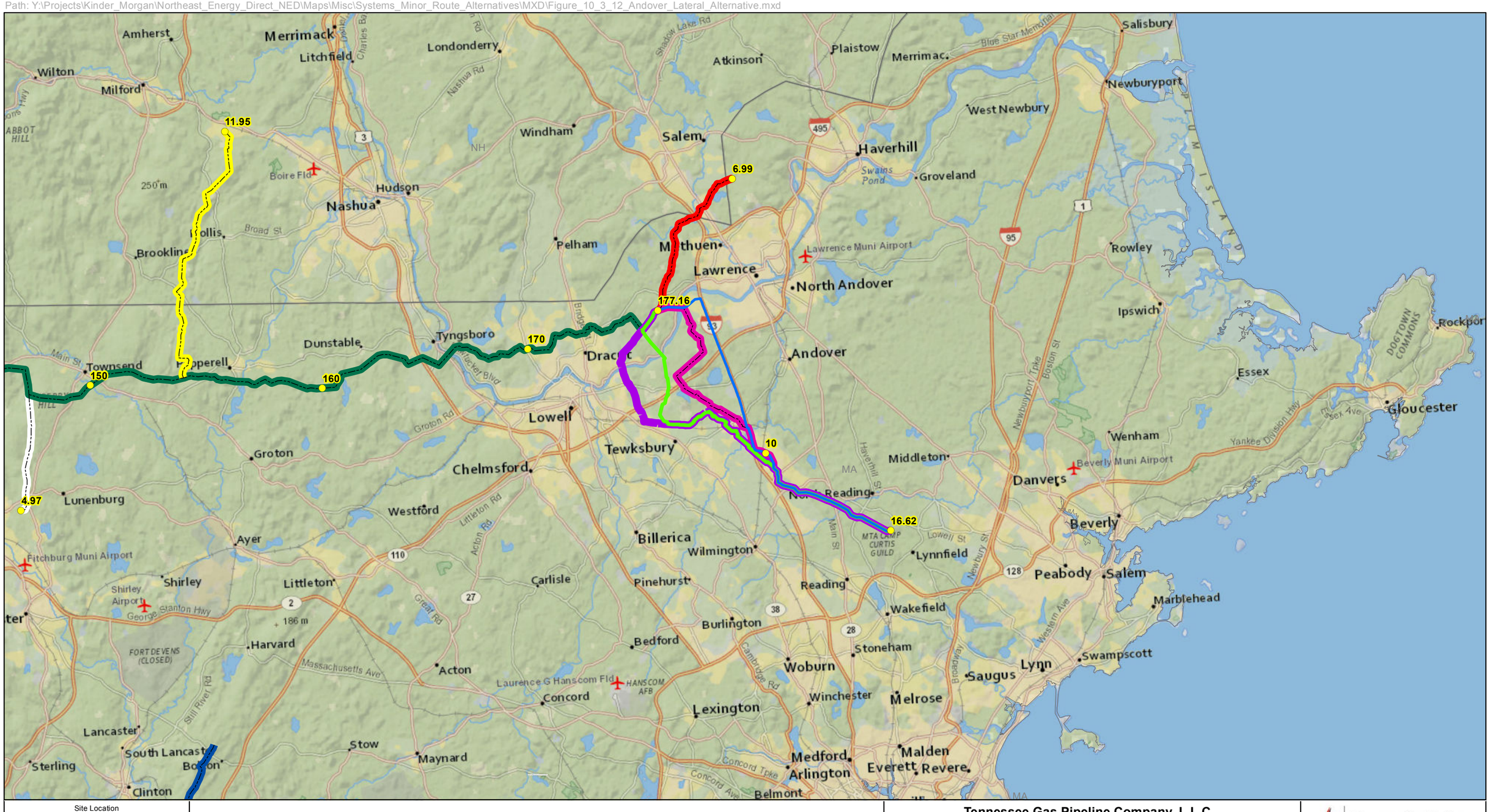
FIGURE 10.3

Path: Y:\Projects\Kinder_Morgan\Northeast_Energy_Direct_NED\Maps\Misc\Systems_Minor_Route_Alternatives\MXD\Figure_10_3_12_Andover_Lateral_Alternative.mxd



Site Location

Legend

- NED West Nashua Lateral
- NED Pittsfield Lateral
- NED North Worcester Lateral
- NED Lynnfield Lateral
- NED Haverhill Lateral
- NED Fitchburg Lateral Extension
- Wright to Dracut Pipeline Segment
- Andover Route 1 Alternative
- Andover Route 2 Alternative
- Andover Route 3 Alternative
- Mileposts

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Northeast Energy Direct Project

Minor Route Alternatives

Andover Lateral Alternatives
Figure 10.3-12

0 1.25 2.5 5 Miles

1 inch = 20,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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FIGURE 10.3