300 LINE EXPANSION PROJECT

DRAFT
RESOURCE REPORT NO. 10
ALTERNATIVES

PUBLIC

Tennessee Gas Pipeline Company
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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)).	Section 10.4

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10.0 INTRODUCTION

This resource report describes the alternatives that have been considered in developing Tennessee Gas Pipeline Company's ("Tennessee") 300 Line Expansion Project ("Project"). Section 10.1 details the no-action alternatives. Section 10.2 discusses system alternatives, and Section 10.3 evaluates route alternatives. Section 10.4 provides additional information relative to aboveground facilities. Section 10.5 provides a summary of the alternatives evaluated by Tennessee during the conceptual planning stages of the Project.

Tennessee is filing an application for a certificate of public convenience and necessity with the Commission for the Project. The proposed Project will include construction of approximately 128 miles of 30-inch pipeline consisting of seven separate pipeline loops in northern Pennsylvania, totaling approximately 111 miles, and one pipeline loop in northwestern New Jersey totaling approximately 17 miles. To the extent that it is practicable and feasible, Tennessee proposes to locate the pipeline loops within and adjacent to the right-of-way ("ROW") associated with its existing 24-inch pipeline designated as the 300 Line. Additionally, as part of the Project, Tennessee proposes to construct two new compressor stations near its existing 300 Line ROW in northwestern Pennsylvania, as well as make improvements and install system upgrades at seven of its existing compressor station facilities in Pennsylvania and New Jersey. Tennessee proposes to begin construction of the Project facilities in the second half of 2010 and to place the facilities in-service by November 2011. Please refer to Resource Report 1 of this Environmental Report for a more complete description of the Project components.

Tennessee undertook an extensive need and alternative routing analysis for the Project. Tennessee's primary objective in performing this analysis was to develop a project that would accomplish Tennessee's objective to meet the market demand for natural gas service, as expressed in a binding open season and confirmed by the execution by a customer of a binding precedent agreement, while working to avoid or minimize potential adverse environmental impacts to the greatest extent practicable. As discussed below, Tennessee evaluated pipeline routing and compressor station site options based on regional topography, potential adverse environmental impacts, 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 18 CFR Section 380.15.

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 have limited ability to provide the necessary natural gas transportation service required to meet expressed needs of a customer that subscribed for the entirety of the Project's projected capacity. Given the constrained pipeline capacity situation in the northeast, other natural gas transmission companies would most likely be required to increase their capacity and construct new facilities to meet the demand for the additional capacity. Such actions would likely result in the transference of environmental impacts from one location to another but would not eliminate or reduce such impacts altogether.

If existing natural gas transmission systems are not enhanced or expanded, energy shortages in times of peak demand may ensue, or users may revert to the consumption of alternative fuels, which may include oil and coal. Utilization of natural gas as the primary fuel offers the best alternatives in terms of

availability with the lowest environmental impact of available energy sources, particularly in regards to air quality impacts. Existing natural gas delivery systems may be readily expanded to meet increased demand with minimal impact to the environment. The no-action alternative was not found to be a feasible alternative for the Project since that alternative would not satisfy the purpose and need for the Project.

10.1.1 Energy Conservation

Reduction in the need for additional energy usage is the preferred alternative wherever possible. Conservation of energy reduces the demand for the limited and over-utilized fossil fuel reserves. Energy conservation is also strongly advocated by both federal and state authorities. Tennessee presently has programs in place that strongly encourage energy conservation. Even with these programs, there remains a need for additional natural gas that would be provided with the construction of this Project. Energy conservation alone is not a viable alternative to the Project.

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 Tennessee customers 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 were instituted 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.

10.1.2.1 Wind Power

Wind power currently is not a viable option for providing the projected power needs in the region where the Project is located. While wind energy is available in the vicinity of proposed pipeline loop segments 321 and 323, identified in Resource Report 1 of this Environmental Report, wind generation is not available at the Project's proposed delivery points and cannot be precisely scheduled based on demand. Hence, 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 natural gas.

