Prepared for:

Tennessee Gas Pipeline
an El Paso company
Houston, TX

COMPREHENSIVE MITIGATION PLAN

HIGHLANDS REGION

TENNESSEE GAS PIPELINE COMPANY, L.L.C.
300 LINE PROJECT
Vernon, West Milford Townships and Ringwood Borough, New Jersey

Original: September 2009
AECOM, Inc.

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1.0 Introduction

Tennessee Gas Pipeline Company, L.L.C.[1] ("Tennessee") developed this Comprehensive Mitigation Plan ("CMP") in support of the Loop 325 Segment of the 300 Line Project (the "Project") which underwent a Highlands Applicability Determination ("HAD") review by the Highlands Council (the "Council") and the New Jersey Department of Environmental Protection ("NJDEP"). Tennessee requested a determination by the NJDEP that the Project is exempt from the Highlands Water Protection and Planning Act, N.J.S.A. 13:20-1 et seq. (the "Act"), as it constitutes "the routine maintenance and operations, rehabilitation, preservation, reconstruction, repair, or upgrade of public utility lines, rights of way, or systems, by a public utility." N.J.S.A. 13:20-28.a(11). The pipeline system is a natural gas system regulated by the Federal Energy Regulatory Commission ("FERC") under Natural Gas Act authority, for purposes of this exemption request. Tennessee should be treated as that term is defined under the Act. N.J.S.A.13:20-3 and NJDEP's regulations adopted pursuant thereto, N.J.A.C. 7:38-1.4. It is Tennessee's objective with development and implementation of this CMP to demonstrate and ensure the Project's consistency with the goals and purposes of the Act to support the exempt status determination by the Council and NJDEP.

The application for an exemption request was initially limited to the Project facilities located within the Preservation Area. Subsequent to that application, Tennessee met on numerous occasions with the Council staff to discuss the Project. The Council staff clarified that it reviewed not only that portion of the Project located in the Preservation Area but also that portion located in the Highlands Planning Area. The Council staff requested that Tennessee include the Planning Area portion of the Project as part of its application for an exemption that was submitted to NJDEP. However, NJDEP's jurisdiction is limited to the Preservation Area. Based on its discussions with the Council staff, Tennessee submitted a separate application to the Highlands Council for the Planning Area portion of the Project. As a result, Tennessee sought action by the Council on two separate applications, but the Council's actions addressed the overall Project including both the Preservation Area and the Planning Area. Accordingly, the various mitigation commitments made within this CMP have been extended to the resource areas within the Planning Area subject solely to Council jurisdiction as well as the resource areas within the Preservation Area that are subject to NJDEP's jurisdiction.

Tennessee recognizes the sensitive resources that comprise New Jersey's Highlands Region (the "Highlands"), as well as the requirements of the Council and the Act to properly manage and protect those resources for the benefit of the residents of New Jersey. Tennessee has developed this CMP for implementation during construction and operation of the Project, identifying the specific resources and the measures designed to avoid, minimize, and mitigate adverse impacts to the Highlands resources. The majority of the associated impact from Project construction is temporary in duration, while permanent impacts associated with the Project have been minimized to the extent practicable and primarily involve the conversion of forested land cover type to a low-shrub/herbaceous cover type.

The purpose of the CMP is to set forth a plan of construction and restoration by which Tennessee would avoid, minimize and mitigate any impacts to Highlands Resources so that there will be no net loss of such resources. Initial meetings to discuss mitigation were held on July 13, August 5, and September 1, 2009. At these meetings, the focus of the CMP and final application was altered. Tennessee agreed to seek an exemption for that portion of the Project included in the Planning Area and also agreed to describe its FERC

[1] Effective October 1, 2011, Tennessee converted from being a corporation to a limited liability company. The company name is now Tennessee Gas Pipeline Company, L.L.C., a Delaware limited liability company.

and United States Department of Transportation ("USDOT") Repair and Maintenance Program in this CMP. In addition, the scope of the CMP was narrowed to focus on aspects jurisdictional only to the Highlands Council. Specifically, the Highlands Council staff agreed that the CMP did not have to address areas that are subject to other regulatory reviews since the Highlands Council would have input to these reviews and would be copied by Tennessee for all applications. Specifically, these areas are as follows:

1. Forest Management on State properties, Green Acres, and forested wetlands regulated by the "No Net Loss" statute, Green Acres as regulated by the Green Acres statute and regulations and forested wetlands regulated by NJDEP under the Freshwater Wetlands Protection Act and implementing regulations.
2. Open water crossings regulated by NJDEP under the Flood Hazard Area Control Act and implementing regulations.
3. Wetlands and wetlands transition areas regulated by NJDEP under the Freshwater Wetlands statute and regulations.
4. Critical habitat within wetlands, NJDEP-regulated transition areas under the Freshwater Wetlands Protection Act and implementing regulations, Green Acres under the Green Acres Act and regulations and water crossings under the Flood Hazard Area Control Act, Freshwater Wetlands Protection Act, and implementing regulations.
5. Historic, cultural, archaeological and scenic resources in such areas as freshwater wetlands and NJDEP wetlands transition areas regulated under the Freshwater Wetlands Protection Act and implementing regulations, water crossings regulated under the Flood Hazard Area Control Act, Freshwater Wetlands Protection Act, and implementing regulations, and Green Acres impacted properties regulated under the Green Acres Act and implementing regulations, etc. Notwithstanding the fact that some historic, cultural, archaeological and scenic resources may not be with the jurisdiction of NJDEP, the report submitted to the NJDEP Historic Preservation Office includes all such resources identified by the Council.

Therefore, this CMP addresses the following Highlands Council Policies:

1. Forest areas in non-DEP regulated wetlands, transition areas, or Green Acres areas.
2. Critical wildlife habitat in non-DEP regulated wetlands, DEP-regulated wetlands transition areas or Green Acres diversion areas.
3. Special environmental zones
4. Non-DEP regulated vernal pool buffer areas (1,000 feet from vernal pools)
5. Steep slopes.
6. Carbonate rock (KARST) topography
7. Water resources
8. Water utilities
9. Air quality
10. Lake management
11. Right-of-way vegetation management
12. Smart Growth

13. Land owner equity
14. Sustainable economic development

NJDEP was the issuing authority regarding the Preservation Area based on recommendation from the Highlands Council, while the Highlands Council took sole jurisdiction for issuance of the determination with respect to the Planning Area. Subsequent to issuance of a recommendation from the Highlands Council, NJDEP granted an exemption from the Highlands Act. Subsequent to the determination, Tennessee has made the following modifications to Loop 325 as a result of the NJDEP Land Use Regulation program review and/or constructability concerns identified by the contractor:

- Workspace modifications and a reduction in the overall length of the Loop 325 Segment;
- The removal of the horizontal directional drill (HDD) crossing of Monksville Reservoir and the combination of the remaining two HDD crossings into a single HDD, resulting in a reduction of the overall HDD workspace;
- The addition of 16 temporary access roads for use during construction; and
- A pipeline route modification to avoid two timber rattlesnake dens.

As shown in Table 1.1-4 below, the above listed modifications result in an overall 1.2 acre reduction in permanent impacts and a 3.02 acre increase in temporary impacts, which results in an overall increase of 1.82 acres of impacts within both the Highlands Planning Area and the Highlands Preservation Area. As shown in Table 1.1-5 below, modifications resulted in no change in permanent impacts and a 3.21 acre increase in temporary impacts, which results in an overall increase of 3.21 acres of impacts within the Highlands Planning Area. As shown in Table 1.1-6 below, modifications resulted in an overall 1.20 acre reduction in permanent impacts and a 0.19 acre reduction in temporary impacts, which results in an overall reduction of 1.39 acres of impacts within the Highlands Preservation Area. Modifications to Loop 325 are outlined in the sections below.

The requested exemption was granted by the Council for Project activities in the Planning Area and by NJDEP for Project activities in the Preservation Area. Tennessee has proceeded with obtaining the required environmental permits for the Project through agencies such as the NJDEP and USFWS. Tennessee will provide copies of application packages and reports, as applicable, to the Council for review and comment. This document also addresses monitoring of mitigation measures and reporting on inspections and monitoring to the Council.

Tennessee will provide a copy of this revised CMP to the FERC. The FERC reviewed Tennessee's application for a certificate of public convenience and necessity for the Project and the FERC issued the certificate pursuant to the applicable provisions of the Natural Gas Act and the FERC's regulations. Construction of the Project and the implementation of the CMP were contingent upon issuance by the FERC of the requested certificate of public convenience and necessity for the Project. Following FERC issuance of a certificate order authorizing the Project, Tennessee filed with the FERC an Implementation Plan for the Project, which included all applicable construction, restoration, and monitoring requirements, techniques, and standards, including the requirements of this CMP. Once the Implementation Plan for the Project was approved by the FERC, Tennessee was required to comply with all provisions of that Implementation Plan, as well as with all requirements and conditions of the certificate order. Compliance with the Implementation Plan was and still is monitored by environmental inspectors from the FERC, as well as Tennessee's environmental inspectors.

During the construction phase of the Project, Tennessee submitted weekly construction progress reports to the FERC, documenting status of construction, any problems experienced, and corrective actions taken. Tennessee has provided copies of these construction progress reports to the Council throughout the construction phase of the Project. Post-construction, Tennessee will be required to file periodic (monthly or quarterly, as required by the FERC) restoration reports with the FERC, and Tennessee will provide copies of those periodic reports to the Council as well. In addition, as discussed further in Section 2.2.2 below, Tennessee is willing to prepare and to provide to the Council an annual monitoring report, for three years following construction or until such time as wetland revegetation is successful, documenting the status of the open water buffer revegetation efforts in the Highlands region. In addition, as discussed in Section 2.24.2.6 below, Tennessee is willing to prepare and to provide to the Council an annual monitoring report, for three years following construction, documenting restoration of the Highlands resource areas in the Highlands region. In the event that the Council has any issues with any of Tennessee's construction, restoration, and monitoring activities in the Highlands area, the Council, in addition to discussing directly with Tennessee, may raise those issues directly with the FERC through the FERC's Enforcement Hotline, discussions with FERC Staff, or a formal complaint filed with the FERC.

1.1 Project Background

For over 50 years, Tennessee has owned and operated its existing 300 Line natural gas pipeline facilities for the interstate transmission of natural gas supplies throughout the northeast United States. The 300 Line facilities consist of a 24-inch diameter buried natural gas pipeline, loop pipeline segments of varying diameter, compressor stations, and other appurtenant aboveground facilities commencing in western Pennsylvania and continuing east through Pennsylvania, New Jersey, New York, and Connecticut before terminating in western Massachusetts. Tennessee's permanent easement or right-of-way ("ROW") width associated with the pipeline facilities varies in size, but Tennessee typically maintains a 50-foot wide corridor (10 feet wide in wetlands) in a low-shrub/herbaceous vegetative cover state to facilitate routine inspection and maintenance, security patrols, and emergency access.

Tennessee's 300 Line Project Loop 325 Segment consists of an approximately 15.98-mile long section of 30-inch diameter loop pipeline that has been sited within or adjacent to Tennessee's existing 300 Line ROW to the extent practicable. Loop 325 will be located at a typical 25-foot offset from the existing 300 Line pipeline within the existing ROW where feasible. Additional new permanent ROW will be required along with temporary workspace and additional temporary workspace to facilitate construction of the pipeline. The routing for Loop 325 was selected to avoid significant areas of residential development, minimize the number of affected landowners, and minimize environmental impacts.

Tennessee has modified portions of the workspace along Loop 325, the majority of which resulted in the removal of temporary workspace. Tennessee has also reduced the overall length of the Loop segment by 1.29 miles. The Loop 325 segment will now total 15.98 miles, of which 14.73 miles will be located within the Highlands Region, with approximately 5.07 miles located within the Highlands Planning Area and 9.66 miles located within the Highlands Preservation Area. The revised terminus of the Loop is located east of the Monksville Reservoir in West Milford Township (MP 15.98) in Passaic County, New Jersey. Table 1.1-1 below, summarizes the proposed pipeline and aboveground facilities. The hydraulics of the Project allowed for a reduction in Loop length and will result in a decrease in overall impacts to the Highlands Preservation Area (see Table 1.1-6 below).

TABLE 1.1-1
PROPOSED PIPELINE AND ABOVEGROUND FACILITIES FOR THE LOOP 325 SEGMENT

Designation	Facility Type	Previous Approximate Length (miles) / Area (acres)[a] (Revised Length)	Previous Milepost	Revised Milepost	Highlands Area	Town	County
300 Line	30-inch natural gas pipeline	1.25 miles	MP 0.0 to MP 1.25	MP 0.0 to MP 1.25	None	Wantage	Sussex
		5.07 miles	MP 1.25 – MP 6.32	MP 1.25 – MP 6.32	Planning	Vernon	Sussex
		3.66 miles	MP 6.32 – MP 9.98	MP 6.32 – MP 9.98	Preservation	Vernon	Passaic
		6.73 miles **(6.00 miles)**	MP 9.98 – MP 16.71	**MP 9.98 – MP 15.98**	Preservation	West Milford	Passaic
		0.56 miles **(0.00 miles)**	MP 16.71 – MP 17.27	**N/A**	Preservation	Ringwood	Passaic
MLV 326-2	Main line valve	0.02 acres	MP 4.2	MP 4.2	Planning	Vernon	Sussex
MLV327-2	Main line valve	0.02 acres	MP 11.4	MP 11.4	Preservation	West Milford	Passaic
MLV327-2A	Main line valve	0.02 acres	MP 14.7	MP 14.7	Preservation	West Milford	Passaic
Pig Receiver	Internal inspection piping	0.30 acres	MP 17.27	**MP 15.98**	Preservation	Ringwood	Passaic

1.1.1 Purpose and Need

Tennessee proposes to construct, install, modify and operate the Project facilities to increase pipeline capacity to provide additional firm natural gas transportation service into northeast markets, as well as to provide for general system modifications. The Project, as described further herein, includes the construction, installation, modification and operation of the following facilities in the states of New Jersey and Pennsylvania: (i) seven pipeline looping segments (consisting of approximately 15.98 miles in New Jersey and 111 miles in Pennsylvania), (ii) two new compressor stations in Pennsylvania, and (iii) modifications and/or horsepower expansions to seven existing compressor stations, one located in New Jersey and six located in Pennsylvania (Stations 313, 315, and 325 (additional horsepower to be installed); Stations 319 and 321 (compressor units to

be restaged); Station 317 (compressor unit to be replaced with an upgraded unit), and Station 323 (filter separator added)) (these new facilities are defined as the "Market Component" of the Project in the certificate application filed with the FERC).

In addition to the modifications and/or horsepower additions that are proposed for the seven existing compressor stations identified above, Tennessee is also proposing to replace compression facilities at four of these stations: Stations 313, 315, 321, and 325 (defined as the "Replacement Component" of the Project in the certificate application filed with the FERC). At these four stations, existing compressor facilities will be replaced with new, larger, more efficient compressor facilities, with certain older facilities retired. The replacements that Tennessee is proposing to include in the Project will increase system reliability by replacing older compressor facilities that often require more maintenance downtime with new compressor facilities that will require less maintenance downtime, which should make the new compressor facilities available to run for a higher percentage of time throughout a year. Additionally, the proposed pipeline looping will reduce the runtime of all the compressor equipment on days of low flow, thereby extending the life of the compressor facilities. Tennessee anticipates that the new, more efficient compressor units will be used typically on days of low flow, with older, less efficient facilities throttled back or shut down. This should reduce fuel consumption and the volume of gas transported for internal consumption will thereby be reduced, making the system more reliable for all of Tennessee's shippers. The proposed general system modifications, though, will not increase the firm transportation capacity available on Tennessee's 300 Line.

Upon completion, the Project will increase natural gas delivery capacity to the northeast region of the United States by approximately 350,000 dekatherms per day ("Dth/d") and, with the proposed replacements, also will improve system reliability. Tennessee has signed a binding precedent agreement with one shipper, EQT Energy LLC ("EQT"), for all of the additional firm transportation capacity resulting from the Project's Market facilities, which demonstrates that the additional firm transportation capacity will be immediately utilized. Currently, there is approximately seven billion cubic feet per day ("Bcf/d") of pipeline capacity on four interstate pipelines, including Tennessee, to transport gas through Pennsylvania from upstream out-of-state sources into New Jersey. However, all four pipelines, including Tennessee, are fully subscribed in this region during the peak heating season. Therefore, unless Tennessee proceeds with the construction of the Project, it will be unable to satisfy EQT's expressed need, as reflected in the executed precedent agreement, for additional capacity of 350,000 Dth/day on Tennessee's system. Additionally, in late 2009, the Rockies Express pipeline is scheduled to tie into the pipeline systems that serve the northeast, with the potential to add 1.8 Bcf/d of new gas supply from the Rocky Mountain producing areas to compete for capacity on the constrained pipelines in the northeast region. Increased regional demand in the northeast, along with the inherent geological conditions in New England, New Jersey and the eastern portions of New York and Pennsylvania which prevent underground storage of natural gas volumes in those areas, will further exacerbate the already constrained pipeline capacity situation in the northeast. Even when underground storage in northwestern Pennsylvania and New York is used to meet peak day requirements for the northeast region, pipeline capacity must still be used to reach market areas.

Construction of the Project, therefore, will help alleviate this situation by increasing pipeline capacity to the high-demand markets in the northeast, and will also assist with the FERC's goal of providing more natural gas to markets by providing access to diversified natural gas supplies from the Gulf Coast, Appalachian, Rockies, and Marcellus Shale supply areas[2] with deliveries to points located across Tennessee's mainline system, to

[2] As discussed in the certificate application, the initial capacity of the Project that was offered was 300,000 Dth/day, and that capacity was awarded to EQT following the conclusion of an open season. Following the close of the open season, Tennessee continued to refine its planning and engineering analysis for the Project. Based on this additional review of its system and the Project, Tennessee concluded that the Project would create an additional 50,000 Dth/d of capacity, for a

various interconnections with other pipelines in northern New Jersey, and White Plains, New York. The White Plains delivery point is an existing interconnect with Consolidated Edison and is one of the delivery points that is reflected in the executed binding precedent agreement supporting this Project. The Project, as designed, will provide the capacity needed to deliver 50,000 Dth/d to the White Plains delivery point, with no modification or new facilities required at that delivery point.

1.1.2 Avoidance and Minimization of Impacts

Tennessee has designed and engineered the Project to minimize impacts to the maximum extent practicable. Tennessee is only proposing those facilities and upgrades that are necessary to meet the requirements of its customer and satisfy the Project's purpose and need, as discussed above. Subsequently, the pipe diameter and length have been engineered to transmit the specific volume of gas required for the Project. As such, Loop 325 is designed as a concise and integral component of the complete Project. Tennessee has incorporated additional measures relative to Project design, construction, and operation that further minimize impacts associated with the Project. Additional impact avoidance and minimization measures are detailed within the various components of the CMP and may include pre-construction planning, specialized construction techniques, and restoration measures.

1.1.2.1 Avoidance Evaluation

As detailed within Resource Report 10 of Tennessee's Environmental Report submitted as part of the certificate application, alternatives to the proposed Loop 325 route through the Highlands were evaluated in response to requests raised by the Council in an early outreach meeting. The analysis centered on the following criteria:

- avoidance of the Highlands Region including both the Planning and Preservation Areas,
- significant environmental advantage over the original proposal,
- ability to meet project objectives, and
- technical and economic feasibility and practicality.

The comparison included evaluation of facility length, environmental disturbance associated with temporary workspace ("TWS") and additional temporary workspace ("ATWS"), number of waterbody crossings, improved and unimproved road crossings, residential impacts, forested and wetland area impacts, reclamation potential, and high consequence areas.