10.1.2.2 Solar Power

Solar power is not an alternative to natural gas in this region due to climactic conditions. Use of renewable resources, such as solar power, are not being developed at a pace fast enough to provide for the projected energy needs in the nation or the region where the Project is located.

10.1.2.3 Geothermal Power

Geothermal energy is available only at tectonic plate boundaries or at volcanic 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 a viable alternative energy source, but compared to natural gas, coal necessitates increased environmental impacts from its extraction point to its combustion as a fuel. Coal is associated with significant mine pollution control problems and reclamation issues, as well as storage problems, acid rain, and costly pollution controls at the burner. Therefore, coal does not represent a preferred alternative for replacing the natural gas to be supplied by the proposed Project.

10.1.2.5 Oil

While oil is a viable alternative energy source for meeting future power generation needs in the Project area, oil has no advantage over natural gas, and oil necessitates increased environmental impacts in transportation and at the burner. For these reasons, particularly for facilities designed to use natural gas, oil would not be a preferable alternative to the natural gas to be supplied by the proposed Project.

10.1.2.6 Nuclear

The use of nuclear energy is not considered to be a viable option for meeting the projected demand for energy in the region where the Project is located. Due to the lengthy lead time to site a new nuclear facility, power generated from such a facility would not be available for development as an alternative to natural gas.

10.1.2.7 Electric Generation

The region where the Project is located does not have a high potential for hydroelectric power generation, even using low head/low power technologies. As a result, hydroelectric power would not be available for development in the region as an alternative to the natural gas supplied by the Project.

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.

10.1.2.8 Fuel Cells

Fuel cells are a developing alternative for generating electricity more directly and cleanly from fossil fuels or hydrogen. 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.

10.1.2.9 Other Energy Sources

Other alternative fuel sources available include using LNG and propane/air storage and vaporization. Though both alternatives have the potential to meet its Project objectives of (1) increasing the maximum peak hourly flow capability; (2) meeting design-day gas supply requirements; and (3) alleviating low pressure problems on its 300 Line system, 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 option.

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. System options 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, although some modifications or additions to existing pipeline infrastructure or construction of entirely new pipeline system may be required to allow for the transportation of the additional natural gas.

In the early phases of the Project, significant interest was found in the northeastern United States for additional supplies of clean-burning natural gas to supply utility companies. Because Tennessee currently operates a transmission system in the northeast, Tennessee determined that it could supply the increased demand for natural gas in this area using efficiencies afforded by its existing system. Accordingly, Tennessee did not consider any system alternatives involving the use of other (non-Tennessee) natural gas pipeline systems. However, Tennessee did consider system alternatives involving different configurations of pipeline and compression facilities within its own transmission system, as described in the following sections.

Tennessee used the following evaluation criteria when selecting reasonable and potentially environmentally preferable system alternatives to the Project:

- Technical and economic feasibility and practicality;
- Extent of environmental impacts; and
- Ability to meet the Project objective to satisfy increased demand for natural gas in the time frame requested by the customer, given that alternative energy sources or conservation are not able to satisfy this demand.

The proposed facility configurations for the Project differed significantly between two specific pipeline sections. For the purposes of the alternatives discussion only, these sections were designated as the Western Section (Station 219 through Station 313) and the Eastern Section (Station 313 through White Plains, New York delivery point). This difference is primarily due to differing geometries and operating pressures of existing facilities in the two sections. As such, alternative system configurations (such as looping only, compression only, and combinations of looping and compression) evaluated for this Project differed for each section and are discussed in separate sections below.

10.2.1 Western Section (Section 219 through Station 313)

This section currently contains a 24-inch diameter pipeline with a completed 30-inch diameter pipeline loop. As part of the Project, this section of pipeline is proposed to be expanded to transport an incremental 180,000 dekatherms per day. The balance of the capacity needed for the Project, 120,000 dekatherms per day, will be provided following the termination of currently effective transportation service agreements.