The following summary compares the preferred and alternative routes:

Route length

The majority of the preferred route through the Highlands Region is co-located within or adjacent to Tennessee's existing 300 Line pipeline ROW. The alternative which avoids the Highlands in its entirety is approximately 46.01 miles in length with the majority of the alignment extending into and through New York. It will be necessary in all circumstances to reconnect with Tennessee's existing 300 Line pipeline to meet the hydraulic requirements of the Project. This alternative re-route would depart from Tennessee's existing Station

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total Project capacity of 350,000 Dth/d. The initial 300,000 Dth/d of capacity will be available for firm transportation along Tennessee's entire 300 Line for deliveries to three selected delivery points, with the additional 50,000 Dth/d available on the 300 Line from Tennessee's Compressor Station 319 in Pennsylvania (Marcellus Shale area) to the Mahwah, New Jersey delivery point. A revised open season was conducted in June/July 2009, and EQT was awarded the full 350,000 Dth/d of Project capacity following that revised open season.

325 outside the Highlands area and proceed in a northerly direction through New Jersey and into New York for a distance where it would then roughly parallel the state boundary before turning in a southerly direction within wholly new ROW to rejoin the existing Tennessee pipeline system outside of the Highlands Planning Area to the east of Mahwah, New Jersey. This alternative re-route would require significant additional financial resources due to the additional materials, construction and land acquisition costs, and would also possible delay the timing of the Project for outreach efforts with landowners and agencies in New York. The alternative route would be over three times the length of the proposed loop which, in itself, eliminates the alternative from further consideration based on cost and significantly greater environmental impact.

Land Disturbance

The existing route affects a total of approximately 230 acres in the Highlands Region, including TWS and permanent operational ROW. While the proposed alternative would not impact land within the Highlands Region, it would result in the temporary impact of over 500 acres based on an assumed construction workspace of 100 feet in uplands and 75 feet in wetlands with no ATWS. The alternative route would also impact approximately 3.59 miles of wetlands and approximately 21.79 miles of forested lands while crossing 44 waterbodies.

Residential Impact

The existing route has a potential impact on approximately three miles of residential property while the alternative route would have a potential impact on over five miles of existing residential areas. While the exact locations of residences within 50 feet of the alternative route cannot be estimated without significant engineering and field surveys, the overall total will significantly exceed the number of residences within 50 feet of the preferred route based on the highly developed nature of the areas the alternative route traverses. Considering that the alternative route is not a loop and there is no existing ROW associated with it, the potential impacts associated with residential areas would be considerably greater due to the inability to use existing ROW for any portion of the workspace. The alternative route would also result in significantly greater cost to the Project from a land acquisition perspective based on the number of new affected landowners and lack of an existing ROW.

Conclusion

In summary, to re-route the 325 loop to entirely avoid the Highlands Region is not feasible. The alternative route increases impacts to all categories evaluated within the Environmental Report from land use to wetlands to rare species and cultural resources. The alternative route is over three times as long as the proposed loop and is not able to co-locate with Tennessee's existing ROW to minimize environmental effects. The residential impacts associated with the alternative are also several times greater in terms of new affected landowners, residential construction and total number of properties affected. In addition to these factors, the cost of constructing a loop that is over 30 miles greater in length and the delays in schedule compounded with the participation of local, state and federal agencies in New York eliminates this alternative from further consideration by Tennessee. The current proposed route of Loop 325 minimizes the overall environmental impacts associated with the Project while maintaining the economic viability and meeting the in-service date required by the customer.

1.1.2.2 Co-Location within Existing Utilities Rights-of-Way

Loop 325 will generally parallel the existing Tennessee pipeline corridor and will be located to the extent practicable within or parallel to the existing, maintained ROW. By siting the Project in this manner, Tennessee has minimized the amount of new disturbance associated with the installation of the pipeline. This includes limiting the amount of temporary disturbance to land required for Temporary Work Space ("TWS") and Additional Temporary Work Space ("ATWS"). Additionally, co-location of the Loop 325 facilities within Tennessee's existing permanent easement limits long-term impacts associated with pipeline operations and

ROW maintenance (e.g., vegetation management). In those areas where the proposed loop has been sited outside of the existing permanent easement for the 300 Line, the route deviation was incorporated to avoid a specific environmental resource or other site-specific condition, which also limits or minimizes impacts to environmental or other resources located along the Project alignment.

1.1.2.3 Horizontal Directional Drill Modifications

Tennessee proposes to employ horizontal directional drill ("HDD") technology in select areas during construction of the Project to avoid sensitive resource areas and areas that present difficulties for conventional construction methodologies. Perhaps the greatest advantage of the HDD crossing technique is the fact that open cut trenching and other equipment disturbance within sensitive resource areas is not necessary, and, as a result, environmental impact to sensitive resource areas is minimized.

Initially, the HDD was designed in two phases: MP 5.41 – 5.83 to avoid Lake Conway and a residential community to the east; and MP 5.83 – 6.50 to avoid a large wetland complex to the west. Due to timing constraints associated with the NJDEP No Net Loss regulations the crossings were redesigned in order to maintain the Project schedule. The two crossings have been combined into a single HDD crossing (MP 5.41 – 6.50), which will result in an overall reduction of HDD workspace.

The original HDD design called for three separate staging areas: a 90,000 square foot (sf) exit point staging area at MP 5.41; a 178,500 sf staging area at MP 5.83 that would serve the enter points for both crossings; and a 98,000 sf exit point staging area at MP 6.50. As part of the new single crossing design: the staging area at MP 5.41 will remain intact; the staging area at MP 6.50 will remain intact but will serve as an enter point, instead of an exit point; and the 178,500 sf staging area at MP 5.83 will be removed altogether. The original HDD design layout will remain as a contingency in the event of a single HDD technical failure; though as construction is ongoing, Tennessee does not expect the need to opt back to the original HDD design. Table 1.1-2 below summarizes the updated HDD crossings within the Highlands Region.

Tennessee has developed a HDD Contingency Plan for the Project that establishes procedures for addressing potential impacts associated with a release of drilling fluid through hydraulically induced fractures during the HDD process. In addition, this document establishes the criteria by which Tennessee and the appropriate regulatory agencies would determine when a proposed HDD is unsuccessful and must be abandoned in favor of the approved alternate crossing method. The HDD Contingency Plan and site-specific engineering plans for the Project will be submitted for review and approval by the appropriate regulatory agencies with the appropriate permit applications.

TABLE 1.1-2
PROPOSED HDD CROSSINGS FOR LOOP 325 WITHIN THE HIGHLANDS REGION

Township	County	Milepost	Approximate Length (feet)	Highlands Jurisdictional Area	Comment
Vernon	Sussex / NJ	5.41 – 6.50	5,735	Planning & Preservation	Wetlands, Roads, Lake & Subdivision

1.1.2.4 Access Roads

Temporary access roads are required for construction so the contractor may move personnel, equipment, and material to the pipeline ROW. Tennessee is proposing to use existing public roadways and existing private access roads. A total of six private access roads were identified in the September 9, 2009 Highlands Exemption request. Tennessee performed a constructability analysis and, based on constraints associated with wetlands, rare species habitat and topography, an additional sixteen private access roads were added and one original (AR-4 in the Highlands Preservation Area) removed. A total of twenty-one (21) private access roads are identified for use during construction of the 325 Loop segment that are within the Highlands Region (see Table 1.1-3). The majority of the private access roads will require minimal modification. All other roadways used for access during construction are public roadways and do not require modification or improvement for use.

This CMP also applies to Project-related impacts related to the improvement of the six existing access roads including the Forest Management Plan for impacts to trees greater than six-inch diameter outside of standard trimming. Restoration and mitigation activities associated with the access roads shall be documented within the reports provided to the Council by Tennessee during construction and also during post-construction monitoring. All restoration activities associated with private access roads are contingent upon landowner approval.

Table 1.1-3
Summary of Privately Owned Access Roads within the Highlands Region Proposed for Use During Construction of Loop 325

Access Road Number	Existing Use / Condition	Milepost at Entry of ROW	Planning / Preservation Area	Municipality/County
1A	Dirt Road	3.47	Planning	Vernon / Sussex
1B	Dirt Road	4.88		
2[a]	Dirt Road	4.93		
2A[a]	Dirt Road	5.16		
2A-1	Dirt Road	5.15		
2B	Dirt Road	5.27		
2B-1	Dirt Road	5.17		
2B-2	Dirt Road	5.16		
2C	Dirt Road	5.74		
3[a]	Residential Paved Driveway	5.77		
3A[a]	Dirt Road	5.89		
3B	Dirt Road	7.66	Preservation	West Milford / Passaic County
3C	Dirt Road	7.74		
4A	Dirt Road	7.83		
4B	Dirt Road	7.86		
4C	Dirt Road	8.79		
4E	Dirt Road	10.88		
4F	Dirt Road	11.11		
5[a]	Paved / Gravel Road	14.83		
6	Dirt Road	15.64		
6A	Dirt Road	15.67		

a: Access Roads that were previously approved (previously approved AR-4 has been removed from the Project).

1.1.2.5 Route Realignment- Timber Rattlesnake Habitat

Two Timber Rattlesnake (*Crotalus horridus horridus)* dens were identified on Loop 325 within Wawayanda State Park during field surveys conducted in Spring 2010. The dens are located immediately north of the

initially proposed pipeline alignment and within the originally approved construction workspace. Based on consultation with the NJDEP Natural Heritage Program staff, Tennessee realigned a 0.32-mile section of Loop 325 from the north of the existing 24-inch 300 Line pipeline to the south. Commencing approximately 600 feet to the west of the dens at MP 12.08, Loop 325 will cross over to the south of the existing 24-inch 300 Line pipeline and cross back over to the north, approximately 600 feet to the east of the dens at MP 12.40. The associated construction workspace was relocated to the south of the new alignment, which will allow for the protection of the dens during construction. Tennessee will adhere to the special conditions within the NJDEP Freshwater wetlands and Flood Hazard Area Individual Permit special conditions associated pertaining to timber rattlesnakes.

1.1.3 Summary of Project Impacts to Highlands Resources

A summary of the estimated land requirements and other aboveground facilities associated with the Project's 325 Loop Segment within the Highlands Region is detailed in Table 1.1-4 below. The above noted workspace modifications, the net reduction of loop length, removal of the HDD staging area at MP 5.83, the rattlesnake loop realignment, the addition of 16 access roads and the removal of one access road resulted in a 1.20 acre decrease in permanent impacts and a 3.02 increase in temporary impacts within the Highlands Region. The Project's 325 Loop Segment will now result in approximately 232.24 acres of total impacts within the Highlands Region; 37.73 acres of permanent impacts associated with operation and 194.51 acres of temporary impacts associated with construction. A summary of estimated impacts to regulated areas within the Highlands Region is detailed in Table 1.1-7.

Table 1.1-4
Summary of Estimated Land Requirements for the Proposed 325 Loop Segment and other Aboveground Facilities within the Highlands Region

Facility	Highlands Jurisdictional Area	Land Affected During Construction[a] (acres)			Land Utilized During Operation[b] (acres)		
		Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate
Pipeline	Planning Area	55.32	-5.26	50.06	7.76	0	7.76
	Preservation Area	111.52	-7.40	104.12	31.17	-1.20	29.97
Subtotal		**166.84**	**-12.66**	**154.18**	**38.93**	**-1.20**	**37.73**
Aboveground Facilities	Planning Area	0.1	0	0.1	0.02	0	0.02
	Preservation Area	0.8	0	0.8	0.34	0	0.34
Subtotal		**0.9**	**0**	**0.9**	**0.36**	**0**	**0.36**
Access Roads[c]	Planning Area	7.81	7.25	15.06	0	0	0
	Preservation Area	1.17	7.21	8.38	0	0	0
Subtotal		**8.98**	**15.68**	**24.66**	**0**	**0**	**0**
Staging Areas/ Pipe Yards	Planning Area	0	0	0	0	0	0
	Preservation Area	15.67	0	15.67	0	0	0
Subtotal		**15.67**	**0**	**15.67**	**0**	**0**	**0**
Total[c]		**191.49**	**3.02**	**194.51**	**38.93**	**-1.20**	**37.73**

a: Land Affected During Construction is based on the extent of temporary work space and additional temporary work space.
b: Land Affected During Operation is based on the extent of the land that will be maintained during operation of the facilities.
c: Aboveground facilities are located within the designated workspace areas associated with the pipeline. Therefore, the total impact calculations are based on those associated with the pipeline, access road and staging area / pipeyard categories.

Table 1.1-5
Revised Estimated Impacts To Regulated Areas Within The Highlands Planning Area
For Loop 325

Highlands Resource Area	Linear Distance Crossed (miles)[a]			Area Impacts (acres)[a]								
				Permanent			Temporary			Total		
	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate
Total Dimensions	**4.16**	**0.00**	**4.16**	**7.76**	**0.00**	**7.76**	**63.13**	**3.21**	**66.34**	**70.89**	**3.21**	**74.10**
Prime Groundwater Recharge Area	2.01	0.00	2.01	2.62	0.00	2.62	27.44	1.97	29.41	30.06	1.97	32.03
Source Water Protection Area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85	1.85	0.00	1.85	1.85
Surface Water Reservoirs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Water Protection Area	0.70	0.00	0.70	0.83	0.00	0.83	9.74	0.76	10.50	10.57	0.76	11.33
Critical Habitat Resource Area	2.29	0.00	2.29	4.46	0.00	4.46	29.02	2.94	31.96	33.48	2.94	36.42
Forest Resource Protection Area	3.76	0.00	3.76	6.61	0.00	6.61	49.34	3.85	53.19	55.95	3.85	59.80
Steep Slopes	0.02	0.00	0.02	0.10	0.00	0.10	2.78	-0.21	2.57	2.88	-0.21	2.67
Agricultural Resource Area	0.64	0.00	0.64	0.80	0.00	0.80	6.30	0.00	6.30	7.10	0.00	7.10
Conservation Priority Area	1.12	0.00	1.12	2.51	0.00	2.51	18.25	2.01	20.26	20.76	2.01	22.77
Riparian Area	1.30	0.00	1.30	2.22	0.00	2.22	14.29	-2.35	11.94	16.51	-2.35	14.16
Lake Management Area	0.18	0.00	0.18	0.46	0.00	0.46	1.69	-2.55	-0.86	2.15	-2.55	-0.40
Special Environmental Zones	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

a – Area / distance is estimated based on GIS datalayers and excludes HDD areas identified in table 1.1-2.

Table 1.1-6
Revised Estimated Impacts to Regulated Areas Within the Highlands Preservation Area
For Loop 325

Highlands Resource Area	Linear Distance Crossed (miles)[a]			Area Impacts (acres)[a]								
				Permanent			Temporary			Total		
	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate
Total Dimensions	**9.86**	**-0.38**	**9.48**	**31.17**	**-1.20**	**29.97**	**128.36**	**-0.19**	**128.17**	**159.53**	**-1.39**	**158.14**
Prime Groundwater Recharge Area	1.83	-0.05	1.78	5.08	-0.17	4.91	24.34	3.52	27.86	29.41	3.35	32.77
Source Water Protection Area	6.03	-0.07	5.96	19.72	-1.20	18.52	67.59	-5.95	61.64	87.31	-7.15	80.16
Surface Water Reservoirs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Water Protection Area	5.86	0.00	5.86	19.41	-0.98	18.43	57.41	-1.60	55.81	76.82	-2.58	74.24
Critical Habitat Resource Area	9.34	-0.06	9.28	28.32	-0.84	27.48	104.46	0.70	105.16	132.78	-0.14	132.64
Forest Resource Protection Area	9.86	-0.12	9.74	31.18	-1.20	29.98	111.52	-0.19	111.33	142.69	-1.39	141.31
Steep Slopes	0.05	-0.01	0.04	0.52	-0.14	0.38	3.47	-0.52	2.95	3.99	-0.66	3.33
Agricultural Resource Area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conservation Priority Area	5.37	-0.18	5.19	20.34	-0.96	19.38	76.27	0.23	76.50	96.61	-0.73	95.88
Riparian Area	4.22	-0.08	4.14	14.62	-0.87	13.75	36.89	-2.17	34.72	51.51	-3.04	48.47
Lake Management Area	0.99	-0.05	0.94	2.96	-0.02	2.94	14.60	0.45	15.05	17.56	0.43	17.99
Special Environmental Zones	0.63	0.00	0.63	1.94	0.00	1.94	6.87	-0.30	6.57	8.81	-0.30	8.51

a – Area / distance is estimated based on GIS datalayers and excludes HDD areas identified in table 1.1-2.

Table 1.1-7
Revised Estimated Impacts to Resource Areas Within the Highlands Planning and Preservation Areas
For Loop 325

Highlands Resource Area	Linear Distance Crossed (miles)[a]			Area Impacts (acres)[a]								
				Permanent			Temporary			Total		
	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate	Previous Estimate	Change	Revised Estimate
Total Dimensions	**14.02**	**-0.38**	**13.64**	**38.93**	**-1.20**	**37.73**	**191.49**	**3.02**	**194.51**	**230.42**	**1.82**	**232.24**
Prime Groundwater Recharge Area	3.84	-0.05	3.79	7.70	-0.17	7.53	51.78	5.49	57.27	59.47	5.32	64.79
Source Water Protection Area	6.03	-0.07	5.96	19.72	-1.20	18.52	67.59	-4.10	63.49	87.31	-5.30	82.01
Surface Water Reservoirs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Water Protection Area	6.56	0.00	6.56	20.51	-0.98	19.53	67.15	-0.84	66.31	87.39	-1.82	85.57
Critical Habitat Resource Area	11.63	-0.06	11.57	32.78	-0.84	31.94	133.48	3.64	137.12	166.26	2.80	169.06
Forest Resource Protection Area	13.62	-0.12	13.50	37.79	-1.20	36.59	160.86	3.66	164.52	198.64	2.46	201.10
Steep Slopes	0.07	-0.01	0.06	0.62	-0.14	0.48	6.25	-0.73	5.52	6.87	-0.87	6.00
Agricultural Resource Area	0.64	0.00	0.64	0.80	0.00	0.80	6.30	0.00	6.30	7.10	0.00	7.10
Conservation Priority Area	6.49	-0.18	6.31	22.85	-0.96	21.89	94.52	2.24	96.76	117.37	1.28	118.65
Riparian Area	5.52	-0.08	5.44	16.84	-0.87	15.97	51.18	-4.52	46.66	68.02	-5.39	62.63
Lake Management Area	1.17	-0.05	1.12	3.42	-0.02	3.40	16.29	-2.10	14.19	19.71	-2.12	17.59
Special Environmental Zones	0.63	0.00	0.63	1.94	0.00	1.94	6.87	-0.30	6.57	8.81	-0.30	8.51

a – Area / distance is estimated based on GIS datalayers and excludes HDD areas identified in table 1.1-2.

1.1.3.1 Planning Area

The above noted workspace modifications, removal of the HDD staging area at MP 5.83 and the addition of 7 access roads resulted in an overall increase of 3.21 acres of temporary impacts and no change to permanent impacts within the Highlands Planning Area. The Project's 325 Loop Segment will result in approximately 74.10 acres of total impacts within the Highlands Planning Area; 66.34 acres of temporary impacts associated with construction and 7.76 acres of permanent impacts associated with operation. Permanently impacted land will be maintained in a low-shrub/herbaceous vegetated cover type to facilitate pipeline operation and maintenance activities. A summary of estimated impacts to regulated areas within the Highlands Planning Area is detailed in Table 1.1-5.

1.1.3.2 Preservation Area

The above noted workspace modifications, the 1.29 mile reduction of loop length, the rattlesnake loop realignment, the addition of 9 access roads and the removal of one access road resulted in a decrease in permanent and temporary impacts within the Highlands Preservation Area, 1.20 acres and 0.19 acres, respectively. The Project's 325 Loop Segment will result in approximately 158.14 acres of total impacts within the Highlands Preservation Area; 128.17 acres of temporary impacts associated with construction and 29.97 acres of permanent impacts associated with operation. Permanently impacted land will be maintained in a low-shrub/herbaceous vegetated cover type to facilitate pipeline operation and maintenance activities. A summary of estimated impacts to regulated areas within the Highlands Preservation Area is detailed in Table 1.1-6.