Incremental pipeline looping was considered for the Project, which would be accommodated by constructing an entirely new third parallel pipeline to the 300 Line. Tennessee's past practices, though, would have required the installation of a 36-inch diameter internally coated pipe loop for the new loop line, which is one standard size larger than the currently largest installed loop line.

Incremental compression at existing compressor stations was also considered for the Project. The existing compressor stations on this pipeline section are approximately 66 miles apart, on average. The relatively long distance between existing compressor stations allowed for Tennessee's consideration of new midpoint compressor stations to be located between each of the existing compressor stations.

10.2.1.1 Looping Only Option

The looping only option for this pipeline section would require the construction of a third parallel pipeline loop. A 36-inch diameter pipe was used for the evaluation of this alternative. This alternative included the construction of the pipeline looping that would be required to eliminate the two proposed midpoint stations (Stations 303 and 310) and the modification to compression at Station 313.

- Station 303 Alternative – Installation of approximately 39 miles of 36-inch diameter pipeline loop would be required to eliminate the need for new Station 303. This would result in approximately 470 acres of land disturbance that would include several acres of wetland alteration, multiple waterbody crossings and potential impacts to rare species habitat. Also, this looping would have cost approximately 400 percent more than the new compressor station. The environmental impacts, number of affected landowners, and economics did not support this option.
- Station 310/313 Alternative – Installation of approximately 61.5 miles of 36-inch diameter pipeline loop would be required to eliminate the need for new Station 310 and the modification to the compression at Station 313. This would result in approximately 745 acres of land disturbance that would include several acres of wetland alteration, multiple waterbody crossings and potential impacts to rare species habitat. Also, this looping would have cost approximately 600 percent more than the new compressor station. The environmental impacts, number of affected landowners, and economics did not support this option.

The looping only option was not selected by Tennessee for this pipeline section due to the large amount of ROW acquisition, ground disturbance, and capital costs associated with the construction of 100.5 miles of incremental pipe looping that this option would have required.

10.2.1.2 Looping and Compression Option

The looping and compression option for this pipeline section would also require constructing a third parallel pipeline loop of the 300 Line in addition to adding compression at existing Stations 307 and 313. The information below represents the looping and compression that would be required to eliminate the two proposed midpoint stations.

- Station 303 Alternative – Installation of approximately 30 miles of 36-inch diameter pipeline loop would be required to maintain a reasonable compression ratio at existing Station 307 to enable existing compression equipment to operate. This would result in approximately 365 acres of land disturbance that would include several acres of wetland alteration, multiple waterbody crossings, and potential impacts to rare species habitat. Installation of approximately 6,130 horsepower at

Station 307 would also be required to eliminate the need for new Station 303. The environmental impacts, number of affected landowners, and economics did not support this option.

- Station 310/313 Alternative - Installation of approximately 34 miles of 36-inch diameter pipeline loop would be required to maintain a reasonable compression ratio at existing Station 313 to enable existing compression equipment to operate. This would result in approximately 410 acres of land disturbance that would include several acres of wetland alteration, multiple waterbody crossings, and potential impacts to rare species habitat. Installation of approximately 7,800 horsepower at Station 313 would also be required to eliminate the need for new Station 310. The environmental impacts, number of affected landowners and economics did not support this option.

The looping and compression option also was not selected by Tennessee for this pipeline section due to the large amount of ROW acquisition, ground disturbance, and capital cost associated with the construction of 64 miles of incremental pipe looping that this option would have required.

10.2.1.3 Additional Compression Only at Existing Compressor Stations

Installation of additional compression at existing compressor stations only, without any pipeline looping, proved to be hydraulically infeasible for this pipeline section. The compression ratio and station discharge temperature exceed recommended design conditions for an efficient operating pipeline.

10.2.1.4 Additional Compression Only at Existing Compressor Stations and New Compressor Stations

Tennessee also evaluated whether the option of the addition of compression at existing compressor stations and the construction of new compressor stations, without any pipeline looping, would be feasible for this pipeline section. The distance between existing compressor stations on this section of pipeline provided Tennessee with an opportunity to consider the construction of midpoint compressor sites. Potential midpoint compressor stations sites were determined by selecting the main line valves that are located approximately midway between Stations 219 and 307 and between Stations 307 and 313. Potential locations were evaluated around those selected sites. Tennessee confirmed that the potential compressor station sites were acceptable per hydraulic modeling. Tennessee also determined that incremental compression would not be required at existing Station 307. However, additional compression would be required at Station 313 in order to maintain its discharge pressure at a maximum allowable operating pressure of 1170 psig, which is necessary for the expansion of the Station 313 to White Plains section discussed below. Based on this analysis, this is the option that Tennessee has selected for this section of the Project.

10.2.2 Eastern Section (Section 313 through White Plains, New York)

This section of pipeline consists of a 24-inch diameter pipeline with several relatively short 30-inch diameter pipeline loops, which parallel the original line. As part of the Project, this section is proposed to be expanded to transport the entire incremental 300,000 dekatherms per day required for the Project. Incremental looping was considered for the Project, which would be accommodated by extending the existing 30-inch diameter parallel pipeline loops. Significant quantities of pipeline looping will be required for this section of the Project as a single 24-inch diameter pipeline is not capable of providing the necessary capacity to transport the total required gas volumes to the market delivery points. The addition of incremental compression at existing compressor stations on this section was also considered for the

Project. The relatively close spacing between existing compressor stations (approximately 30 miles apart, on average) eliminated consideration of new midpoint compressor stations for this section of pipeline.

10.2.2.1 Looping Only Option

Pipeline looping is necessary for this section of the Project as a compression only option (which is discussed further below) would have resulted in gas velocities above Tennessee's recommended design velocity for efficient and safe operation of its system. The information below summarizes the amount of pipeline looping that would be required to eliminate the proposed additional compression at existing Stations 315 and 325.

- Station 315 Alternative – Installation of approximately 20.9 miles of 30-inch diameter loop upstream of Station 315 (in lieu of the 16.9 miles proposed as part of the Project) would be required to eliminate the need for additional compression at Station 315. This would result in approximately 255 acres of new land impacts during construction that would include wetlands, waterbodies, rare species habitat, and agricultural land as well as multiple newly affected landowners.
- Station 317 Alternative – Additional horsepower was not proposed for this station.
- Station 319 Alternative – Additional horsepower was not proposed for this station.
- Station 321 Alternative – Additional horsepower was not proposed for this station.
- Station 323 Alternative – Additional horsepower was not proposed for this station.
- Station 325 Alternative – Installation of approximately 27.1 miles of 30-inch diameter loop downstream of Station 325 (in lieu of the 16.4 miles proposed as part of the Project) would be required to eliminate the need for additional compression at Station 325. This would result in approximately 327 acres of new land impacts during construction that would include wetlands, waterbodies, rare species habitat and agricultural land as well as multiple newly affected landowners.

Tennessee determined that the looping only option is not the preferred option for this pipeline section. This option was not chosen due to the additional amount of ROW acquisition, ground disturbance, and capital cost associated with the minimum of 14.7 miles of incremental pipe looping that would have been required. Any of the looping only options would result in significantly greater environmental impacts due to increases in clearing of mature forest, modification of wetland type, temporary alteration of waterbodies and riparian areas, and potential loss of rare species habitat. By modifying existing compressor stations within previously disturbed areas, these additional impacts are avoided.

10.2.2.2 Compression Only Option

Compression only is not an option for this pipeline section. The existing 24-inch diameter pipeline cannot transport the entire expanded gas volumes to the market points at the recommended pressure. The addition of midpoint compressor stations is not feasible as the current compressor stations are located relatively close to each other (approximately 30 miles average between stations).