1.1.3.3 Prime Groundwater Recharge Area

The Council has determined Draft Prime Ground Water Recharge areas based upon a method developed by the New Jersey Geological Survey to map ground water recharge areas that most efficiently provide 40 percent or more of the total recharge volume for each United States Geological Survey ("USGS") 14 digit Hydrologic Unit Code (HUC 14) subwatershed. The method used to delineate Prime Groundwater Recharge Areas uses precipitation, surface runoff, evapotranspiration, and soil moisture deficit information to estimate recharge rates. It is highly dependent on available information regarding soils, precipitation patterns and land cover to differentiate and rank the recharge capacity of various land areas within a geographic area. Given that aquifers and streams are most stressed during drought periods, and that the Council's method for defining available water supplies is based upon data for low flows, the CMP uses drought rainfall estimates as the basis for mapping prime recharge areas (NJHC 2009).

1.1.3.4 Source Water Protection Area

The Highlands Region's surface and groundwater resources provide a significant source of the State of New Jersey's potable water supply. The largest surface water supply systems of the Highlands provide water to urban and suburban parts of northern and central New Jersey. There are a few surface water supply systems for potable water supply that provide water primarily to municipalities of the Highlands Region.

The resource assessment required by the Act includes the identification of Source Water Protection Areas ("SWPA") when determining availability of water resources to support the land use capacity of the Highlands Region. The objective is to determine the areas supplying potable water through surface water supply reservoirs and intakes, and to protect the quantity of supply (Safe Yields) to these water supply systems. Source water areas include the entire drainage area that flows to or past an intake point. This delineation includes all surface waters within HUC 14 subwatersheds that contribute to a water supply reservoir or intake, as well as all overland water flow to any stream that is upstream of the intake as it is applied to the NJ Highlands Council Regional Master Plan (NJHC 2009). The New Jersey Highlands Source Water Protection Area can be defined as those subwatersheds (HUC14) that serve as contributing drainage areas upstream of potable water surface water intakes or reservoirs. This includes all tributaries and their headwaters.

1.1.3.5 Surface Water Reservoirs

Surface water reservoirs include those major surface water reservoir systems that provide water to urban and suburban areas of northern and central New Jersey and smaller reservoirs providing water supply on a local scale. The reservoirs store water during times when stream flows are higher, and then release water from storage both to serve customers and to maintain mandatory "passing flows" to downstream areas during dry periods. Highlands reservoirs provide over 600 million gallons per day ("MGD") to public water supply service areas in these regions, with individual reservoir system supplies ranging from less than one to roughly 175 MGD. A major purpose for protection of the Highlands is the Region's role in providing the vast majority of potable surface water supplies used in northern and central New Jersey, where the majority of the State's population resides. These reservoirs rely either directly or indirectly on water flowing in Highlands streams (NJHC 2009).

Loop 325 crosses the Monksville Reservoir from MP 15.99 to 16.90. Tennessee's existing 300 Line pre-dates the reservoir, which was constructed in 1985 as part of the North Jersey District Water Supply Commission. The Project does not involve any temporary or permanent impacts to the reservoir, as Tennessee has incorporated a HDD crossing of the surface water resource.

1.1.3.6 Open Water Protection Area

Highlands Open Waters include all springs, wetlands, intermittent or ephemeral streams, perennial streams, and bodies of surface water, whether natural or artificial, located wholly or partially within the boundaries of the Highlands Region. The Highlands Region contains an extensive network of surface waters and associated riparian lands. The total stream length mapped in the Highlands is 3,605 miles and the extent of mapped streams and lakes acreage is 32,213 acres. The total for mapped wetlands in the Highlands Region is 90,091 acres (NJHC 2009).

These open waters and the associated Riparian Areas provide protection against floods and help to ameliorate the effects of prolonged droughts. These areas provide important habitat for numerous plant and animal species, including many rare, threatened, or endangered species in the State. Additionally, these areas provide a wealth of agricultural, recreational, and aesthetic uses for both residents and visitors alike, helping to contribute to a vibrant regional economy.

The vegetated corridors adjacent to lakes, streams, rivers, and wetlands are effective and important tools to protect water quality and stream health both in rural and urban environments. The Highlands Regional Master Plan includes a Highlands Open Waters Protection Area necessary to maintain the quality and ecological integrity of open waters and includes a 300-foot protection area buffer around all streams and wetlands. By filtering sediments and transforming nutrients so they are less damaging to the water bodies, buffers safeguard Highlands Open Waters from the impacts of adjacent land use practices.

1.1.3.7 Critical Habitat Resource Area

The Council delineated the Critical Habitat area by incorporating NJDEP-certified vernal pools including a 1,000-foot habitat buffer, Significant Natural Areas that includes regionally significant ecological communities and habitat for documented threatened and endangered plant species, and Critical Wildlife Habitat as mapped by the NJDEP's Endangered and Nongame Species Program Landscape Project Version 3 to identify areas of habitat for rare, threatened, and endangered species habitat. The updated Landscape Project (Version 3) was developed for the Highlands Region to identify habitat ranked by documented occurrences of rare, threatened, or endangered species. This area includes lands given Landscape Rank 2 through 5 in the Preservation Area, which accounts for habitat supporting a federally listed threatened or endangered species (Landscape Rank 5), species designated as State Endangered (Landscape Rank 4), species designated as State Threatened (Landscape Rank 3), and species designated as Special Concern (Landscape Rank 2). (NJHC 2009)

1.1.3.8 Forest Resource Protection Area

The Council assessed the ecological integrity of forests through the examination of landscape level characteristics at the forest patch and subwatershed level, utilizing measures of forest fragmentation to identify where regionally significant forests are located in the Highlands Region. These are the forests that are most suited to support ecological processes. The Forest Resource Area includes high ecological value forest areas, including those forested areas that exhibit the least fragmentation and are vital for the maintenance of ecological processes. The Council spatially delineated the Forest Resource Area by including those forested areas that express one or more of the following indicators: a contiguous forest patch of equal to or greater than 500 acres in size; an area consisting of >250 acres of core forest area greater than 300 feet from an altered edge, or areas that include >45% of mean total forest cover; and mean distance to nearest patch (HUC14 only). The result of this assessment is the spatial delineation of the Forest Resource Area within the Highlands Region (NJHC 2009).

1.1.3.9 Steep Slopes

Due to the unique geologic conditions present in the Highlands Region, the area contains extreme topographic relief. Subsequently, the presence of steep slopes as defined by the Council, provide a unique and significant environmental resource within the Highlands. Land disturbance of steep slopes can result in erosion and sedimentation, disturbance or loss of wildlife habitat, impacts to surface water quality, sedimentation of wetlands, and alteration of drainage patterns. To protect areas of steep slopes within the Highlands, the Council has mapped areas that encompassed a minimum of 5,000 square feet and that exhibited one of the following grade classifications:

- Grades of slopes of 20 percent or greater;
- Grades of slope between 15 percent and 20 percent; and
- Grades of slope between 10 percent and 15 percent that occur within the Riparian Area. (NJHC 2009)

The Act specifies that linear development as defined at N.J.A.C. 7:38-1.4 shall be permitted on a slope with a grade of 20 percent or greater provided that there is no feasible alternative for the linear development outside the steep slope (N.J.A.C 7:38-3.8(c)).

1.1.3.10 Agricultural Resource Area

Agriculture has historically been and continues to be a vital component of the culture and the landscape of the Highlands Region. Agriculture plays a significant role in the economy of the Highlands through agricultural production and maintaining the rural character of Highland's communities. The protection of these agricultural resources through implementation of the Highlands Regional Master Plan is in response to the loss of farmland over recent decades.

The Agricultural Resource Area was developed to delineate an integrated coverage of regional agricultural lands within the Highlands Region. The Council utilized the following factors to assess the Region's farmland and identify the Region's most important agricultural resources:

1) Contiguous farming landscapes (Agricultural Parcels comprised of 10 percent or greater Agricultural Land-Use codes from the 2002 NJDEP Land-Use/Land-Cover dataset AND that form a contiguous farming area of at least 250 acres.
2) Farms that include important farmland soils (prime farmland, farmland soils of statewide, local and unique importance from NRCS SSURGO dataset).

3) Concentrations of existing preserved farmland (SADC Preserved farmlands). (NJHC 2009)

1.1.3.11 Conservation Priority Area

The Conservation Priority Area was determined by the Council to identify those lands in the Highlands with the highest ecological values to establish priority areas for land conservation. The Council evaluated the ecological values of land based upon a combination of 33 ecological indicators which measure the quantity and quality of the following regional resource values: forests, watershed condition, critical habitat, prime ground water recharge areas, open waters and riparian areas, and steep slopes (NJHC 2009).

1.1.3.12 Riparian Area

As primary mechanism of protecting, enhancing and restoring water resources, the Council has incorporated protection of lands adjacent to the Highlands Open Waters known as Riparian Areas. Riparian areas are hydrologically connected to surface waters through overland surface runoff, hydric soils, wetlands, or subsurface flow, and serve as an interface between surface water bodies (e.g., streams, rivers, lakes, or reservoirs) and terrestrial ecosystems.

The Riparian Area was defined and mapped using hydrologic properties of land cover, soil, and evidence of periodic inundation or saturation. The integration of flood prone areas, riparian soils, Highlands Open Waters, and wildlife corridors was used to generate a single riparian GIS coverage and ultimately to create a combined riparian area map. Each is described in more detail below.

1) Flood Prone Areas: defined as NJDEP documented and undocumented flood prone areas and Federal Emergency Management Agency (FEMA) 100-year floodplain.
2) Riparian Soils: defined as a hydric soil, a soil exhibiting a shallow depth to seasonal high water table, or alluvial soil.
3) Highlands Open Waters: defined as all mapped rivers, lakes, streams and wetlands that are adjacent to and hydraulically interconnected with a river or stream as identified in the Highlands Open Water Inventory.
4) Wildlife Corridors: defined as a 300-foot corridor on each mapped stream bank or from the stream centerline if no stream bank is mapped.

The Council-mapped Riparian Area is over two-fifths of the Highlands Region, emphasizing the importance of water related resources to the area (NJHC 2009).

1.1.3.13 Lake Management Area

The Council has established Lake Management Areas to protect the Highlands Region's significant surface water resources and their environs from the adverse effects of overbuilding and other poor management of shoreland areas resulting in the degradation of water quality, harm to the lake ecosystem, decrease of natural aesthetic values, and overall loss of property values for lake communities. Additionally, lakes can be harmed by pollutant sources within their contributory watershed. Studies of public lakes in the Highlands Region indicate that most are experiencing contamination, most often including excessive bacteria and nutrients resulting from outdated septic system designs (or even cesspools) on inadequately sized lots. Furthermore, many lake communities have been experiencing intensifying land uses as the original buildings are torn down and replaced by larger structures.

Lake Management Areas have been defined that include four tiers: A Shoreland Protection Tier consisting of an area measured 300 feet or the first public road perpendicular to the shoreline of the lake; A Water Quality

Management Tier consisting of an area measured 1,000 feet perpendicular from the shoreline of the lake, including the Shoreland Protection Tier; A Scenic Resources Tier consisting of an area measured 300 to 1,000 feet perpendicular from the shoreline of the lake, scaled based upon the view distance from the opposite shoreline, and determined through the size and layout of the lake, and topography of the land area, with wider portions of lakes and greater topographic relief having longer view distances; and A Lake Watershed Tier consisting of the entire land area draining to the lake (NJHC 2009).

1.1.3.14 Special Environmental Zones

The Highlands Council has designated these areas for protection from development to protect water resources and environmentally sensitive lands based upon Regional Master Plan ("RMP") Conservation Priority Area rank, and the potential to a) protect water supply reservoirs and other critical water features, b) create large contiguous areas of environmentally sensitive lands, c) create habitat corridors, and d) connect existing preserved open space. Additionally, the Highlands Council states that existing land use patterns shall be considered to minimize conflicts between the designation of a Special Environmental Zone and ongoing land uses (NJHC 2009).

Within the Preservation Area, Loop 325 will cross Council-mapped Special Environmental Zones for approximately 0.63 miles and will temporarily impact 6.87 acres and permanently impact 1.94 acres. There are no Special Environmental Zones located within the Planning Area.

2.0 Comprehensive Mitigation Plan Components

Executive Summary

The CMP has been developed to ensure that the Project provides for "no net loss" of the functions and values associated with the various Highlands Resource Areas. Where impacts from installation of the pipeline or management of the post-construction ROW cannot be avoided, Tennessee has incorporated mitigation measures into the Project that provide in-kind resource and / or function and value compensation to a similar or greater level. These measures are detailed in the various components of the CMP and may include specialized construction techniques, acquisition of land within similar resource areas, and post-construction restoration and monitoring of the ROW.

Key highlights of the CMP include

- Specialized construction techniques to minimize resource area impacts (previously submitted as part of Tennessee's 300 Line Project Environmental Construction Plan, submitted with the certificate application for the Project and previously submitted to the Council; for ease of reference, a copy of the ECP is included with this CMP).
- Full-time environmental inspection staff to oversee construction and ensure permit compliance
- Post-construction restoration measures that promote wildlife habitat and re-establishment of forest
- Long-term monitoring of restored ROW and detailed reporting specific to Highlands Resource Areas
- Acquisition and permanent protection of land within areas designated as Conservation Priority Areas and Special Environmental Zones

As background, Tennessee notes that it has developed an Environmental Construction Plan, or "ECP" specifically for the Project. The ECP describes the basic environmental construction techniques that Tennessee (and its contractors) will implement during and following construction and maintenance to protect the environment and to minimize potential effects of the pipeline construction and maintenance. Tennessee has based the specifications in the ECP on procedures successfully used in constructing, operating, and maintaining transmission systems throughout the United States, and on guidelines and recommendations from the U.S. Army Corps of Engineers ("ACOE" or the "Corps"), the U.S. Department of Agriculture, the Natural Resources Conservation Service ("NRCS"), and the FERC. Additionally, the ECP meets all conditions outlined in the FERC's "Wetland and Waterbody Construction and Mitigation Procedures" (the "Procedures") and FERC's Upland Erosion Control, Revegetation and Maintenance Plan (the "Plan"), except in those areas where Tennessee is requesting a waiver from specific conditions as outlined in Section 9.0 of the ECP. Copies of the Plan and Procedures are attached to this CMP.

The ECP covers the following subjects: Section 2.0 provides site description information. Section 3.0 discusses construction supervision, environmental inspection, and the responsibilities of the environmental inspector. Section 4.0 discusses preconstruction planning, standard construction methods, and erosion and sedimentation control practices. Section 5.0 discusses specialized construction methods including waterbody and wetland crossing procedures. Section 6.0 identifies site-specific construction information applicable to environmentally sensitive areas. Section 7.0 discusses measures to prevent, contain, and control spills. Section 8.0 discusses contaminated materials handling. Section 9.0 lists exceptions to the FERC's Plan and Procedures requested for this Project.

2.1 Forest Resources – Forest Management Plan

The goal of the Forest Management Plan is improving forest habitats on parcels acquired to compensate for Highlands impacts as well as minimizing the initial impacts and restoring forest resources primarily associated with the improvement of existing access roads and creation of new permanent easement, which account for an identifiable impact from the Project.

As part of this plan, all Highlands forests will be identified in accordance with the Council's Method for Identifying Upland Forests in the Highlands Region. The Project does not affect any core forest areas. Per the RMP, core forest areas are those areas of forest greater than 300 linear feet from an altered edge. An altered edge is defined as the spatial delineation of the geographic boundary (i.e., edge) between forest and non-forest land. The existing ROW associated with the existing 300 Line pipeline meets the definition of an altered edge. Since no work is proposed within 300 feet of the altered edge, no core forest shall be affected by the Project.

The Forest Management Plan provides for compensation for those forest resources that are temporarily and permanently impacted by access roads, staging areas and other construction related activities outside of the ROW. No forest mitigation would be required for vegetative impacts within the existing 300 Line ROW primarily because the existing ROW is maintained in a scrub-shrub condition for access, visibility and safety per the FERC rules governing natural gas transmission lines.

The Forest Management Plan would be designed to enhance the functional values of the forest habitat under the control of Tennessee outside of the ROW. The plan would identify the specific forest habitat to be impacted and would be designed to demonstrate that there is no net loss of forest habitat and function. Tennessee will consult with a licensed state forester regarding the Forest Management Plan and will provide copies of the consultation(s) and subsequent response(s) to the Council.

The Plan will address construction-related mitigation for the improvement of access roads and creation of new permanent easement to include:

- Identification of a route that results in the least disturbance to existing forest resources, including locating the proposed Loop 325 within and adjacent to the existing 300 Line easement.
- Identification and avoidance (as practical) of large specimen trees or den trees.
- Silt fence along roads and the ROW (in sensitive areas or where necessary) to prevent migration of soils from the work area.
- The use of a geo-textile fabric under gravel access roads to reduce soil compaction.
- Reverse compaction of those portions of access roads and agricultural areas where the weight of equipment and vehicle traffic has compacted the soils potentially limiting infiltration.
- Where appropriate, replanting restored temporary access and staging areas using native deer resistant species of shrubs, sub-canopy trees and canopy trees.
- Identification of locations where the planting of shrubs and sub-canopy trees and canopy trees will help restore vertical structure to forested areas impacted by deer browsing. Plant species will be

selected from the native species on either side of the ROW/access roads to be restored, and all planted species will be protected with deer fencing.

- Existing access roads will be used for the Project to avoid impacts to interior forest dwelling avian species.

- An appropriate nutrient rich soil profile for planting tree and shrub species will be established prior to tree and shrub planting if required.

2.1.1 Upland Forest Restoration

The approach to upland forest mitigation and restoration involves a combination of impact minimization during construction and vegetation re-establishment involving natural, successional processes as a key component. Tennessee believes that this approach will best minimize the long-term impacts to forested uplands and facilitate the development of an upland forest with a vegetation community composed of species best suited for the site and successional stage. Tennessee's reforestation plan is based upon principles outlined within the No Net Loss Reforestation Act (P.L. 1993, c106 C.13:1L-14.2) and shall be limited to those forested upland areas within designated temporary workspace. In addition to reforestation, Tennessee's commitment to the acquisition of land shall also mitigate for the temporal loss of forest. The site currently under consideration contains over 55 acres of mature upland forest located within the forest resource area and designated as having a high forest integrity value.

- Minimize the amount of tree clearing to the maximum extent practicable while still allowing for safe construction of the pipeline. Although Tennessee has requested a typical 100-foot construction ROW, where possible as determined by the Environmental Inspectors ("EI"), selected trees along the edge of the various corridors may be preserved to help minimize impacts. To the extent practicable, trees and brush will be cut and/or ground just above or to ground level, leaving the stumps and root systems intact. Tree stumps will be preserved to the maximum extent practicable and removed only over the trenchline and where the EI determines the stumps present a safety hazard for construction. Stumps requiring removal in the construction zone will typically be ground down to ground level, leaving some of the root collar and root system in place. Treating stumps and root systems in this manner will promote the potential for re-sprouting in some species.

- Re-establishment of forest will be performed using a combination of plantings and natural, successional processes. A variety of plantings and seed mixes are proposed to stabilize and restore the temporary workspace utilized during construction to quickly stabilize the area and ensure the short-term establishment of a native, non-invasive plant community and long-term re-establishment of a forested cover type. Diversity in species composition is critical to reduce the risk of widespread loss of trees to single insect and disease infestation. Therefore, similar species should not exceed 30 percent of the total planting. Components of the forest restoration plan include:

    - Restoration planting densities of 600 plants-per-acre within upland forests, 400 of which shall consist of tree species. Tree species will consist of four to six foot whip-sized individuals in a variety of native upland species obtained from a reputable plant nursery. No cultivars or other ornamental sub-species will be allowed as substitutes. Alternatively, reforestation planting may consist of 800 to 1,000 seedlings per acre.

    - To ensure successful completion of the mitigation plan and increased survivorship of individual plantings, Tennessee will conduct the planting in early- to mid-fall 2011 following completion of Project construction. If actual construction timeframes do not accommodate a

fall 2011 planting schedule, Tennessee shall conduct the planting as soon as practicable within the 2012 growing season with the understanding that installation of the plantings will be logistically impractical during inundated conditions that typically occur during early spring, while planting during drought or excessively hot conditions typically occurring in early- to mid-summer will greatly increase the potential for individual mortality due to heat or water stress and where supplemental irrigation of plantings is impractical if not impossible.

- Planting will be conducted by a qualified and reputable landscape contractor contracted by Tennessee to provide oversight of the restoration activities. The landscape contractor will be provided a copy of the CMP and will be apprised of Tennessee's obligations under the plan and applicable NJDEP permit conditions.

- Any inadvertent impacts that occur during restoration planting activities, including but not limited to impacts outside of permitted work limits or excessive soil rutting, shall be restored to pre-existing conditions as soon as practicable.

- Spacing of individual plants (typically six to ten feet on center) will be conducted so as to maintain consistent areal canopy coverage and adequate sun exposure as the plantings grow and mature. Additionally, consistent pre-determined spacing of individuals will ensure thorough and adequate replanting of the entire disturbed area, as well as limit the potential for confusion and subjective in-field spacing decisions by planting laborers.

If the timing of final grading and restoration activities associated with pipeline construction does not coincide with that of the planned restoration planting schedule, or site conditions and soil temperature are not appropriate for transplantation and seed germination, the mitigation area will be temporarily seeded with annual ryegrass at an application rate of 40 pounds/acre and stabilized with 2 to 4 inches of straw mulch, which equates to an application rate of three tons/acre, and subsequently planted at an appropriate time.

Plantings will be accomplished through the use of plant stocks chosen for their compatibility with the local environment. Commercially available plants and seeds will be utilized to accomplish this goal. The planting plan has been designed to provide a variety of plant species to promote species richness, enhance wildlife habitat, and help to "jump start" restoration of the forest community within the temporary workspace impacted during construction activities.

Spacing of individual plants will be conducted so as to maintain consistent areal canopy coverage and adequate sun exposure as the plantings grow and mature. Consistent pre-determined spacing of approximately 10-feet on-center of tree species individuals will ensure thorough and adequate densities and replanting of the entire mitigation area, as well as limit the potential for confusion and subjective in-field spacing decisions by planting laborers. However, final spacing and placement of the plantings may be determined in the field. Should supplemental irrigation of restoration plantings be required due to climatic conditions at the time of planting and immediately thereafter, the contractor will be required to maintain adequate hydration to support the plantings until successful establishment.

To reduce the immediate threat and minimize the long-term potential of degradation, the species included in the document *An Overview of Nonindigenous Plant Species in New Jersey* published by the NJDEP (2004)

shall not be included as planting stock in the overall Project. Only plant materials native and indigenous to the region shall be used. Species not specified in the mitigation plan shall not be used without prior written approval from NJDEP.

Tennessee will conduct post-construction monitoring of all forested areas affected by construction for a minimum of three years to access the condition of vegetation and the success of restoration. As a component of the monitoring program, Tennessee will perform quantitative sampling to determine the type and quantity of tree and shrub species naturally colonizing and re-sprouting in the construction ROW. At the end of the each growing season, the results of the field monitoring will be compared to pre-determined threshold success criteria (75% survival of plantings). Restoration shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed land. Yearly monitoring reports shall be submitted to the Council at the end of each growing season. These success criteria will identify quantities of native woody species that would be considered necessary to ensure successful forested restoration. If actual field stem counts fall short of the pre-determined threshold values, Tennessee will develop supplemental plans in conjunction with the appropriate state and federal agencies.

- The species to be included in the supplemental replanting plan will be based on those identified to be naturally colonizing and succeeding on the various construction sites. By mimicking natural processes and site ecology, and planting appropriate species at the appropriate successional stage, efforts to promote restoration of forested areas will be maximized. Through post-construction monitoring, the site will dictate which species will be better suited for supplemental planting so effort and cost will not be wasted planting species maladapted to the site conditions.

- Specifications for species, planting stock size and quality, stem quantity and spacing, and planting method will be developed for review by appropriate agency personnel. Implementation of the supplemental planting program, if necessary, will occur during the spring following the end of the second growing season.

2.2 Open Waters and Riparian Areas Plan

All new major Highlands development is prohibited within a Highlands open water and its adjacent 300-foot buffer except for linear development, which shall be permitted provided that there is no feasible alternative for the linear development outside the Highlands open water or Highlands open water buffer (Highlands Act). As discussed in Resource Report 10 of Tennessee's Environmental Report (submitted as part of Tennessee's certificate application for the Project) which provides a detailed alternative analysis for avoiding the entire Highlands region, the Project has no feasible alternative for development outside of Highlands open due to the linear nature of pipeline installation. Additionally, conventional boring of open water areas is not a feasible alternative due to potential safety constraints associated with the required bore pits.

Multiple streams will be required to be crossed to facilitate the construction of Loop 325. This will require an individual freshwater wetland encroachment and flood hazard area permit from the NJDEP. The Flood Hazard Area Control Act (NJAC 7:13) regulates impacts to vegetation within the riparian zone, which can extend from 50 feet to 300 feet from the top of bank of a subject stream, depending on location and category of the stream. Tennessee is working with NJDEP to determine the riparian zone width for each stream crossed by Loop 325. Mitigation of wetland and riparian zone impacts will be addressed through the NJ DEP LURP permitting process and therefore are not included within the scope of this CMP. The following sections of the CMP pertain to the 300-foot Highlands open water buffer areas including those areas that are located outside of NJDEP wetland or flood hazard area jurisdiction.

2.2.1 Open Water Buffer (Transition Area) Restoration

The approach to open water buffer area mitigation and restoration involves a combination of impact minimization during construction, topographic restoration, and vegetation establishment involving natural, successional processes as a key component. Tennessee believes that this approach will best minimize the long-term impacts to the buffer areas and facilitate the re-establishment of the functional value with a vegetation community composed of species best suited for the site and successional stage. Functions and values of the wetland transition areas such as provision of wildlife habitat, groundwater recharge, flood prevention, etc., shall not be permanently affected through construction and operation of the Project.

The following measures will be implemented to ensure the timely restoration of the buffer areas:

- Minimize the amount of tree clearing to the maximum extent practicable while still allowing for safe construction of the pipeline. Selected trees along the edge of the various corridors may be preserved to help minimize impacts. In forested areas, trees and brush will be cut and/or ground just above or to ground level, leaving the stumps and root systems intact. Tree stumps will be preserved to the maximum extent practicable and removed only over the trenchline and where the EI determines the stumps present a safety hazard for construction. Stumps requiring removal in the construction zone will typically be ground down to ground level, leaving some of the root collar and root system in place. Treating stumps and root systems in this manner will promote the potential for resprouting in some species.

- During the restoration phase, the pre-construction ground contours and drainage patterns will be restored to approximate original condition. If necessary, surface rock and boulders that had been windrowed during the construction phase will be distributed in a more natural configuration in the temporary workspace. Following restoration of the ground surface, the buffer areas shall be seeded and/or mulched according to Table 2.3-1 to stabilize the area and provide herbaceous cover.

- Re-establishment of forest and shrub vegetation in buffer areas will be performed using a combination of plantings and natural, successional processes. A variety of plantings and seed mixes are proposed to stabilize and restore the temporary workspace utilized during construction to quickly stabilize the area and ensure the short-term establishment of a native, non-invasive plant community and long-term re-establishment of the functions and values associated with the transition area. Components of the revegetation plan include:

    - Restoration planting densities of 600 plants-per-acre within buffer areas. In forested areas, a minimum of 400 of which shall consist of tree species (See Table 2.3-2). Tree species will consist of two-to-three foot whip-sized individuals in a variety of native species obtained from a reputable plant nursery. No cultivars or other ornamental sub-species will be allowed as substitutes.

    - To ensure successful completion of the mitigation plan and increased survivorship of individual plantings, Tennessee will conduct the planting in early- to mid-fall 2011 following completion of Project construction. If actual construction timeframes do not accommodate a fall 2011 planting schedule, Tennessee shall conduct the planting as soon as practicable within the 2012 growing season with the understanding that installation of the plantings will be logistically impractical during inundated conditions that typically occur during early spring, while planting during drought or excessively hot conditions typically occurring in early- to mid-

summer will greatly increase the potential for individual mortality due to heat or water stress and where supplemental irrigation of plantings is impractical if not impossible.

- Planting will be conducted by a qualified and reputable landscape contractor under the supervision of Tennessee. The landscape contractor will be provided a copy of this wetland mitigation plan and will be apprised of Tennessee's obligations under the plan and applicable NJDEP permit conditions.

- Any inadvertent impacts that occur during restoration planting activities, including but not limited to impacts outside of permitted work limits or excessive soil rutting, shall be immediately reported to Tennessee construction managers and restored to pre-existing conditions as soon as practicable.

- Spacing of individual plants will be conducted so as to maintain consistent areal canopy coverage and adequate sun exposure within the wetland as the plantings grow and mature. Additionally, consistent pre-determined spacing of individuals will ensure thorough and adequate replanting of the entire disturbed area, as well as limit the potential for confusion and subjective in-field spacing decisions by planting laborers.

If the timing of final grading and restoration activities associated with pipeline construction does not coincide with that of the planned restoration planting schedule, or site conditions and soil temperature are not appropriate for transplantation and seed germination, the mitigation area will be temporarily seeded with annual ryegrass at an application rate of 40 pounds/acre and stabilized with 2 to 4 inches of straw mulch, which equates to an application rate of three tons/acre, and subsequently planted at an appropriate time.

Plantings will be accomplished through the use of plant stocks chosen for their compatibility with the local environment as well as the various hydrologic regimes within the buffer area. Commercially available plants and seeds will be utilized to accomplish this goal. The planting plan has been designed to provide a variety of plant species to promote species richness, enhance wildlife habitat, and help to "jump start" restoration of a forested or scrub-shrub community as applicable within the temporary workspace impacted during construction activities.

Table 2.1-3 provides the composition of the proposed seed mixes that may be applied within the proposed restoration areas. Only plant materials native and indigenous to the region will be used. No cultivars of native species shall be used.

TABLE 2.2-1
TYPICAL SPECIES COMPOSITION OF SEED MIXES FOR OPEN WATER BUFFER AREA RESTORATION ACTIVITIES

Seed Mix[a]	Common Name (Scientific name)	
Native Right-of-Way Seed Mix (Ernst Seed Company)	Virginia Wild Rye (*Elymus virginicus*)	
	Annual Ryegrass (*Lolium multiflorum*)	
	Switchgrass (*Panicum virgatum*)	
	Creeping Red Fescue (*Festuca rubra*)	
	Autumn Bentgrass (*Agrostis perennans*)	
	Fox Sedge (*Carex vulpioidea*)	
	Showy Tick-Trefoil (*Desmodium canadense*)	
	Nimble Will (*Muhlenbergia schreberi*)	
	Deer Tongue (*Panicum clandestinum*)	
Native Upland Wildlife Forage and Cover Mix (Ernst Seed Company)	Virginia Wild Rye (*Elymus virginicus*)	Fowl Bluegrass (*Poa palustris*)
	Little Bluestem (*Schizachyrium scoparium*)	Big Bluestem (*Andropogon gerardii*)
	Switchgrass (*Panicum virgatum*)	Partridge Pea (*Chamaecrista fasciculata*)
	Indiangrass (*Sorghastrum nutans*)	Black Eyed Susan (*Rudbeckia hirta*)
	Eastern Gamma Grass (*Tripsacum dactyloides*)	Showy Tick-Trefoil (*Desmodium canadense*)
	Plains Coreopsis (*Coreopsis tinctoria*)	Ox Eye Sunflower (*Heliopsis helianthoides*)
	Coastal Panic Grass (*Panicum amarum*)	
Northeast Upland Wildflower / Restoration Erosion Mix (Southern Tier Consulting)	Redtop (*Agrostis alba*)	
	Red Fescue (*Festuca rubra*)	
	Annual Ryegrass (*Lolium multiflorum*)	
	Birds-Foot Trefoil (*Lotus corniculatus*)	
	Common Yarrow (*Achillea millefolium*)	
	Black Eyed Susan (*Rudbeckia hirta*)	
	Ox-Eye Daisy (*Chrysanthemum leucanthem*)	
	New England Aster (*Aster nocae-angliae*)	
	Dame's Rocket (*Hesperis matronalis*)	
	Queen Anne's Lace (*Daucus carota*)	
	Pennsylvania Smartweed (*Polygonum pensylvanicum*)	
Northeast Upland Wildlife Seed Mix (Southern Tier Consulting)	Timothy (*Phleum pretense*)	Oats (*Avena sativa*)
	Alsike Clover (*Trifolium hybridum*)	
	Orchard Grass (*Dactylis glomerata*)	
	Bicolor Lespedeza (*Lespedeza bicolor*)	
	Switchgrass (*Panicum virgatum*)	
	Broom-Sedge (*Andropogon virginicus*)	
	Fox-Tail Bristle Grass (*Setaria italica*)	
	Common Sunflower (*Helianthus annuus*)	
	Pennsylvania Smartweed (*Polygonum pensylvanicum*)	

a: Seed application rates should follow the manufacturers recommendation for the individual seed mix.
b: Seeds collected from western New York and northwestern Pennsylvania.

TABLE 2.2-2
OPEN WATER BUFFER AREA RESTORATION
TYPICAL PLANT SPECIES LIST

Species	Size	Condition	Notes	Quantity
Hay-scented Fern (*Dennstaedtia punctilobula*)	Clump	Pot/Root	Fern	25
New York Fern (*Thylypteris noveboracensis*)	Clump	Pot/Root	Fern	50
Interrupted Fern (*Osmunda claytoniana*)	Clump	Pot/Root	Fern	25
SUBTOTAL				**100**
Mountain Laurel (*Kalmia latifolia*)	2 Gal.	Container	Shrub	20
Black Huckleberry (*Gaylussacia baccata*)	0.5' - 1' Ht.	Container	Shrub	20
Lowbush Blueberry (*Vaccinium angustifolium*)	0.5' - 1' Ht.	Container	Shrub	40
Maple Leaf Viburnum (*Viburnum acerifolium*)	2' - 3' Ht.	Container	Shrub	20
SUBTOTAL				**100**
Sugar Maple (*Acer saccharum*)	2' - 3' Ht.	Container	Small Tree	100
White Oak (*Quercus alba*)	2' - 3' Ht.	Container	Small Tree	100
Eastern Hophornbeam (*Ostrya virginiana*)	2' - 3' Ht.	Container	Small Tree	25
White Oak (*Quercus alba*)	4' - 5' Ht.	Balled & Burlapped	Tree	100
American Beech (*Fagus grandifolia*)	4' - 5' Ht.	Balled & Burlapped	Tree	25
Sweet Birch (*Betula lenta*)	4' - 5' Ht.	Balled & Burlapped	Tree	25
Black Gum (*Nyssa sylvatica*)	4' - 5' Ht.	Balled & Burlapped	Tree	25
SUBTOTAL				**400**
TOTAL				**600**

During planting, the qualified and supervising professional may relocate up to 50 percent of the plantings if as-built conditions would pose an unreasonable threat to the survival of plantings installed according to the mitigation plan. The plantings will be relocated to locations where appropriate structural context with other planting cells can be maintained. To reduce the immediate threat and minimize the long-term potential of degradation, the species included in the document *An Overview of Nonindigenous Plant Species in New Jersey* published by the NJDEP (2004) shall not be included as planting stock in the overall Project. Only plant materials native and indigenous to the region shall be used.

Tennessee will conduct post-construction monitoring of all buffer areas affected by construction to access the condition of vegetation and the success of restoration. As a component of the monitoring program,

Tennessee will perform quantitative sampling to determine the type and quantity of tree and shrub species naturally colonizing and re-sprouting in the construction ROW. At the end of the second growing season, the results of the field monitoring will be compared to pre-determined threshold success criteria (minimum 75 percent survival), if any, developed in consultation with the permitting agencies. These success criteria will identify quantities of native woody species that would be considered necessary to ensure successful forested wetland restoration. If actual field stem counts fall short of the pre-determined threshold values, Tennessee will develop supplemental plans in conjunction with the appropriate state and federal agencies.

- The species to be included in the supplemental replanting plan will be based on those identified to be naturally colonizing and succeeding on the various construction sites. By mimicking natural processes and site ecology, and planting appropriate species at the appropriate successional stage, efforts to promote restoration of vegetation will be maximized. Through post-construction monitoring, the site will dictate which species will be better suited for supplemental planting so effort and cost will not be wasted planting species maladapted to the site conditions.

- Specifications for species, planting stock size and quality, stem quantity and spacing, and planting method will be developed for review by appropriate agency personnel. Implementation of the supplemental planting program, if necessary, will occur during the spring following the end of the second growing season.

2.2.2 Open Water Buffer Restoration Monitoring

Tennessee will monitor buffer revegetation efforts annually for the first three years after construction or until wetland revegetation is successful. As discussed above, Tennessee will file an annual report with the Council identifying the status of the open water buffer revegetation efforts. The report will include the percent cover achieved and problem areas. An annual report will be filed until buffer revegetation is successful. Revegetation will be considered successful if the cover of herbaceous and/or woody species is at least 75 percent of the type, density and distribution of the vegetation in adjacent buffer areas that were not disturbed by construction. If the area is not showing signs of re-establishing native vegetation during the third growing season following construction, Tennessee will develop and implement (in consultation with a professional landscape ecologist and/or other state and federal regulatory agencies, as needed) a plan to revegetate the buffer with native species. Revegetation efforts will continue until revegetation is successful. A copy of the monitoring report will be provided to the Council at the end of each growing season until revegetation is successful.

2.2.3 Shallow Depth to Bedrock and In-Stream Blasting of Open Waters

The exact thickness of surficial deposits and substrates present at an individual stream crossing depend on multiple fluvial geomorphological factors. Table 2.2-3 details stream crossings in locations with substrates that have shallow depths to lithic bedrock. These are not locations where bedrock has been determined to be within 60 to 72 inches of the soil surface; however based upon the mapped soil types in the vicinity of the stream crossing, these locations have a higher likelihood of intercepting bedrock during trenching activities, and thus may require pneumatic hammering or blasting of bedrock to provide adequate trench depth to meet U.S. Department of Transportation pipeline safety requirements related to sufficient pipeline backfill cover.

A stream or watercourse with a solid rock bottom is not the typical stream substrate and would only occur in a location and instance where a stream has eroded the surficial substrates down to expose the underlying bedrock. Should in-stream blasting or rock hammering be required for any watercourse crossing, Tennessee will restore the pre-construction streambed contours and substrates to the maximum extent practicable. Under the oversight and direction of an EI, the stream bed will be restored utilizing native materials excavated, chipped or blasted from the crossing location or vicinity. The preferred methodology will be to backfill the

trench with finer native substrates, including sand, gravel, cobble, and stones, ultimately capping the backfilled trench with the largest, flattest pieces of stone available to mimic the pre-construction streambed conditions as closely as possible. While multiple flat pieces of stone would not exactly mimic a solid bedrock substrate, the additional voids, crevices and rock surface area created between the stone pieces would serve to enhance the quality and increase the density of in-stream microhabitats available to small fish species and macro-invertebrates that inhabit the stream. An alternative methodology will be to backfill the trench using controlled-density fill prior to the placement of the larger stones at the surface. This would provide a sufficient seal of any fissures that may have been created through the blasting / excavation process and would aid in preventing both streambed gouging and water loss.

Prior to the commencement of construction activities across waterbodies with a surficial bedrock substrate, Tennessee will evaluate the flow rate of the stream to ensure that the size stone selected for final substrate restoration is of sufficient size and weight that it will not become displaced by high volume / velocity flow events within the waterbody. The results of any such evaluations will be provided to the Council. Post-construction monitoring will be conducted within the summer / fall after spring runoff has occurred. This monitoring will specifically evaluate the stability and location of the stone within the waterbodies to ensure that no displacement has occurred as a result of spring runoff and significant precipitation events.