10.2.2.3 Looping and Compression Option

As discussed earlier, partial incremental pipeline looping will be required for this section of the Project as the single 24-inch diameter pipeline that comprises this pipeline section could not efficiently transport an

incremental 300,000 dekatherms per day of gas volumes, in addition to the current capacity. A 30-inch diameter pipe was selected for the looping to avoid pipe size changes and to continue the existing, previously installed 30-inch diameter pipeline loops already in place along the 300 Line. The length of the looping in each segment between compressor stations was optimized to limit velocity through the remaining single 24-inch diameter portions and to efficiently use the existing compressor stations.

Installing new pipeline loops on ROW adjacent to the an existing line is the preferred option. ROWs for the new pipeline loops were evaluated based on the mileages provided from Tennessee's hydraulic model. Physical loop beginning and ending points between each compressor station were recommended based on results from a helicopter fly-over of existing ROWs and computer software analysis of the area. For example, the pipeline looping between Stations 317 and 319 was changed from one continuous section of new loop pipe to two sections to avoid the environmental impacts and cost of crossing the Susquehanna River.

For the 315 and 325 looping sections, Tennessee proposes to minimize the amount of pipeline needed for expansion by installing additional horsepower at stations 315 and 325, eliminating the need for approximately 15 miles of right-of-way acquisition. At both stations, the increase in horsepower would be achieved by replacing the existing compressor packages in-situ with larger horsepower units. This would allow for the optimization of the station from a standpoint of operational efficiency and reliability while minimizing the environmental impact related to ground disturbance.

Horsepower replacement is also being proposed at Station 321, where the existing compressors must be restaged in order to achieve the increase in capacity on the system. The gas turbine engines at this station would be replaced with new equipment increasing the reliability and efficiency of the station.

Based on this analysis, this is the looping and compression option is proposed for this section of the Project.

10.3 ROUTE ALTERNATIVES

10.3.1 Pipeline Facilities

Several alternatives to the proposed pipeline loop segments were evaluated as part of the planning and design process for this Project. 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.

The selection of the major route alternatives discussed in Section 10.3.1.1 was dictated by several factors.

- Determination of most cost effective technical solution (i.e., loop versus 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.

Sources of existing information such as field reconnaissance, aerial photography, topographic maps from the United States Geological Survey, and National Wetland Inventory maps were used during the route identification and evaluation processes.

In evaluating the routing options for the required segments of pipeline loop, it was determined that given Tennessee's existing pipeline, the loop segments should be co-located with the existing pipeline ROW to the maximum extent possible. 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 loop segments. The utility corridor created by Tennessee's existing pipeline minimizes further environmental impacts and pubic disturbance, as well as construction costs. Siting pipeline facilities along the existing corridor reduces the establishment of new corridors in previously undisturbed areas, while limiting the number of affected landowners.

Section 10.3.1.1 examines the major route alternatives that were identified during the planning stage of the Project, but were not selected due to factors such as greater environmental impact, increased numbers of directly affected landowners, and potential disruptions to communities during the construction of the Project facilities. In general, the effects of the Project on environmental resources in the Project area were determined to be essentially equivalent, and none of the alternatives examined appear to have sensitive environmental resources that would preclude the Project from receiving the necessary permits and approvals for construction and operation.

The main determinants used to select the preferred route over the other routes evaluated pertained to minimizing the number of affected landowners, constructability issues, and Tennessee's desire to limit the extent of disruption on the communities potentially being affected during construction.

10.3.1.1 Major Route Alternatives

One approach to meet the Project objective would be to deviate significantly from the existing 300 Line alignment and review all other available greenfield routes to achieve the Project objectives. When reviewing this alternative, it became apparent that the installation of approximately 130 miles of new permanent right-of-way would have a significant environmental and land use impact over looping portions of the existing pipeline and would directly conflict with the Commission's guidance for siting new facilities within or directly adjacent to existing corridors.

10.3.1.2 Minor Route Variations or Deviations

As proposed, the various preferred pipeline loop segment routes optimize Project constructability and economics, while minimizing impacts to the environment. When evaluating minor alternative routes or minor route deviations, no particular route or deviation changed, avoided or minimized environmental conditions or potential impacts over the preferred alignments (i.e., the few available corridors considered for alternative route deviations impacted similar communities or existing conditions in the region). In several instances along the various loops, the loop pipeline and associated workspace were moved north or south of the existing pipeline to avoid sensitive resources, residential areas or construction constraints. These crossovers are depicted on the Project alignment sheets and were not considered to be route variations or deviations. Additionally, any minor alternative routes/minor deviations would add additional length to the proposed pipeline, thus leading to potential increases in environmental impacts and costs for the Project.

10.3.1.2.1 Loop 317 – Susquehanna River

The initial design of the 317 Loop segment included one continuous addition of 30-inch outside diameter pipeline downstream of Compressor Station 317. This would have necessitated the crossing of the Susquehanna River at approximate milepost 22.7 to achieve the necessary length. Based on the site conditions, the crossing of the river would require an approximately 1,800 foot horizontal directional drill which posed several significant issues. The general topography of the area is not conducive to drilling as the majority of the area is forested with steep slopes on both sides (See Figure 10.3-1 in Attachment A of this Resource Report).

Based on the environmental concerns with an HDD as well as the high probability of encountering cultural resources within close proximity to the river, Tennessee examined an alternative that includes an additional 1.3 miles of looping upstream of Compressor Station 319. This alternative satisfied the hydraulic model for the Project without the issues associated with the HDD crossing of a major river. Based on this evaluation, the 317 Loop segment was decreased by approximately one mile and the 1.3-mile loop upstream of Compressor Station 319 was incorporated into the Project.

10.3.1.2.2 Loop 325 – Monksville Reservoir

The existing 300 Line was installed prior to the construction of the Monksville Reservoir. Based on its presence, the only feasible way to loop the existing pipeline is via HDD. The original HDD design for the proposed crossing of the reservoir attempted to maintain the standard offset and configuration of the loop segment (See Figure 10.3-2 in Attachment A of this Resource Report). Upon completion of environmental and engineering surveys, it was apparent that the initial crossing configuration was not optimal based on the extent of temporary workspace ("TWS") required outside of the existing ROW. Additionally, the exit location of the HDD would be located on a steep slope, which posed technical feasibility concerns as well as the need for significant areas of TWS and additional temporary workspace. By modifying the HDD configuration to the proposed location north of the existing 300 Line ROW, the extent of TWS required outside of the existing ROW is minimized and both the HDD entry and exist points are located outside of steep topographical areas thereby allowing for a minimization of workspace to the extent practicable.

10.4 ALTERNATIVE SITES FOR NEW COMPRESSOR STATIONS

Tennessee conducted a hydraulic analysis to determine the optimum horsepower and compression to provide the increased volumes necessary to meet market demand. As a result, Tennessee identified the need for two new compressor stations (Compressor Station 303 and Compressor Station 310) to help meet the compression needs for the increased delivery volume. While the availability of land for purchase was the initial limiting factor in the site selection process, the following considerations also influenced property suitability for siting the new compressor stations:

- Engineering Design and Construction: Several engineering design and construction issues were evaluated for selection of a preferred site, including facility and workspace requirements, site elevation, road access, and length of interconnecting pipe between the new compressor stations and Tennessee's existing pipeline:

    - Pipeline design limitations – Tennessee used an approximate two-mile east and two-mile west distance from the closest MLV to identify new compressor station properties.

- Land/workspace requirements – Tennessee undertook a detailed analysis to select a 25 acre or greater property for a site to install the new compressor stations.

- Site elevation – Tennessee sought out land parcels featuring topography that minimizes the extent of fill or excavation of soil required during construction of the new facilities, including workspace needs.

- Road access – Tennessee sought to maximize proximity of the new compressor stations to the nearest public road, thereby minimizing the need for a new access road as well as modifications or improvements to existing roads.