TABLE 2.2-3
WATERBODIES CROSSINGS FOR LOOP 325 WITH POTENTIALLY SHALLOW DEPTH TO BEDROCK

Feature ID	Waterbody Name	County	Town	Approx MP	Water-body Type[a]	Crossing Width (feet)	Stream Attributes[d]			Timing Restriction[f]	Crossing Method[g]	Comment
							Bank Height (feet)	Bank Width (feet)	Water Depth (Inches)			
S002	UNT to Wallkill River	Sussex	Vernon	1.88	P	5.6	4-6	2.5	12-18	July 1 – April 30	II	Associated with W003
S017	UNT to Black Creek	Sussex	Vernon	3.05 – 3.08	P	5.0	0-2	5	0-3	March 16 – Sept 14	II	Stream parallels pipeline loop.
S052[h]	Lake Conway (Town Brook)	Sussex	Vernon	6.02 – 6.07	POW	273.0	-	-	-	May 1 to Ice Out	HDD	To be field surveyed in 2009
S027	UNT to Pequannock River	Sussex	Vernon	6.56	P	18.7	0-2	10	3-6	March 16 – Sept 14	II	Associated with W038
S032	UNT to Cherry Ridge Brook	Sussex	Vernon	7.86 – 7.87	I	11.9	0-2	3	0-3	N/A	I	N/A
S031	UNT to Cherry Ridge Brook	Sussex	Vernon	8.58	I	5.8	0-2	3-4	0-3	N/A	I	Associated with slope breaker
S053	Belcher Creek	Passaic	W. Milford	13.75 – 13.76	P	43.0	0-2	40	18-24	July 1 – April 30	II	To be field surveyed in 2009
S033	UNT to Hewitt Brook	Passaic	W. Milford	14.77	I	2.2	0-2	3	0-3	N/A	I	Upland channel
S034	UNT to Hewitt Brook	Passaic	W. Milford	15.06 – 15.17	P	0.0	2-4	6	0-3	N/A	N/A	Culverted at northern edge of ROW
S036	UNT to Hewitt Brook	Passaic	W. Milford	15.14	P	11.1	2-4	15	6-12	March 16 – Sept 14	II	Associated with W044 and S035
S037	UNT to Hewitt Brook	Passaic	W. Milford	15.24	P	2.2	2-4	4	3-6	March 16 – Sept 14	II	Associated with S046

N/A = Not Applicable

a: I = Intermittent; P = Perennial; POW = Palustrine Open Water

b: MI = Minor (<10 feet); I = Intermediate (10 - 100 feet); MA = Major (>100 feet).

d: Stream attributes were estimated in the field and are approximate

f: Timing restrictions for warm water and cold water fisheries are from Tennessee's ECP (Volume II – Appendix D). Timing restrictions reflect dates during which construction activities are allowed to occur.

g: I = Conventional, Open- Cut Crossing Method; II = Dry Crossing Method including Flume and Dam and Pump. Intermittent streams containing stream flow at the time of construction will be crossed using a dry crossing method.

2.3 Steep Slope Construction Plan

The Project includes clearing, grading, and excavation disturbing more than one acre of land, therefore a soil erosion and sediment control plan ("SESCP") has been developed for the Project in accordance with NJAC 2.90-1. The SESCP, also known as the ECP, will be submitted to the Sussex and Passaic County Soil Conservation Districts for review and approval. The ECP, as discussed above, covers all areas of construction, including the ROW, access roads, staging areas and pipeyards and additional temporary workspace. The ECP also identifies locations for the placement of silt fence, construction staging, gravel tracking pads and other requirements of the applicable County Soil Conservation District.

Loop 325 has been designed to avoid steep slopes where possible and has minimized workspace areas within step slope areas to the extent practicable to allow for safe working conditions during construction. In areas where steep slopes are unavoidable, specialized construction techniques, including the following, are included within the ECP:

- Identification by milepost of areas with steep slopes (greater than 24 degrees) prior to commencement of construction.
- Use of two-tone construction technique in areas of rugged/steep topography.
- During grade restoration, 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 PVC pipe and/or gravel French drains installed as part of the cut restoration.
- In the areas of construction where the slope exceeds 24 degrees or more, 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.
- Use of erosion control matting on new access roads to prevent soil loss. Placement of fencing along access roads to limit unnecessary access during construction. Re-establishment of slope profile and replanting of the access road post-construction with grass and shrubs to stabilize the soils.
- Permanent trench breakers consisting of sandbags or foam (though gravel or cement filled sacks may also be used) 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.
- Additional erosion controls in riparian areas including silt fencing and multi-barrier approaches. Use of advanced techniques in silt fencing and strong materials to avoid undercutting, toppling or splitting of the fence. This is especially true where down gradient threatened and endangered species habitat may be affected.
- When impacts to steep slopes are unavoidable, emphasize disruption of the least sloped areas over the more steeply sloped areas.
- Minimize length of traverse across steep slopes while controlling erosion/disruption potential (i.e., having a short traverse down a severe slope may be more disruptive than a longer traverse that avoids the steep slope).

- Strictly limit vegetation removal on either side of access roads in steep slope areas.
- Diffusion of stormwater flow in sloped areas should be emphasized using measures appropriate to rural areas, such as slope intercepts and off-flow points and swales.
- In forested wetlands, mulch shall be anchored immediately after placement on steep slopes and stream banks.
- In areas of rugged topography, ROW restoration will begin within 10 days of final pipeline installation to minimize potential erosion and sedimentation control problems.
- Use of geotextile fabric (such as jute matting or curlex) to assist in maintaining slope stability, preventing erosion of topsoil, and assisting in revegetation of slope.

Post-construction mitigation would include installation of permanent trench and/or slope breakers, revegetation and monitoring to ensure stabilization of the site. Slope breakers would be installed to slow down the flow of water and increase stormwater infiltration. Swales lined with grass and shrubs may also be designed so as to trap sediment as it comes down the slope.

2.4 Critical Habitat Mitigation Plan

As described in Section 1.1.3.6 above, Critical Habitat Resource Areas as mapped by the Highlands are crossed by the proposed Loop 325 within both the Planning and Preservation Areas. Field surveys of this area were conducted by qualified biologists and botanists during the fall of 2008 and the spring and summer of 2009. Survey results and biological assessments will be submitted when all field surveys have been completed. Ongoing coordination with the Natural Heritage Program ("NHP"), and the Endangered and non-game program biologists within NJDEP, and the USFWS will continue through the permitting and construction of the Project to avoid and mitigate for impacts on sensitive species including rare, threatened or endangered species. Mitigation for any species listed on the Federal Register will occur in compliance with USFWS requirements. Tennessee will provide the Council with copies of relevant correspondence with USFWS pertaining to federally-listed species for review and comment.

Tennessee has initiated consultations with the USFWS, NJDEP Division of Fish and Wildlife – Bureau of Land Management, NJ Division of Parks and Forestry, NJDEP Division of Fish and Wildlife to identify significant wildlife habitats and wildlife managed lands. The NJDEP has been consulted and identified Federal and state-listed plant and animal species potentially present in the Project area, as well as vegetative communities of special concern in the vicinity of the Project area. The NJDEP has identified three Natural Heritage priority sites within the vicinity of Loop 325 (Lord 2008); however Loop 325 only crosses one of the three priority sites identified by NJDEP. The species-specific approach that Tennessee is taking toward surveying the Project area will identify any occurrences of federal and state-listed species present. Based upon the results of these field surveys, Tennessee will work cooperatively with the USFWS and the NJDEP to develop impact avoidance and mitigation measures for federal species and those state species with habitats located in wetlands, transition areas and flood hazard areas. The scope of proposed impact mitigation measures outlined within this CMP extends to those upland areas outside of the jurisdiction of either USFWS or NJDEP. Table 2.4-1 identifies state-listed species associated with Loop 325. Table 2.4-2 includes New Jersey Natural Heritage Areas identified by the NJ NHP (Lord 2008).

TABLE 2.4-1
NEW JERSEY STATE LISTED SPECIES ASSOCIATED WITH LOOP 325

Species	Scientific Name	State Status [a]
Mammals		
Bobcat	*Lynx rufus*	E
Indiana Bat	*Myotis sodalis*	E
Birds		
Bald Eagle	*Haliaeetus leucocephalus*	E
Barred Owl	*Strix varia*	T
Black-throated Green Warbler	*Dendroica virens*	S
Bobolink	*Dolichonyx oryzivorus*	T
Canada Warbler	*Wilsonia canadensis*	S
Cerulean Warbler	*Dendroica cerulea*	S
Cooper's Hawk	*Accipiter cooperii*	T
Golden-winged Warbler	*Vermivora chrysoptera*	S
Grasshopper Sparrow	*Ammodramus savannarum*	T
Great Blue Heron	*Ardea herodias*	S
Least Bittern	*Ixobrychus exilis*	S
Northern Goshawk	*Accipiter gentilis*	E
Northern Harrier	*Circus cyaneus*	E
Red Headed Woodpecker	*Melanerpes erythrocephalus*	T
Red-shouldered Hawk	*Buteo lineatus*	E
Savannah Sparrow	*Passerculus sandwichensis*	T
Veery	*Catharus fuscescens*	S
Winter Wren	*Troglodytes troglodytes*	S
Worm-eating Warbler	*Helmitheros vermivorus*	RP
Dragonflies & Damselflies		
Midland Clubtail	*Gomphus fraternus*	S
New England Bluet	*Enallagma laterale*	S
Brook Snaketail	*Ophiogomphus asperses*	S
Plants		
American Fly-honeysuckle	*Lonicera canadensis*	E
Hemlock-parsley	*Conioselinum chinese*	E
Northern Beech Fern	*Phegopteris connectilis*	NA
Oak Fern	*Gymnocarpium dryopteris*	NA
Prairie Goldenrod	*Solidago rigida*	E
Rosy Twisted-stalk	*Streptopus roseus*	E
Soft-leaf Sedge	*Carex disperma*	NA
White Adder's-mouth	*Malaxis monophyllos*	E
Witch Hobble	*Viburnum alnifolium*	E
Reptiles and Amphibians		
Bog Turtle	*Clemmys muhlenbergii*	E
Timber Rattlesnake	*Crotalus horridus horridus*	E
Wood Turtle	*Glymptemys insculpta*	T

Source: Lord 2008a, 2008b and 2009

a: Key: E = Endangered; T = Threatened; S = Species of Special Concern; RP = Regional Priority; NA = Not Available

TABLE 2.4-2
NEW JERSEY NATURAL HERITAGE DATABASE INVENTORY OF SIGNIFICANT VEGETATIVE COMMUNITIES CROSSED BY LOOP 325

Habitat Type	Location	Approx. MP
Cherry Ridge Ravine – An extensive hemlock ravine with wooded swamp and seepage area. The site contains wetland and upland habitats for several rare plants.	The site is located southeast of Highland Lake. Cherry Ridge Brook runs through it.	8.00 – 9.00
McAfee Quarry - Wooded limestone ridge and unforested limestone outcrops along a railroad right-of-way. It contains the best occurrence of a critically imperiled state plant species and an excellent occurrence of an imperiled plant species.	The boundaries of this site include known habitat for rare plant species and some buffered habitat that is currently undeveloped.	4.00 (0.125-miles South)
Wawayanda Lake - Mountain lake with an elevation of 1150 feet that contains the only known occurrence of a plant species. This site contains a concentration of state endangered and other rare aquatic plant species.	The primary boundary of this site includes the lake and immediately adjacent wetlands that provide habitat to rare plant species. The secondary boundary includes the drainage basin for the lake.	9.00 (Lake is 1.5-miles North; Drainage basin is 0.125-miles North)
Potential Vernal Pool Area - Seasonal fluctuating water level that may dry out completely in summer. These ponds lack mature fish populations and; therefore, it can provide critical breeding habitat for several species of amphibians.	As certified and mapped by NJ DEP Natural Heritage Program	15.66 – 15.96

As it relates to the Council-designated Critical Habitat, the post-construction restored ROW and workspace will be substantially equivalent to the existing field conditions given the existing pipeline and maintained easement present. Currently, the existing maintained easement within the Critical Habitat area provides “edge” habitat that attracts a variety of wildlife that preferentially utilize this type of habitat for specific behaviors. Wildlife species that preferentially avoid this type of habitat would not be expected to currently utilize the area or would be expected to present intermittently as they move through the area to other preferred habitat types. As a result, the short- and long-term increase in the amount of edge habitat present as a result of clearing activities required for construction and operation will likely only serve to increase the habitat value for the species currently utilizing the Project area. Those species that do not preferentially utilize edge habitat would not be substantially impacted by the increased post-construction edge habitat, as they likely do not utilize the existing edge habitat present.

2.4.1 Impact Minimization

Long-term impacts to wildlife habitat due to construction and operation of the Project will be limited to clearing of upland and wetland forests required for temporary workspace and new permanent easement. To the extent practicable, Tennessee has routed the pipeline loops to follow existing line ROWs (and thus follow existing forest edges), thereby minimizing the acreage of forest lands crossed and the relatively greater impacts that would be associated with clearing an entirely new ROW through a contiguously forested area. Areas cleared for temporary workspace and for pipeline construction will quickly regenerate and provide additional open land habitat (i.e., scrub/shrub and old-field). These areas will not be maintained post-construction, and will revert back to forested habitat over time, much like land that has been previously cut during timber harvesting operations. Areas of early successional habitat that are impacted by construction will naturally re-vegetate within one to two growing seasons to their pre-construction condition and cover type.

The wildlife populations that utilize the Project areas will not be permanently adversely affected by the proposed Project. While temporary impacts upon food, cover and water sources may occur, none of the species located within the Project area are specialized in such a way that construction of the pipeline will inhibit the overall fitness or reproductive output of the populations as a whole. Most species are not dependent on the ROW or transitional areas to provide all of their habitat requirements. Many of the mammal, bird, reptile, and amphibian species are adaptive to changing habitat conditions and possess the capability to expand or shift their home ranges to find alternative sources of food, water and shelter until the disturbed habitats become re-established (DeGraaf et al. 1992). Restoration and re-vegetation will occur after construction has been completed, and the restored areas will be closely monitored until final site stabilization and re-vegetation has been achieved.

Tennessee is in the process of conducting species-specific field surveys for federal and state-listed plant and wildlife species. Tennessee will be coordinating and negotiating directly with the USFWS regarding impact avoidance and mitigation measures associated with federal species (bog turtle and Indiana bat) such that there will be no net loss of habitat for or a regulatory taking of either species. Tennessee will also coordinate and negotiated directly with the NJDEP relative to state-listed species that may be present within wetlands, wetland transition areas, and flood hazard areas. The Council will be provided copies of relevant survey reports and correspondence between Tennessee and USFWS and/or NJDEP relative to Indiana bat and bog turtle habitat present within the Project ROW. Potential impacts to rare species identified within areas solely subject to Council jurisdiction such as additional wetland transition areas and uplands shall be addressed below.

2.4.2 State-Listed Threatened and Endangered Species

Surveys for rare plant species are currently underway and will proceed throughout the 2009 field season depending upon the flowering period of the specified species. Additionally, Phase I habitat surveys for specific state threatened and endangered vertebrates along Loop 325 have commenced, to better assess the proper locations and extent of Phase II surveys. Once completed, survey results will be submitted to the Council and NJDEP. If present in the Project area, the following mitigation methods may be incorporated into the mitigation plan dependent on consultation with the NJDEP:

2.4.2.1 General Rare Species Mitigation Measures

- EI job responsibilities will include understanding and implementing the components of the federal and state-listed threatened and endangered species mitigation measures. The EIs will not be selected for the Project until the necessary regulatory approvals are received by Tennessee. Credentials of the on-site EIs will be forwarded to the Council prior to the commencement of construction.

- Before being allowed to conduct work on the Project site, all field personnel including all construction contractors and subcontractors will be required to complete an environmental training session during which they will be advised on the potential presence of applicable species, specified habitats where they are likely to found, visual or other identifying features, and specific activity protocols to be followed in the event that a species is encountered.

- Signage posted at applicable locations in the field along the ROW alerting personnel to the potential presence of rare species, including representative color photographs of the species, and notification protocols and contact information for EI personnel or dedicated rare species monitors.

- Tennessee will provide mitigation for each species' habitat that is permanently disturbed through construction activities. Mitigation should be four-part and account for no net loss of habitat value in terms of quality, quantity, type and function, and is not injurious to occurrences of rare plant species or rare ecological communities.

- A field survey of the Project area, including all proposed temporary and permanent access roads, staging areas, etc, and an inventory of rare plant species (in cooperation with NJDEP). The inventory shall include a description of the survey method, all vegetation communities, and occurrences of rare, threatened and endangered species within the Project areas to the extent physically or visually accessible. The inventory shall include a map depicting surveyed species and associated habitat.

2.4.2.2 Timber Rattlesnake

NJDEP's Landscape Program identified habitat for timber rattlesnake along a large portion of the Project route. These areas are considered known habitat based primarily on previous records. The NJDEP provided Tennessee with the following feedback regarding impact avoidance / mitigation for the timber rattlesnake:

- All blasting and digging must be restricted to the June 1 - September 30 time period each year to avoid disturbance or harassment of denning snakes and those basking in the vicinity of dens during egress/ingress.

- A trained (and Endangered Species Program ("ENSP") -approved) contractor should be on site to locate and safely capture and move rattlesnakes located on the ROW (since snakes frequently bask on ROWs during the summer months). All snakes, with the exception of timber rattlesnakes, will be captured and moved off the ROW to a safe location. All timber rattlesnakes will be captured and temporarily held in captivity by the ENSP-approved contractor until an ENSP biologist is contacted. An ENSP biologist will determine the course of action to be taken regarding all captured timber rattlesnakes. Timber rattlesnakes may be held in captivity by the ENSP until all work on that section of the ROW has been completed.

- Access roads through rattlesnake areas would be silt fenced and would be retrofitted with culverts and directional funnels to facilitate snake movement.

2.4.2.3 Wood Turtles

Due to the linear nature of pipeline routing and construction, avoidance of waterbodies that may provide suitable habitat for wood turtles is not feasible. Tennessee has conducted surveys to identify wood turtle habitat within the Project ROW and has, through consultation with NJDEP, identified several impact avoidance measures, including:

- Locating a qualified biologist on-site during construction taking place between March and November to relocate any turtles found in the work area.

- Installation of silt fence and seeding disturbed areas immediately upon completion of construction activities to prevent sediment from reaching adjacent streams.

- Planting of hedgerows, where feasible, across the ROW in non-wetland areas, to facilitate connectivity between fragmented forests.

- No use of pesticides or herbicides in wood turtle habitat.

- Additional consultation will be conducted with NJDEP through the permitting process to ensure protection of individual wood turtles and wood turtle habitat. The Council will be provided copies of applicable correspondence for review during the process.

2.4.2.4 Other State-Listed Species

- Avoidance of barred owl, red-shouldered hawk, and goshawk habitat requires that old growth and contiguous wetland forests stands should not be fragmented by access roads or paths. Siting of such should occur in existing edge or disturbed portions of forests. The location of Loop 325 within and adjacent to the existing 300 Line ROW and use of existing access roads minimizes new fragmentation of forested areas. Avoidance of red-shouldered hawk nesting sites, including a ¼ mile buffer, should be required during breeding season (late March through May). Tennessee will not develop any new access roads within the Highlands Region. The Project alignment has been sited within and adjacent to the existing 300 Line pipeline ROW and, therefore, no new fragmentation of existing habitat for the above-listed species will occur.

- Avoidance of Cooper's hawk habitat requires construction and site disturbance activities to occur outside a ¼ mile buffer, or after the breeding season (early April through late July), in mixed riparian or wetland forests. Access roads or paths should avoid these mapped habitats to the extent practicable. Eastern hemlock wetland forests located along the Project corridor provide foraging and nesting habitat for the Cooper's hawk. The NJDEP Landscape Project identified potential habitat for Cooper's hawk from M.P.1.0 to M.P.16.1 of the Project route. Field habitat assessment conducted during summer 2009 evaluated 57 different areas within this portion of the line, and categorized 2 percent of the line as high potential habitat for Cooper's hawk. Since the suitable habitat occurs within wetlands or riparian areas, Tennessee will address potential impact mitigation measures through the NJDEP review process and will provide copies of applicable correspondence to the Council for review and comment.