- Interconnecting pipe – To minimize the impact on the surrounding community, Tennessee favored siting the new compressor station sites on a property that would not require a pipeline extension for the suction and discharge piping. This approach also minimizes the land requirements for the Project, thereby minimizing the number of impacted property owners.

- Land Availability: The proposed compressor station sites are both within rural settings. The landowners within this area typically own lot-sized property or small tracts of land.

- Environmental Impacts: Environmental parameters for the alternative sites were evaluated based on a combination of field reconnaissance and available desktop resources such as 7.5-minute United States Geological Survey ("USGS") topographic mats, aerial photography, and available literature on environmental resources. Several environmental characteristics were evaluated using these resources, including:

  - Soils, including presence of prime farmland;

  - Federally and state-listed threatened and endangered species; and

  - Cultural resource sites listed or eligible for listing on the National Register of Historic Places.

Several locations were identified to meet the requirements for siting of each new compressor station - the preferred site and up to two alternative sites for each compressor stations (See Figures 10-4-1 and 10.4-2).

10.4.1 Compressor Station 303

Two potentially suitable parcels were identified in an undeveloped area of Cranberry Township, Venango County, Pennsylvania for the site of new Compressor Station 303.

The preferred location (Site 303A) is an approximately 76-acre parcel located to the north of Meadow Church Road, which provides frontage access across the entire parcel. Tennessee's existing 300 Line extends across the southeastern quadrant of the parcel. This site is preferred for the new compressor station based on its higher elevation, forested buffer from the closest residential properties, and lack of wetlands. The paved frontage of Meadow Church Road allows for better than average access to the site as well as direct accessibility to electric distribution lines. The portion of the property to be used for the compressor station currently consists primarily of old fields which will minimize impacts to forested areas.

The preferred site also features the following characteristics:

- Tennessee's existing pipeline system crosses through the site.
- The site will require minimal grading and clearing prior to construction of the compressor station. The civil work will be planned to balance the cut and fill requirements to minimize the impact associated with having excessive soil materials remaining from the grading operations.
- Surface waterbodies and wetlands were identified within the western quarter of the site. Tennessee has sited the proposed facility outside of these wetlands and will maintain all temporary workspace a minimum of 50 feet from the edge of the wetland boundary. In addition, the proposed compressor station will be designed to ensure that these resources will not be impacted during operation of the facility.
- Cultural resource surveys have been completed at the site, and no cultural resources were identified within any areas to be affected during construction or operation of the compressor station. Please refer to Resource Report 4 for additional information regarding the cultural resource survey process.
- Noise-sensitive areas ("NSAs") were identified within one mile of the site. The results of the noise survey conducted for this site are discussed in Resource Report 9.

10.4.1.1 Alternative Site – Compressor Station 303

The primary alternative site reviewed was a 59-acre parcel located directly south and west across Meadow Church Road. This parcel was identified based on the access from Meadow Church Road and the fact that Tennessee's existing 300 Line pipeline extends across the parcel from southwest to northeast. The majority of this parcel is forested and slopes gently to the south. There are two streams, one perennial and one intermittent that flow into and through the parcel, intersecting in approximately the middle of the parcel. These streams and associated wetlands limit the options for a compressor station on the parcel. Additionally, any site work would require significant clearing of forest resources. The extent of forest, wetlands, and waterbodies within the parcel would limit the acceptable locations for the compressor station and would result in significantly greater environmental impacts than the preferred site. Potential environmental impacts, along with difficulty in contacting the landowner, eliminated this site from further consideration.

10.4.2 Compressor Station 310

The preferred location for new Station 310 (Site A) is an approximately 25-acre parcel located within a remote area of Sergeant Township, McKean County, Pennsylvania. Tennessee's existing 300 Line bisects the site from southwest to northeast. The preferred site is located away from residences and populated areas and is in close proximity to other energy production (gas well) facilities. The site provides good access and good soils, along with minimal impact to the surrounding acres, neighbors, and environment. This parcel has been secured by a Purchase and Sale Agreement, and the purchase and sale transaction will be closed following the completion of a due diligence review.