- A survey of northern harrier nest sites should occur along the ROW edges and within emergent wetlands located within 1,000 feet of the ROW. 1000-foot protection buffers should be maintained around all documented nests during the breeding season (late February through late June) to the extent practicable. Since Tennessee does not have the survey access permission to conduct northern harrier nest surveys within 1,000 feet of the ROW, Tennessee will coordinate review and impact avoidance / mitigation measures through NJDEP during the wetland and flood hazard area permitting process. Tennessee will provide copies of applicable correspondence to the Council for review and comment during the process.

- Snags should be maintained in wetland forested areas as nesting sites in mapped red-headed woodpecker habitat. Tennessee will coordinate review and impact avoidance / mitigation measures

through NJDEP during the wetland and flood hazard area permitting process. Tennessee will provide copies of applicable correspondence to the Council for review and comment during the process.

- Seeding of warm season grasses within upland portions of the ROW is encouraged for enhancement of Bobolink and Savannah sparrow habitat. Tennessee's standard ROW management techniques require that the ROW be maintained in a herbaceous state that promotes the production and maintenance of upland grassland bird breeding habitat.

- Within NJDEP mapped habitat areas for long-eared owls, Tennessee shall avoid high foliage density stands of evergreens within the Project ROW to the extent practicable to protect nesting and roosting habitat.

2.4.2.5 Rare Plants

- If found to be present during field surveys, mitigation would include avoidance and fencing of known populations of these species, removal and replanting of the population outside of the construction workspace area or removal, translocation to an approved plant nursery during construction and replanting during restoration.

2.4.3 Vernal Pool Buffer Habitat

The Project alignment passes through the 1,000-foot buffer to a certified vernal pool between mileposts 15.66 and 15.96. The proposed Project activities are located close to the limits of the dispersal habitat (800 to 1,000 feet from the vernal pool). There will be no direct impacts on the vernal pool or associated wetland. Potential project-related impacts will be limited to the upland dispersal habitat potentially used by obligate and facultative vernal pool species such as wood frogs (*Rana sylvatica*) and mole salamanders (*Ambystoma* sp.). Due to the linear nature of pipeline routing and construction, avoidance of areas located within the 1,000-foot buffer to vernal pools is not feasible. No NJDEP-certified vernal pools are located within the Project ROW. To avoid impacts to upland dispersal and overwintering habitat within the 1,000-foot vernal pool buffer, Tennessee proposes the following measures to be implemented during construction:

- Installation of silt fence along the southern limit of temporary workspace to prevent dispersal of individuals into the construction area.

- Installation of signage along the ROW to identify the area as vernal pool habitat.

- Daily sweeps of the construction workspace by the EI to identify and remove any individual frogs or salamanders that may be located within the workspace.

- Specialized environmental training for contractor personnel to identify species of concern and protocol for contacting the EI should an individual animal be found within the workspace during active construction.

- Placement of wood debris on the ground within the restored temporary workspace to provide for escape cover and overwintering habitat post-construction per landowner agreements.

2.5 Carbonate Rock Plan

Geographical information system ("GIS") data available from the United States Geological Survey ("USGS") displays mapping of karst in the U.S. (2004), showing carbonate bedrock underlying the Project area from MP 2.00 – 4.12 and MP 8.56 – 11.34. Due to the specialized nature of pipeline construction and in consideration that only a relatively minor amount of the required construction workspace will be trenched, a full scale geotechnical subsurface exploration program for the Project area is not necessary for the planning, design or construction phases of the Project. The presence of karst features will be determined during the ditch excavation. During trenching activities, mitigation measures include, but are not limited to, grouting, re-grouting, and backfilling with supportive flowable fill material. Stormwater control measures will be implemented to limit surface water runoff within known karst features. If voids are encountered, then the ditch may be grouted or impermeable plugs may be installed to minimize adverse impacts to karst features from groundwater. Additionally, Tennessee will not release hydrostatic testing wastewater volumes within those areas identified above as susceptible to sinkhole development unless a dewatering structure or energy dissipating device will be used to prevent scouring or erosion.

Tennessee will restore the excavated area to pre-construction contours and elevations to maintain the existing drainage at the site, and to prevent diversion of stormwater to the area identified by NJGS as prone to sinkhole development. Trench breakers may also be used to prevent stormwater from collecting in the identified area. Tennessee will monitor the identified area on an annual basis post-construction to identify any evidence of sinkhole development and will implement any measures necessary to prevent further solution of the soils. A summary of the mitigation measures to be implemented during construction of the Loop 325 segment are detailed below.

- During trenching activities, mitigation measures include, but are not limited to, grouting, re-grouting, and backfilling with supportive flowable fill material.
- Stormwater control measures will be implemented to limit surface water runoff within known karst features.
- If voids are encountered, then the ditch may be grouted or impermeable plugs may be installed to minimize adverse impacts to karst features from groundwater.
- Trench plugs will be incorporated prior to backfill operations to prevent or limit subsurface water flow within the trench or along the pipeline.
- Restoration of the construction workspace as rapidly as possible following pipeline installation and backfill to quickly re-establish vegetative cover and limit the amount of time that the site will be exposed to periods of concentrated flows as well as preventing excessive drying of the soils.
- During hydrostatic testing, Tennessee will not release large volumes of water directly onto land that is susceptible to sinkhole development. A dewatering structure or energy dissipating device will be used to prevent scouring or erosion.
- Restoration of the excavated area to pre-construction contours and elevations to maintain the existing drainage at the site and to prevent diversion of stormwater to the areas identified as prone to sinkhole development. Trench breakers may also be used to prevent stormwater from collecting in the identified area.

- Remediate sinkholes that develop during construction in accordance with the *Standards for Soil Erosion and Sediment Control in New Jersey* (1999) guidelines as detailed in Appendix A10 pages 17 to 35 of the guidelines.

- Monitoring the identified area on an annual basis post-construction to identify any evidence of sinkhole development and implementing any measures necessary to prevent further solution of the soils.

2.6 Lake Management

To ensure that water quality within Lake Management Areas is protected, Tennessee will construct the Project facilities in accordance with its ECP as well as all applicable regulatory approvals. Standard construction techniques, such as use of erosion and sedimentation controls, dewatering structures, trench plugs and water bars, will ensure that both storm and groundwater are managed in a manner that minimizes the potential for adverse impacts on water quality.

2.7 Water Resources Availability

The Project does not result in the expansion or creation of a public water supply system, public wastewater collection and treatment system or a community on-site treatment facility. Additionally, the Project does not result in the generation of wastewater nor require a permanent water source. Therefore, mitigation measures are not required for this resource.

2.8 Water Resources Quantity Protection Plan

Portions of the Project within both the Planning and Preservation Areas will be located within the Prime Groundwater Recharge Area. The requirement for compliance under the Highlands RMP is the provision of 125% of the pre-construction recharge volumes for the affected Prime Groundwater Recharge Area. Since there is no new impervious area associated with the Project, and all disturbed areas will be revegetated or restored upon completion of construction, there will be no decrease in the groundwater recharge area. Therefore, 100% of the groundwater recharge area will be maintained.

The modification (lowering) of the land elevation post-construction to provide additional groundwater recharge volume is not a viable option for providing the additional 25% recharge volume for several reasons. First, it directly conflicts with FERC's standard to restore the ROW to pre-construction condition, which would require a formal variance from the FERC Plan. Second, any proposed post-construction land modification would need to be approved by the applicable landowner(s) since all TWS areas revert back to the landowner(s) once the Project is complete. Lastly, modifications to the ROW may pose significant safety complications during operation of the pipeline facilities since Tennessee's operations personnel must be able to safely and efficiently access the ROW in the event of an emergency. Variable topography that could potentially include retention basins or significant changes land elevation are likely to create situations where emergency access is compromised.

Additional measures incorporated into the Project design to ensure protection of groundwater recharge volume includes:

- Restoration of the site to maintain pre-construction hydrology.
- Use of slope and trench breakers to slow down the flow of water and increase stormwater infiltration.
- Any travel lanes developed within TWS areas to allow access by construction traffic shall be removed when use is no longer required. Soils within the travel lane shall be decompacted and restored in accordance with the CMP.
- The topsoil and subsoil shall be tested for compaction by a third-party monitor within each segment of Prime Groundwater Recharge Area crossed by the Project. Cone penetrometers or other appropriate devices will be used. Tests shall be conducted at intervals sufficient to determine the need for decompaction. Tests shall be done on the same soil type under the same moisture conditions. Tests shall be conducted in the following areas:
    a. undisturbed areas;
    b. the trenched zone;
    c. the work area; and
    d. travel lanes.
- If necessary, soil shall be decompacted by using a harrow, paraplow, paratill or other equipment. Deep subsoil shattering shall be performed with a subsoiler tool having angled legs. The subsoil shall be decompacted prior to final restoration of the pre-construction contours and shall be consistent with adjacent soils at the limits of the ROW. Test results will be provided to the Council.
- To mitigate for the additional 25% of recharge volume as required by the RMP, Tennessee is proposing to acquire and protect an area of land within a designated Prime Groundwater Recharge Area (see Sections 2.20 and 2.23 below for further information regarding land parcels to be used for mitigation purposes). By protecting the property against development, Tennessee will be preventing potential impacts to groundwater recharge. Additionally, should the property acquired contain previous development such as a residence or impervious area, Tennessee will remove all structures, driveways, parking areas and lawns and replace them with grassland or forest to provide a significant increase in the recharge volume than the current condition of such property. Tennessee will coordinate with the Council to ensure that the selected parcel provides significant additional groundwater recharge volume.
- Tennessee calculated the groundwater recharge volumes in mapped Prime Groundwater Recharge Areas crossed by the Project as well as those associated with potential mitigation properties. Upon completion of the calculations, they will be submitted to the Council in a supplement to this CMP that will also include an assessment and justification for the use of preserved lands to mitigate for the additional 25% recharge volume requirement.
- After an exhaustive search of potentially available parcels to meet the Prime Ground Water Recharge Area ("PGWRA") obligation, Tennessee was unable to identify and acquire a suitable parcel(s). Therefore, after c onsultation and agreement with Highlands Council, both Tennessee and the Highlands Council have agreed on a calculation method to determine an appropriate financial contribution. This method is based on the following facts and assumptions:
    - The number of PGWRA acres impacted as of September 2010 is 59.47 .
    - The number million gallons of water per year impacted is 20.5.
    - 125% of 20.5 million gallons per year equals 25.625 million gallons per year (as restoration efforts will provide an estimated 20.5 million gallons per year, an incremental 5.125 million gallons per year is needed).

- It is assumed the PGWRA is evenly dispersed across a parcel's acreage. The Wallkill Refuge provides 360,000 gallons per year, and a parcel that was reviewed and found suitable for its PGWRA characteristics in the Township of Byram, but that Tennessee was not able to purchase, provides 430,000 gallons per year. Upon averaging these two parcels, 395,000 gallons per year is provided.
- Since 5.125 million gallons per year is needed, and on average 395,000 gallons per year is provided per acre, 12.96 acres are needed for Tennessee to meet its obligation. For the purposes of funding, the 12.96 acres is rounded to 13 acres. The agreed upon price per acre is $7,500 per acre as representative of land pricing in either or both Sussex and Passaic Counties. Therefore, the total amount to be contributed by Tennessee for PGWRA mitigation is $97,500.

- Due to the changes made in the project following the exemption received in 2010, there is an increase in acreage impacts shown to PGWRA by approximately 5.32 acres. Because these temporary impacts lie only in existing access roads being used temporarily by the Project and not in areas of workspace for pipeline installation, no additional mitigation is being proposed.

2.9 Water Quality Protection Plan

2.9.1 Wellhead Protection

The Project is not anticipated to adversely impact groundwater quality and/or supply. Tennessee proposes to implement construction practices designed to reduce and/or mitigate potential impacts on groundwater during construction as detailed within Tennessee's ECP. Tennessee and its contractors will adhere to these practices related to groundwater protection including specifications for trench breakers and dewatering as well as restrictions on refueling and storage of hazardous substances.

During the initial landowner contacts for survey permission, Tennessee's land representatives requested information on the location of wells and septic systems from landowners whose residences were in close proximity to the proposed pipeline loops and work spaces. In many locations, this information was used to reduce work areas or re-align the pipeline route to avoid impacts to these structures. As part of the negotiations with landowners for work space, additional easements (if required), and/or damages, Tennessee's land representatives will again request information on the location of wells and septic systems, in order to prepare and inventory for any required pre- and post-construction monitoring and tests. To the extent that any septic systems or wells encroach into Tennessee's existing permanent easement, Tennessee will work with the landowner to resolve the encroachment.

Owners of wells identified that are within 150 feet of the construction work area shall be offered pre- and post construction well testing. This testing shall be conducted by a qualified independent inspection service and shall include tests of water quality and in the case of shallow dug wells or springs, sufficient analysis on quantity to determine if pipeline construction has created an impact. In the unlikely event that construction of the Project temporarily impacts private or public well quality or yield, Tennessee will provide alternative water sources or other compensation to the well owner(s). In the event where it is determined that permanent impacts have occurred to a well, Tennessee shall repair or replace the well, to as near pre-construction condition as possible.

All equipment used in construction of the pipeline will be refueled and lubricated within the limits of the ROW at a minimum distance of 100 feet from all wetlands and waterbodies. Auxiliary fuel tanks will be used to reduce the frequency of refueling operations. The impact minimization measures will prevent the discharge of hydraulic fluids or fuels from leaving the ROW and/or leaching into the groundwater.

2.9.2 Hydrostatic Pressure Testing

In compliance with USDOT specifications, Tennessee will conduct hydrostatic testing on all Project pipeline loops, including Loop 325, prior to placement in-service. Upon completion of the hydrostatic tests, the wastewater will be discharged to an upland area through a filtration device. Environmental impacts from withdrawal and discharge of test water will be minimized by utilizing the measures outlined in Tennessee's ECP as well as by complying with all applicable permit requirements.

Multiple test sites are required to meet the required pressure requirements for an acceptable test. Test segments were selected based on several factors: the pipe parameters, the elevation changes within the loop, the target design pressure of 1170 pound force per square-inch gauge ("psig"), and the class locations of the pipeline. Pipe was allocated as necessary to minimize the quantity of test segments in each loop and to meet DOT design standards. Tennessee will require approximately 3.2 million gallons of water to test Loop 325 and has designated the Monksville Reservoir as its primary source of water. To the maximum extent practicable, Tennessee will transfer hydrotest water from one test segment to the next within a loop (cascaded), to reduce the volume of water required per loop.

In accordance with Sections VII.C.2 and VII.D.2 of the FERC Procedures, hydrostatic test water will not be obtained from, or discharged to, high quality streams unless approved by the applicable state permitting

agency. For hydrostatic pressure testing of the pipeline, Tennessee shall obtain a Highlands Water Allocation Permit or Highlands Water Use Registration from NJDEP. Tennessee will consult directly with the NJDEP relative to the rate of water withdrawal and the combined pump capacity. Tennessee will provide the Council with any correspondence and/or permit approvals from NJDEP for the withdrawal and/or discharge of water from/to high quality (C1) waterbodies. If withdrawal/discharge of testwater within C1 streams/watersheds is not permitted, Tennessee will submit to NJDEP and the Council any change in the source and/or discharge location for hydrostatic testwater. Tennessee does not anticipate the use of any additives within the hydrostatic testwater. Should it be determined that additives are necessary based on the source and composition of the testwater, Tennessee will submit detailed information on any chemicals, such as concentration at discharge and proposed treatment / disposal methods, to NJDEP and the Council for review and approval prior to use.
Environmental impacts associated with the withdrawal and discharge of test water shall be minimized by:

- Using state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species or waterbodies designated as public water supplies only upon written permission from the appropriate Federal, state and/or local permitting agencies.
- Obtaining approval from the Susquehanna River Basin Commission and the Delaware River Basin Commission, if required.
- Performing inspection of all welds or hydrostatic testing the pipeline sections before HDD installation under waterbodies or wetlands.
- Locating hydrostatic test manifolds outside of wetlands and riparian areas as practical.
- Withdrawing from and discharging to water sources shall comply with appropriate agency requirements which consider the protection of fisheries resources on a case-by-case basis.
- Complying with all appropriate permit requirements. Water samples (grab) shall be taken at the beginning and end of the discharge period for a minimum of 2 sampling events.
- Screening the intake to avoid entrainment of fish.
- Maintaining adequate stream flow rates to protect aquatic life, provide for all waterbody uses, and downstream withdrawals of water by existing users.
- Anchoring the discharge pipe for safety.
- Discharging test water to a suitable receiving body of water, across a well-vegetated area or filtered through a filter bag or erosion control barriers.
- Discharging test water against a splash plate or other energy dissipating device approved by the EI in order to aerate, slow, and disperse the flow (ECP Figure ED2).
- Controlling the rate of discharge at a level that appropriately prevents flooding or erosion.
- Not allowed to discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies without written permission from the appropriate Federal, state and local permitting agencies.
- Coordinating hydrostatic test water withdrawal and discharge activities with the EI, the Tennessee Division Environmental Coordinator (“DEC”), Houston Environmental Coordinator (“EC”), and NJ DEP.

2.9.3 Stormwater Management

The ECP incorporates as one document Tennessee's Erosion and Sediment Control Plan, Wetland and Waterbody Crossing Plan and Spill Prevention and Control Plan. By incorporating the above plans into one

concise document and adding site specific information, Tennessee was able to tailor the ECP to the requirements of the Storm Water Pollution Prevention Plan required under the U.S. Environmental Protection Agency ("EPA") storm water permit or equivalent state program.

The ECP has been modified to include additional requirements that have been imposed by the NJDEP, NRCS Soil and Water Conservation Districts, County Conservation Districts, the Corps, and other federal, state, and local agencies. More specifically, the ECP was modified to include the additional requirements of NJDEP's *Standards for Soil Erosion and Sediment Control in New Jersey* (July 1999). This combined approach will allow contractors and EI to reference all environmental conditions in one document. The ECP will be included as part of the construction contract.

Tennessee's objective is to minimize the potential for erosion and sedimentation during pipeline construction, and to effectively restore the ROW and other disturbed areas. Tennessee will meet these objectives by employing the erosion and sediment control measures contained in this section. These erosion and sediment control measures will serve as minimum standards during construction. In general, the measures are designed to minimize erosion and sedimentation by:

- minimizing the quantity and duration of soil exposure;
- protecting critical areas during construction by reducing the velocity of and redirecting runoff;
- installing and maintaining erosion and sediment control measures during construction;
- establishing vegetation as soon as possible following final grading; and
- inspecting the ROW and maintaining erosion and sediment controls as necessary until final stabilization is achieved.

The EIs are the primary responsible party(ies) for ensuring that Tennessee's contractors implement and maintain erosion and sediment control measures on a daily basis during the construction phase. Specific responsibilities of the EI are described in Section 3.0 of the ECP. By implementing the measures detailed in the ECP, Tennessee will meet the objectives of the RMP with respect to stormwater management.

2.10 Water Utility

The Project does not result in the expansion or creation of a public water supply system, public wastewater collection and treatment system or a community on-site treatment facility. Therefore, mitigation is not required for this objective.

2.11 Wastewater Utility

The Project does not result in the expansion or creation of a public water supply system, public wastewater collection and treatment system or a community on-site treatment facility. Additionally, the Project does not result in the generation of wastewater nor require a permanent water source. Therefore, mitigation measures are not required for this objective.

2.12 Septic System Yield

Septic system yields are not applicable to the Project; therefore no mitigation is required for this objective.

2.13 Agricultural Resources

There are no Agricultural Resource Areas crossed by the Project; therefore the Agricultural resource policies and objectives are not applicable to the Project and no mitigation is required.

2.14 Historic, Cultural, Archaeological and Scenic Resources Plan

2.14.1 Historic, Cultural and Archaeological Resources

Section 106 of the NHPA requires federal agencies, including the FERC, to take into account the effect of that undertaking on cultural resources listed or eligible for listing in the National Register of Historic Places ("National Register") (36 CFR § 60). The Section 106 process is coordinated at the state level by the State Historic Preservation Office ("SHPO"), represented in New Jersey by the Historic Preservation Office ("HPO") and includes review of Highlands historic, cultural and archaeological resources.