The preferred site also features the following characteristics:

- Tennessee's existing pipeline system crosses through the site.
- The site will require minimal grading prior to construction of the compressor station. The civil work will be planned to balance the cut and fill requirements to minimize the impact associated with having excessive soil materials remaining from the grading operations. While the site is managed for timber, the majority of the quality trees have been previously harvested, and this site was recommended by the landowner to avoid significant clearing of high value timber.
- Surface waterbodies and wetlands surveys were completed within the site. There are no wetlands within the property that would be affected by the construction or operation of a new compressor station.
- Cultural resource surveys have been completed at the site, and no cultural resources were identified within any areas to be affected during construction or operation of the compressor station. Please refer to Resource Report 4 for additional information regarding the cultural resource survey process.
- NSAs were not identified within one mile of the site. The results of the noise survey conducted for this site are discussed in Resource Report 9.

10.4.2.1 Alternative Site - Compressor Station 310

One alternative site for Compressor Station 310 was identified in Sergeant Township, McKean County, Pennsylvania. The site is located in close proximity to the preferred site and adjacent to County Route 146. The alternative site includes high quality timber growing land and is within close proximity to seasonal and year round residences. Any site work would require significant clearing of forest resources. The proximity of the nearest NSA to the alternative site was significantly closer than the preferred location. Potential environmental impacts, along with the location of NSAs, eliminated this alternative site from further consideration.

10.4.3 Compressor Station Modifications

The location of the proposed compressor station modifications allows Tennessee to utilize existing sites that have all of the following benefits:

- Tennessee owns the property where the compressor station modifications are proposed.
- Each existing compressor station area was previously disturbed through prior industrial land use.
- Tennessee has existing facilities at each compressor station, thereby avoiding the need to construct new facilities at a different location.
- Tennessee may utilize existing access roads associated with the existing compressor stations.
- The size of the project site and presence of Tennessee's pipeline system has allowed Tennessee to design the development plan outside of federal and state wetland areas and waterbodies.
- Bedrock outcrops or near surface bedrock are not expected to be encountered during construction. Therefore, no mitigation due to blasting is expected to be required for any nearby private water supply wells.

- The proposed modifications will not adversely affect wildlife, wildlife habitats or rare species.
- There have been no sensitive cultural resources identified within the existing compressor stations.
- There will be no modifications to the existing land use of the property.
- The compressor station equipment will be selected and designed to result in projected sound levels at the modified compressor stations to be 55 dB(A) L_{eq} or lower at the nearest NSA property line. It is expected that the L_{eq} sound levels produced by the modified compressor station operations will be less than 55 dB(A) L_{eq} at all other NSAs and will typically be below the ambient hourly L_{eq} sound levels measured at each NSA. Furthermore, the sound levels produced by the modified compressor stations are expected to meet all state and local noise requirements and be within the Commission's 55 dB(A) L_{dn} requirement.

Accordingly, Tennessee did not examine alternative sites for the proposed compressor station modifications as that would require the construction of additional new compressor stations which would significantly increase the environmental and stakeholder impacts associated with the Project.

10.5 ALTERNATIVES SUMMARY

If the proposed Project is not constructed to help meet customer demand (i.e., the No-Action Alternative), the market served by the customer who has executed a binding precedent agreement for all of the Project capacity 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 of natural gas customers 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 considered a viable "complete" solution to the current energy demand for the market served by this Project.

As discussed herein, Tennessee conducted a detailed study of pipeline looping options, new compression options, modifications to existing compression options, and combinations of compression and pipeline looping options. This detailed system alternatives analysis allowed Project designers to select the best configuration of proposed facilities to meet the needs of the market. Further analysis led to the selection of the best locations for the two new compressor stations. Accordingly, Tennessee concludes that the preferred facility locations meet the Project's purpose and need while minimizing adverse impacts to landowners as well as the physical and socio-cultural environment in which the Project is located.