The primary goals of cultural resource investigations conducted as part of the Section 106 review are to:

- locate, document, and evaluate buildings, structures, objects, landscapes, and archaeological sites that are listed, or eligible for listing, in the National Register;
- assess potential impacts of the Project on those resources; and
- provide recommendations for subsequent treatment, if necessary.

In addition to Section 106 requirements, cultural resources investigations were conducted for the Project in accordance with the FERC's Office of Energy Project's Guidelines for Reporting on Cultural Resources Investigations (2002), and the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 Fed. Reg. 44716-42, Sept. 29, 1983); Section 380.3 of the FERC's regulations; 18 CFR § 380.3 (2008). In New Jersey the relevant state law is the New Jersey Register of Historic Places Act of 1970.

Tennessee has conducted the necessary consultations with the applicable federal, state and tribal agencies relative to the potential presence of sensitive cultural or archaeological resources. Additionally, Tennessee has conducted the necessary field investigations of the Loop 325 Segment survey corridor to identify any previously unidentified or undocumented occurrences of any historic or archaeological resources.

Within the Highlands Preservation Area, Tennessee has identified only one location within the Project area with potentially sensitive or significant cultural resource value. The privileged and confidential nature of potentially significant cultural resources prevents detailed discussion as it relates to this document; however the results of Tennessee's field investigations have been conferred to the HPO for concurrence. As mitigation, Tennessee has committed to avoidance of this site and will fence the area during construction to prevent inadvertent impacts related to Project activities. If Project-related circumstances arise that prevent avoidance of this resource, additional HPO consultation and concurrence would be required, as well as phase II cultural resource investigations to fully determine the extent and significance of the site.

Tennessee recognizes that despite intensive cultural resource field investigations that are typically performed prior to project construction, or a determination that a particular area exhibits low archaeological sensitivity, it is nonetheless possible that cultural resource deposits could be discovered during Project construction or maintenance activities, particularly during excavation. Tennessee also recognizes the requirement for compliance with federal and state regulations and guidelines regarding the treatment of human remains, if any are discovered. Subsequently, Tennessee has proposed additional mitigation as it relates to cultural resources through the implementation of Tennessee's "Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains" document, which has been previously provided to the HPO for approval and concurrence. The aforementioned document details specific procedures that must be followed in the case of an unanticipated discovery to maintain compliance with all applicable federal and state laws governing cultural resources. These procedures including the immediate suspension of all activities at the discovery site, agency notification requirements including applicable contact information and additional assessments of the discovered materials by a qualified cultural resources expert. That document has been incorporated into Tennessee's construction conditions and procedures proposed for the Project and will be implemented during Project construction upon final review and approval by the applicable federal and state regulatory agencies. Additional correspondence between Tennessee and SHPO shall be provided to the Council for review and comment.

2.14.2 Scenic Resources

Permanent visual impacts associated with installation of the pipeline loop will not occur within non-forested areas; however, tree clearing for construction and maintenance of the permanent ROW in forested areas may result in temporary visual impacts. To minimize this potential, Tennessee has sited the proposed loop segment adjacent to the existing 300 Line corridor to the greatest extent possible to limit the amount of tree clearing. This also concentrates utilities in existing areas and reduces the degree of disturbance within previously undisturbed areas. Temporary impacts of limited duration will be mitigated through restoration practices to revegetate the ROW in a timely manner in accordance with the measures identified within this CMP.

2.15 Transportation

Transportation issues are not applicable to the Project; therefore no mitigation is required for this objective.

2.16 Land Use Capability

Tennessee has prepared and will construct the Project in accordance with its ECP as well as all other applicable local, state, and federal approvals. Oversight of the Project will be conducted by various regulatory agencies throughout construction; however, ultimate oversight and compliance will be conducted by FERC. Tennessee must construct, operate, and maintain the Project in accordance with the FERC's certificate order approving the Project, Tennessee's subsequent Implementation Plan (which will include the ECP). There will be third-party oversight of construction by the FERC or its designated agent to ensure that the Project is constructed as approved. There are stringent reporting requirements (typically every two weeks) to document construction progress as well as procedures for requesting any variances to the approved certificate conditions. This oversight will extend to this CMP as well as other regulatory approvals that are submitted by Tennessee under its Implementation Plan and will extend through the post-construction monitoring period. Non-compliance with the FERC certificate or Tennessee's approved Implementation Plan may result in significant enforcement action and fines. The various levels of regulatory oversight of the Project as well as

Tennessee's commitment to full-time environmental inspection during construction will ensure the implementation of this CMP as well as Tennessee's ECP.

2.17 Redevelopment

Redevelopment issues are not applicable to the Project; therefore no mitigation is required for this objective.

2.18 Smart Growth

The RMP goals, policies, and objectives relative to Smart Growth relate directly to the management of stormwater associated with Project construction activities. As detailed within Section 2.9.2 of this CMP, Tennessee has developed a Project-specific ECP that is based on industry standards pertaining to erosion control, stormwater management, and post-construction best management practices. There is no new impervious area associated with the Project; therefore no structural stormwater management facilities such as detention basins, wet swales, bio-swales will be implemented during construction. These types of stormwater management practices are better suited for residential and commercial development projects where long-term or permanent controls may be required.

Pipeline construction incorporates a "design with nature" approach by implementing temporary stormwater control measures that ensure the control of both stormwater runoff rate and volume. Standard industry practices such as water diversion berms, temporary and permanent trench plugs, and permanent water bars are used to manage stormwater during construction. The ECP not only provides narrative descriptions of the stormwater management practices implemented during construction but also provides typical details of the facilities that may be used. As discussed above, the ECP incorporates the FERC's Plan and Procedures. Both this CMP and the ECP demonstrate that stormwater will be managed in a manner that is consistent with the RMP goals, policies and objectives for Smart Growth.

2.19 Housing and Community Facilities

Housing and Community Facilities are not applicable to the Project; therefore no mitigation is required.

2.20 Landowner Equity

The application for an exemption request under consideration by the Council was initially limited to the Project facilities located within the Preservation Area. Subsequent to that application, Tennessee met on numerous occasions with the Council staff to discuss the Project. Based on those discussions, Tennessee intends to include the portions of the Project within the Planning Area within its final amended application for an exemption from the Act. The various mitigation commitments made within this CMP shall be extended to the resource areas within the Planning Area subject solely to Council jurisdiction.

In addition to the parcel identified in Section 2.23 to mitigate for potential impacts with the Special Environmental Zone, Tennessee identified a parcel of land for mitigation purposes to supplement the CMP for the Planning Area. This property is approximately 68 acres in size (see Figure 14) and is identified as a Conservation Priority Area by the Council. Tennessee conducted a desktop review of the mitigation parcel to

identify possible resource values. In doing so, Tennessee found that NWI mapping delineates approximately 5.11 acres of wetlands on the parcel, all of which are designated as forested wetlands. The entire parcel is designated as Critical Habitat and high integrity forest.

To also achieve "no net loss" of the estimated 38 acres of impacted forested lands, Tennessee has proposed and Highlands Council has agreed that the 68.23 acre parcel mentioned above in the Township of Vernon (Block 269.15, Lot 1) would be acquired. The United States Fish and Wildlife Service will acquire this parcel, using funds provided by Tennessee, for the Wallkill River National Wildlife Refuge ("Refuge"). However, Tennessee notes that the above-described parcel does not constitute mitigation by Tennessee of impacts to the Refuge from the Project. Tennessee will mitigate impacts of the Project crossing the Refuge through acquisition of a separate and distinct parcel of land. The 68.23 acre parcel will only be used for Highlands Council mitigation requirements.

2.21 Sustainable Economic Development

Through the implementation of this CMP, Tennessee believes that the Project qualifies as environmentally compatible development. While there may be temporary impacts associated with construction of the Project, the expenditures of over $3.3 million dollars in local economies represent a significant expansion of the economic base. Subsequent to construction, between $1.5 and $2 million dollars in tax revenue will be generated by the Project for the affected municipalities that will continue after implementation of the CMP and restoration of the functions and values of the various resource areas. The Project's impact on agri-, eco- and historical tourism opportunities will be limited to the construction period and are further limited by the general lack of tourism opportunities within the Project area. Additional demonstration of mitigation of any impacts on agri-, eco- and historical tourism is accomplished through implementation of the mitigation efforts described within the CMP. The operation of the Project facilities within the same area/corridor as Tennessee's existing 300 Line pipeline, which has been in operation for over 50 years, will not adversely affect the potential tourism opportunities within the Project area.

2.22 Air Quality

As discussed above in the section demonstrating the purpose and need for the Project, there are several justifications supporting the need for incremental transportation of domestic natural gas supplies to the northeast region, including the loss of natural gas imports from Canada. One of the underlying reasons contributing to the loss of those Canadian supplies to the region is Canada's early election to support the Kyoto Protocol and the decision to convert many coal fired power plants in Ontario to natural gas. Colin Anderson, CEO, Ontario Power Authority, has stated that "Ontario is on-track to replace 20 percent of our electricity supply by phasing out coal fired electricity generation by 2014, North America's biggest climate change initiative."[3] These conversions, already underway, require an increased percentage of Canada's domestic supplies to remain in Canada, and have created a need for U.S supplies to replace that loss. Thus, on an indirect basis, this Project will contribute to the reduced use of dirty resources such as coal and an

[3] Ontario's 20-Year Vision for Sustainable Electricity Supply", presentation by Colin Andersen, Chief Executive Officer, Ontario Power Authority ,at Ontario Energy Forum 2009 (University of Ontario Institute of Technology, Oshawa, Wednesday, May 6, 2009).

increased use of cleaner resources such as natural gas, as well as reducing the Unites States' reliance on imported energy.

Additionally, there are several proposals for new LNG import terminals on the east coast, including in and adjacent to New Jersey. The transportation of domestically produced natural gas into the region by this Project has the potential to reduce the imports of LNG into those terminals which would not only reduce the country's reliance on imported energy, but potentially could minimize environmental impacts, including impacts on air quality, considering the more complex construction and operation of LNG terminals as compared to installation of the best available technology equipment for natural gas compressor stations as proposed for the Project. Additionally, as part of the Project, Tennessee will be replacing older equipment at several of its existing compressor stations with new state of the art equipment.

2.22.1 Construction Emissions

Air quality impacts associated with construction and installation of Loop 325 in the Highlands will include emissions from fossil-fueled construction equipment and fugitive dust. Such air quality impacts, however, will generally be temporary, localized, and insignificant. Large earth-moving equipment and other mobile sources may be powered by diesel or gasoline engines and are sources of combustion-related emissions including NO_x, CO, VOCs, SO_2, PM_{10}, and small amounts of HAPs. Air pollutants from construction equipment will be limited to the immediate vicinity of the construction area and will be temporary.

The majority of air emissions produced during construction activities will be PM_{10} and $PM_{2.5}$ in the form of fugitive dust. Fugitive dust will result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. The amount of dust generated will be a function of construction activities, soil type, moisture content, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions will be greater during dry periods and in areas of fine-textured soils subject to surface activity.

Tennessee will comply fully with state regulations that address fugitive dust impacts from construction activities. In Pennsylvania, state regulations specifically allow emissions of fugitive air contaminants from specific activities including:

- Construction or demolition of buildings or structures.
- Grading and paving of roads.
- Use of roads.
- Clearing of land.
- Stockpiling of materials.

However, the regulation states that a person responsible for these fugitive emission source types must take all reasonable actions to prevent particulate matter from becoming airborne. These actions include, but are not be limited to, the following:

- Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads or the clearing of land.
- Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles and other surfaces which may give rise to airborne dusts.

- Paving and maintenance of roadways.

- Prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water or other means.

NJDEP regulates construction-related particulate emissions through N.J.A.C. 7:27-22.16. The rule prohibits the emissions of any air contaminant in a quantity and duration which tends to be injurious to human health or welfare, animal or plant life or property, or which would unreasonably interfere with the enjoyment of life or property.

Tennessee will employ proven construction practices to control fugitive dust emissions during construction. Construction of the Project facilities will result in intermittent and temporary fugitive emissions. Construction equipment will be operated only during the day time on an as-needed basis. These emissions will be released near ground level and will not disperse far from the construction site. All areas disturbed by construction will be stabilized. Tennessee will require its contractors to comply with best management practices discussed in Tennessee's 300 Line Project ECP related to air quality during construction, including dust suppression (e.g., watering) and utilizing newer, cleaner operating equipment and encourage its construction contractors to use low emission fuels. Given all of these factors, it is reasonable to assume that during construction of all Project facilities fugitive dust emissions and the impacts from these emissions will be insignificant.

Sussex County, New Jersey, is designated as a moderate ozone non-attainment area. Additionally, New Jersey is located in the Ozone Transport Region which is treated as a moderate ozone nonattainment area for VOCs and NO_x. Tennessee estimated fugitive dust and exhaust emissions from construction/modification of the pipeline loop to facilitate a comparison of the Project to the General Conformity Thresholds. Under 40 CFR Section 93.153(b)(1), a review for VOC and NO_x emissions is required for ozone non-attainment areas, such as Sussex County. The de minimis emissions levels as defined by the General Conformity Regulations are listed in Table 9.1-17.

TABLE 2.22-1
GENERAL CONFORMITY THRESHOLDS

Pollutant/NAA	Tons/Year
Ozone (VOCs or NO_X):	
Serious non-attainment areas (NAAs)	50
Severe NAAs	25
Extreme NAAs	10
Other ozone NAAs outside an ozone transport region	100
Other ozone NAAs inside an ozone transport region:	
VOC	50
NO_X	100
Carbon monoxide: All NAAs	100
SO_2 or NO_2: All NAAs	100
PM–10:	
Moderate NAAs	100
Serious NAAs	70
$PM_{2.5}$:	

Direct emissions	100
SO_2	100
NO_X(unless determined not to be a significant precursor)	100
VOC or ammonia (if determined to be significant precursors)	100
Pb: All NAAs	25

Total emissions from construction activities of Loop 325 are presented in the table below (Table 9.1-19). All site locations where construction will take place are in attainment for CO, SO_2, PM_{10}, and $PM_{2.5}$; therefore, demonstration of compliance to the General Conformity thresholds for these "attainment" pollutants is not required. Anticipated CO, SO_2, PM_{10}, and $PM_{2.5}$ emissions are provided for informational purposes.

TABLE 2.22-2
EMISSIONS FROM CONSTRUCTION OF PIPELINE LOOP 325

Loop ID	Total Site Emissions (tons)					
	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Loop 325	52.68	5.72	72.82	0.08	40.30	7.69

Emissions from construction of the pipeline loop were aggregated according to county to compare against the de minimis emission levels. This comparison is provided in Table 9.1-20:

TABLE 2.22-3
LOOP 325 EMISSIONS BY COUNTY COMPARED TO GENERAL CONFORMITY THRESHOLDS

County / State	Source(s)	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$
Sussex, NJ	Pipeline Loop 7	30.55	3.32	42.24	0.044	23.38	4.46
Passaic / NJ	Pipeline Loop 7	22.13	2.40	30.59	0.032	16.93	3.23

The summary reflects the Project to be in conformity with the respective de minimis levels.

2.23 Special Environmental Zones

As a component of the CMP, Tennessee will develop a plan that will protect environmentally sensitive lands in the vicinity of the Project area. Through the use of Geographic Information Systems (GIS) technology and collaboration with federal, state, and local conservation agencies and organizations, Tennessee will identify lands in the vicinity of the Project located within Special Environmental Zones ("SEZ") that are particularly vulnerable to development and preserve the undeveloped parcels through any number of conservation

mechanisms, including but not limited to fee acquisition, purchase of development rights and recording of a conservation easement on the title or deed, or donations to third party conservation organizations whose mission is to preserve natural/undeveloped lands.

To implement this component, in coordination with the Highlands Council Tennessee has identified potential parcels for preservation that contain similar functions and values to those that will be permanently impacted during operation of the Project facilities, and at least one of which is designated as a SEZ. Ideally, the preserved parcel will be located within the same watershed as those lands with permanent impacts from Project construction, and to preserve the functions and values of impacted lands, Tennessee will prioritize acquisition of the property containing environmental resources, such as upland forest, forested wetlands, streams, 100-year floodplain, vernal pools, and rare species habitats. The mitigation parcel will be a minimum of 23 acres in area, unless otherwise agreed upon compensation is accepted by. Tennessee will also prioritize parcels that are located within Council-mapped Conservation Priority Areas or SEZ. Lands within the SEZ would be specifically targeted for acquisition by the Tennessee as these areas have already been identified by the Council for preservation according to their specific environmental functions including Conservation Priority Area rank, and the potential to a) protect water supply reservoirs and other critical water features, b) create large contiguous areas of environmentally sensitive lands, c) create habitat corridors, and d) connect existing preserved open space.

To achieve "no net loss" of the Special Environmental Zone ("SEZ") areas crossed by the Project, Tennessee agreed to acquire approximately 23 acres of SEZ designated property. In order to satisfy this obligation, Tennessee proposed and Highlands Council agreed that Tennessee would purchase an 18.1 acre SEZ-designated parcel in the Township of West Milford (Block 6402, Lot 7). This property will be ultimately assigned by Tennessee to a suitable land conservation entity or other public entity with an appropriate conservation deed of easement to ensure no development on the property which the Highlands Council shall have the secondary right to enforce. Additionally, to address the difference between the above-referenced 23 acre obligation and the actual size of the 18.1 acre parcel discussed above, Tennessee has agreed to make a financial contribution to address the difference. The Highlands Council and Tennessee have agreed to an amount of $7,500 per acre as representative of the value of comparable land in either or both of Sussex and Passaic counties. The financial contribution to address the 4.9 acre differential at a rate of $7,500 per acre equals $36,750.

2.24 ROW Restoration and Monitoring Plan

The ROW Restoration and Monitoring Plan developed for Loop 325 will incorporate measures outlined in the ECP, which incorporates the FERC's Plan and Procedures.. The purpose of this CMP is to support multiple environmental and operational safety objectives for the proposed Loop 325 ROW through the Highlands Region. This CMP will support management techniques for maintaining high water quality standards including minimizing impacts to riparian zone vegetation and wetland communities crossed by Loop 325 during construction and maintaining vegetation and hydrology in these communities post-construction.

Long-term impacts to successional habitats will be limited to forest and scrub-shrub areas during operation of the Project facilities. The siting of the alignment along a previously disturbed and maintained pipeline corridor was the preferred alternative as it reduces the clearing of forested areas during construction and minimizes the potential for habitat fragmentation. In areas where workspace within forested areas is unavoidable, the forested areas will be cleared, and standard erosion control/cover species will be planted after construction is completed. Temporary workspace that was identified as forest during the field surveys will be allowed to revert to forest. Areas that are already vegetated with grasses or early successional species will be restored after the conclusion of construction activities.

Impacts within the temporary workspace will be allowed to revert to forest post-construction. The primary impact minimization measure to reduce the impact of the Project on forested uplands consists of locating the proposed pipeline loop segments within the existing cleared ROW to the extent practicable to limit the extent of forest clearing required for construction and operation of the facilities. Additionally, Tennessee has located ATWS areas outside of forested land where possible to further minimize impacts. Impact minimization, post-construction restoration methods, and long-term maintenance for the ROW are described in the following sections.

2.24.1 Site Preparation, Clearing and Construction

The following techniques and standards will be adhered to during site preparation and construction to minimize impacts to vegetated communities crossed by Loop 325:

- Delineation and marking of wetlands and waterbodies prior to the commencement of construction.
- In wetlands, stumps shall be removed only in the trenchline except where construction constraints or safety concerns require their removal.
- Installing temporary erosion control measures such as silt fence and/or hay bale barriers.
- No rubber-tired equipment will be allowed to work in wetlands unless it will not damage the root systems and its use is approved by the EI. Bulldozers will not be used for clearing. Trees and brush will be cut by hand at ground level by hydroaxes, tree shears, grinders or chain saws.
- Within wetlands, the minimum clearing necessary to safely construct the pipeline will be done. As many trees as possible will be left on stream banks. The frequency of machine movement across riparian zones and stream ecosystems will be minimized.
- Within wetlands, Tennessee will use amphibious excavators (pontoon mounted backhoes) or tracked backhoes (supported by fabricated timber mats) to dig trenches.
- Within wetlands, grading will be limited to the areas directly over the trenchline, except where topography requires additional grading for safety reasons. Where grading is required, topsoil will be segregated and returned as an even layer to all graded areas.
- A trained EI will be employed to oversee wetland construction and monitor erosion and sedimentation controls.

2.24.2 Post-construction restoration and revegetation

Restoration and revegetation of the ROW incorporates permanent erosion and sediment control measures. However, in the event that final restoration cannot occur in a timely manner due to weather or soil conditions, temporary erosion and sediment control measures will be maintained until the weather is suitable for final cleanup and revegetation. In no case shall final cleanup be delayed beyond the end of the next recommended seeding season.

2.24.2.1Temporary erosion control

- Stabilization measures shall be initiated as soon as practical on upland portions of the ROW where activities have temporarily or permanently ceased except when the initiation of stabilization measures by the seventh day is precluded by weather. Stabilization measures shall be initiated as soon as machinery is able to obtain access to the ROW.

- Stabilization of waterbodies and wetlands shall be initiated immediately after backfilling, weather permitting.

- If construction is completed more than 20 days before the perennial vegetation seeding season, the construction work area shall be mulched with 3 tons/acre of straw, or its equivalent (Refer to Tables 2.1-1 through 2.1-3).

- Temporary upland plantings will be fertilized in accordance with Table 2.1-1.

- All temporary sediment barriers will be removed when an area is successfully revegetated (i.e., when the ROW surface condition is similar to adjacent undisturbed lands), or when permanent erosion controls are installed.

2.24.2.2 Permanent Restoration Methods

- Permanent restoration of waterbodies and wetlands shall be initiated immediately after backfilling, weather permitting.

- Final grading shall be completed, including topsoil replacement and permanent erosion control measures, within 20 days after backfilling the trench (10 day in residential areas), weather permitting. Table 2.1-2 provides seeding and fertilizer application rates for permanent restoration in New Jersey.

- Construction debris shall be removed from the ROW and the ROW shall be graded so that the soil is left in the proper condition for planting.

- Where trench compaction has not been done, the ROW shall be graded to pre-construction contours, as practical, with a small crown of soil left over the ditch (except in waterbodies) to compensate for settling, but not to interfere with natural drainage.

- Where topsoil has been segregated, the topsoil shall be spread back along the ROW in an even layer.

- Permanent water bars shall be constructed to the same specifications as temporary water bars after final grading and prior to seeding.

- Permanent water bars will be constructed to replace temporary erosion control barriers upslope of road and railroad crossings, and on both sides of all wetland and waterbody crossings, where appropriate.

- Within 30 days of the in-service date of the Project facilities, Tennessee will prepare a summary report identifying:

    a. quantity and type of fertilizer, seed and mulch used;

    b. the amount of lime applied (if required);

    c. the equipment used to implement this process;

    d. the acreage treated;

    e. the dates of backfilling and seeding;

f. the number of landowners specifying other seeding requirements and a description of the requirements;

g. and any problem areas, and how they were addressed.

2.24.2.3 Revegetation and Seeding

- The ROW shall be limed, fertilized, seeded, and mulched in accordance with the ECP, unless otherwise requested by the landowner. Fertilizer, lime and mulch will not be used within wetlands unless required in writing by the appropriate land management or state agency. Where possible, lime and fertilizer will be incorporated into the top 2 inches of soil. If seeding cannot be done within the recommended seeding dates, temporary erosion and sediment controls shall be used and seeding of permanent cover shall be done at the beginning of the next growing season.

- The ROW will be seeded within 20 working days (10 days in residential areas) of final grading in accordance with recommended seeding dates, weather and soil conditions permitting. Seeding must utilize native species and must target habitat type and function.

- Turf, ornamental shrubs and other landscaping materials shall be restored in accordance with landowner agreements.

- Where broadcast or hydro-seeding is to be done, the seedbed will be scarified to ensure sites for seeds to lodge and germinate.

- Where hand broadcast seeding is used, the seed shall be applied at one-half the rate in each of two separate passes. The passes will be made perpendicular to each other to ensure complete and uniform coverage.

- The seedbed will be prepared to depth of 3 to 4 inches using appropriate equipment to provide a firm, smooth seedbed, free of debris.

- Slopes steeper than 3:1 shall be stabilized immediately after final grading in accordance with recommended seeding dates, weather permitting.

- Seed shall be purchased in accordance with the Pure Live Seed (“PLS”) specifications for seed mixes and used within 12 months of testing.

- Legume seed will be treated with species-specific inoculants per manufacturer’s specifications.

- The seed shall be applied and covered uniformly per local soil conservation authorities’ recommendations, depending on seed size. A seed drill equipped with a cultipacker is preferred, but broadcast or hydro-seeding may be used at double the recommended seeding rates. Where broadcast seeding is used, the seedbed shall be firmed after seeding.

- Other alternative seed mixes specifically requested by the landowner or land-managing agency may be used.

- A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed, inspected and maintained as specified. When access is no longer required, the travel lane shall be removed, decompaction of the travel lane will occur, and the travel lane restored.

- Habitat for threatened and endangered species may be created through modifications of existing habitat conditions for species such as the bog turtle.

- Access roads would be graded to support access and planted with an interspersion of warm grass species that can be used to delineate the roadway from the maturing shrub species and cultivars of low and slow growing tree species which will not need to be trimmed.

2.24.2.4Mulching

- Where mulching is permitted, mulch will be applied according to Tables 2.1-1 and 2.1-2 on the entire ROW except lawns, agricultural (crop) areas, and areas where hydro-mulch is used.

- If construction or restoration activity is interrupted for extended periods (more than 20 days), mulch will be applied before seeding.

- If mulching before seeding, mulch application will be increased on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre.

- Up to 1 ton/acre of wood chips may be added to mulch if areas are top-dressed with 11 pounds/acre of available nitrogen, 50% of which must be slow release.

- If a mulch blower is used, the strands of the mulching material shall be at least 8 inches long to allow anchoring.

- Mulch shall be anchored immediately after placement on steep slopes and stream banks. Slopes that are too steep for crimping with tracked equipment or a mulch anchoring tool (i.e., slopes >15%) will be anchored manually by the use of matting or netting.

- When mechanically anchoring mulch, a mulch anchoring tool or tracked equipment will be used to crimp the mulch to a depth of 2 to 3 inches.

- When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Liquid mulch binders will not be used within 100 feet of wetlands or waterbodies.

2.24.2.5Matting/Netting/Erosion Control Fabric

- Matting or netting consists of jute, wood excelsior, or similar materials, and is used to anchor mulch and stabilize the surface of the soil during the critical period of vegetative establishment, as directed by the EI. Specific manufacturer's installation instructions should be followed to ensure proper performance of the product.

- Matting or netting will be applied to critical, sensitive areas (i.e., steep slopes [typically slopes >15%], banks of waterbodies, bar ditches, etc.), as specified by the EI. Matting or netting will also be applied to any areas where temporary/permanent vegetation is not taking/working to assist is protecting the seed bank.

- Matting or netting will be anchored with pegs or staples.

2.24.2.6Post-Construction Monitoring (Standard Construction)

- For 3 years following construction, Tennessee will file with the Council annual monitoring reports documenting restoration of the Highlands resource areas, any problems experienced (including those

identified by the landowner) and corrective actions taken, as well as how the restoration is working to protect and promote the resource area functions and values.

- Tennessee will conduct follow-up inspections after the first three growing seasons following seeding to determine the success of revegetation. Revegetation will be considered successful if non-nuisance vegetation is similar in density to adjacent undisturbed lands, based on representative random sampling in the field (e.g., visual survey). If vegetative cover is not successful or if there is a need for noxious weed control measures, an experienced agronomist shall be used to determine the need for additional restoration measures.

- Tennessee will use one or more of the following measures in cooperation with the landowner, if warranted or required, to control off-road vehicles:

  a. posting, as necessary, appropriate signage;

  b. installing a locking gate with fencing to prevent bypassing the gate;

  c. in extremely sensitive areas, planting conifers or other appropriate shallow-rooted trees and/or shrubs across the ROW except where access is required for Tennessee's use. The spacing of trees and/or shrubs and length of ROW planted will make a reasonable effort to prevent unauthorized vehicle access and screen the ROW from view. A gate may be used in conjunction with the screening. This method will be used only when reflected on site-specific plans or other specifications; or

  d. installing a barrier across the ROW consisting of slash and timber, piping, a line of boulders or a combination thereof.

- Signs, gates, and marker posts shall be maintained as necessary

2.24.3 Invasive Species Management

The specific objective of invasive species management is to control invasive plant species within areas subject solely to Council jurisdiction by means of limited herbicide use in concert with other control methods such as mechanical removal, mowing and cutting, if necessary. The rationale for controlling invasive species with herbicides is to ensure that the existing ecosystem is not compromised by the colonization and dominance of these species. Invasive species reduce the effectiveness of the ecosystem by competing with existing native species for light, nutrients and water. They can also change habitat structure, adversely affect native seed production and alter hydrologic regimes. Tennessee's certificate application for the Project includes a Draft Invasive Species Management Plan. That plan is intended to serve as a guideline for the eradication and/or control of invasive plant species that occupy the Project area and provide the necessary tools for successful eradication and/or control of invasive species. That plan is subject to modifications as data collection warrants. Invasive species management will be conducted on the permanent pipeline easement as well as in temporary workspace areas, unless otherwise requested by the landowners.

Although it may be impossible to totally eliminate all invasive species in the Project area because of such issues as seed drift or colonization from off-site locations, Tennessee's overall goal is to control the invasive species to a level such that uplands are not dominated by the invasive species listed below to a point where the function of the system is compromised. Tennessee will follow a program to reduce the levels of invasive species to a non-dominant position during the first three (3) years following construction.

2.24.3.1 Invasive Species Potentially Present

- Japanese Barberry (*Berberis thunbergii*)
- Burning bush or Winged Euonymous (*Euonymous alatus*)
- Multiflora rose (*Rosa multiflora*)
- Autumn olive (*Elaeagnus umbellate*)
- Japanese knotweed (*Polygonum cuspidatum*)
- Common buckthorn (*Rhamnus cathartica*)
- Common reed (*Phragmites australis*), or Phragmites
- Oriental bittersweet (*Celastrus orbiculatus*)

2.24.3.2 General Management Activities

- Tennessee plans to use a foliar herbicide method to control invasive species along the proposed loop segments and at aboveground facilities. Invasive species management will be conducted within the ROW during the same time period as restoration monitoring activities. Herbicides will be applied according to manufacturers' printed recommendations and in accordance with federal and state regulations governing herbicide application. A qualified contractor will be consulted to determine the best management practice for the application of the approved herbicides and may suggest methods other than foliar herbicide application. With guidance from a qualified contractor, Tennessee will also identify the most effective herbicide to use for each application and may modify application techniques or herbicide brands, based on results, site conditions, etc. However, if herbicides are not approved by FERC and/or NJDEP, than mechanical methods will be used in lieu of herbicides.

- To provide for stabilization of the ROW post-construction and re-growth of native species, Tennessee proposes to provide clean (invasive/weed free) topsoil as necessary to re-establish preconstruction surface contours. Disturbed areas within the ROW will be seeded and mulched in accordance with the measures outlined in the above sections.

- Mechanical cutting methods will also help to control some invasive species on Loop 325. The removal of invasive species will be incorporated in the ROW maintenance/mowing plan for the 300 Line.

- Reapplication of herbicides will occur as needed based on the findings of the monitoring listed below. Additionally, mechanical methods may be warranted to remove future growth of invasive species and will be coordinated as needed.

- During the first three years following construction, invasive species monitoring will occur at least yearly and possibly more frequently during the growing season, as recommended by the qualified contractor. These surveys will be performed during the first five years to determine growth by re-sprouting plants or re-colonization. Treatment and retreatment will be conducted accordingly, with timing to be determined by Tennessee and its qualified contractor.

- After the third year of monitoring, Herbicide applications will be managed on an as-needed basis, and eradication efforts will be incorporated into the current ROW mechanical mowing maintenance plan.

TABLE 2.24-1
INVASIVE SPECIES PLAN TIMELINE FOR LOOP 325

Month	Application/Removal Method	Comments
2012[a]		
September	None	Monitoring of restored ROW to identify colonization of invasive species
2013		
May	Foliar Herbicide	
July	Foliar Herbicide / Manual Removal[c]	
2014		
May	Foliar Herbicide	
July	Foliar Herbicide / Manual Removal	
2015		
May	Foliar Herbicide	
July	Foliar Herbicide / Manual Removal	
2016 & Beyond		
ROW mowing	Conducted on a 3 - 5 year basis	

a: Certain aspects of construction, including winter tree clearing to avoid Indiana bat breeding periods, installation of HDD segments, and sensitive commercial and/or residential areas may begin during the second half of 2010. Tennessee also anticipates that certain construction activities will occur at existing Compressor Station 325 beginning in the second half of 2010. The remaining construction activities for the Project are scheduled for 2011.
b: Mechanical method will consist of the excavation of the root stocks
c: Manual removal will consist of the cutting and digging up of the root stocks
d: ROW mowing is conducted on a continual 3 to 5-year rotational basis.

2.24.4 Long-term Maintenance

There is a pervasive federal statutory and regulatory scheme that occupies, to the exclusion of state regulation, the field of interstate natural gas pipeline maintenance and repairs. Included in that federal scheme are the following federal statutes and regulations:

- The Natural Gas Act, 15 USC Sec. 717 et seq.
- The Natural Gas Policy Act, 15 USC Sec. 3301 et seq.
- The National Environmental Policy Act, 42 USC Sec 4321 et seq
- The Natural Gas Pipeline Safety Act, 49 USC Sec 60101 et seq.

- Regulations promulgated by the FERC, located at 18 CFR Parts 154, 157, 284, and 380
- Regulations promulgated by the USDOT, located at 49 CFR arts 190-199.

Tennessee, as a federally regulated interstate natural gas pipeline company, is legally bound to comply with these statutes and regulations. To further assist the Highlands Council staff in understanding some of the federal regulation to which Tennessee's maintenance and repair activities are subject, Tennessee is identifying below, for informational purposes only, maintenance and repair activities that may be required for interstate natural gas pipeline facilities and the environmental compliance required for by the FERC for such activities.

2.24.4.1 Interstate Natural Gas Pipeline Maintenance and Repair Activities

After initial construction activities of interstate natural gas pipeline facilities (performed pursuant to the conditions of the specific certificate order for the Project, the FERC-approved Implementation Plan, and applicable regulations), post-construction and restoration pipeline maintenance and repair activities will take place as needed. These activities include but are not necessarily limited to:

- Testing pipeline facilities including activities such as:
  - pigging the pipeline (i.e. running cleaning and instrumentation tools through the pipeline);
  - hydrostatic testing (i.e. isolating a pipeline segment and testing strength by filling and pressuring the pipeline segment with water); and
  - excavating the pipeline for direct inspection.
- Anomaly remediation (corrective action taken as a result of pipeline inspections) such as:
  - repairing pipeline coating;
  - replacing pipeline coating;
  - adding steel sleeves to reinforce a pipeline segment; and
  - replacing pipeline segment.
- Mowing and clearing right-of-way.
- Controlling erosion and maintaining cover over pipeline.
- Installing signage (e.g., "Do not dig" and "One Call").
- Installation, modification, or replacement of appurtenant equipment such as:
  - pig launchers and receivers,
  - cathodic protection equipment,
  - drips,
  - ball valves,
  - check valves,
  - blowdown valves,
  - relief valves,
  - valve guards,
  - valve operators,
  - concrete saddles and pads to protect pipe,
  - communication equipment,
  - electronic gas measurement equipment,
  - transducer,
  - flanges,
  - gas sampler,
  - flow control equipment,
  - flow computer,
  - check meters,

- o jumper pipeline,
- o yard piping, and
- o pressure regulation.

2.24.4.2Maintenance and Repair Activities Pursuant to Original Certificate Order

Although routine post-construction maintenance and repair activities may be done without any further authorization from the FERC beyond the certificate order authorizing the initial construction and operation of the facilities (if such activities can be accomplished within the original footprint of construction), interstate natural gas pipelines are required to adhere to the FERC's maintenance requirements in Section 380.15 of the FERC's regulations, 18 C.F.R § 380.15 (2008). These requirements include the following:

- Avoid or minimize effect on scenic, historic, wildlife, and recreational values.
- The requirements of Section 380.15 of the FERC's regulations do not affect a pipeline's statutory obligations to comply with the safety regulations of the U.S. Department of Transportation.
- The desires of the landowners should be taken into account so long as the result is consistent with applicable requirements of law, including laws relating to land-use and any requirements imposed by the FERC.
- Vegetative covers established on a right-of-way should be properly maintained.
- Access and service roads should be maintained with proper cover, water bars, and the proper slope to minimize soil erosion. They should be jointly used with other utilities and land-management agencies where practical.
- Chemical control of vegetation should not be used unless authorized by landowner or land-managing agency. When chemicals are used for control of vegetation, they should be approved by EPA for such use and used in conformance with all applicable regulations.
- Unobtrusive sites should be selected for the location of above-ground facilities.
- Above-ground facilities should cover the minimum area practicable.
- Noise potential should be considered in locating compressor stations, or other above-ground facilities.
- The exterior of above-ground facilities should be harmonious with surroundings and other buildings in the area.
- The site of above-ground facilities that are visible from nearby residences or public areas should be planted in trees and shrubs or other appropriate landscaping, and should be installed to enhance the appearance of the facilities consistent with operating needs.

In addition to the above-listed requirements, the FERC imposes conditions related to maintenance and repair activities in its orders issuing certificate authorizations. Such conditions may relate to construction techniques, restoration requirements or on-going maintenance of pipeline right-of-way. For example, the FERC routinely includes the following condition in orders authorizing pipeline construction:

> Routine vegetation maintenance clearing shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be maintained annually in a herbaceous state. Routine vegetation maintenance clearing shall not occur between April 15 and August 1 of any year. This condition is also one of the myriad of provisions in FERC's "Upland Erosion Control, Revegetation and Maintenance Plan". By including the provision in its order, FERC is placing this requirement on the pipelines for the life of the pipeline.

When repair and maintenance activities require excavation, Tennessee will restore excavated sites to pre-excavation contours and will monitor the disturbed area until the site is successfully revegetated. As noted above, the desires of the landowner will be taken into account so long as the result is consistent with applicable requirements of law and any requirements imposed by the Commission. Tennessee follows the applicable FERC guidelines as stated in FERC's Plans and Procedures. Copies of the Plan and Procedures are enclosed with this CMP.

2.25 Comprehensive Mitigation Plan Summary

This report has been prepared to provide an overview of the Project, identify the Highlands resource areas affected, and to detail the components that are proposed to be included within the CMP to minimize impacts to the Highlands. Tennessee is currently preparing to submit several required permit applications which will finalize details of the proposed Project. Through the FERC certification and state permitting processes, Tennessee has benefited from the public and agency input received on the Project, and has redesigned elements of the Project in direct response to the concerns presented. The proposed development of the various components of the CMP as detailed in this document will also provide stakeholders, including landowners and agencies, with the opportunity for additional input as to ways that Tennessee may reduce, minimize, and mitigate for the environmental impacts of the Project. Through implementation of this CMP during the construction and restoration process for the Project, Tennessee believes that the Project will meet the goals and purposes of the Act.

3.0 References

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APPENDIX A

TENNESSEE GAS PIPELINE COMPANY, L.L.C.

300 LINE PROJECT

ENVIRONMENTAL CONSTRUCTION PLAN – New Jersey

APPENDIX B

FERC UPLAND EROSION CONTROL, REVEGETATION AND MAINTENANCE PLAN

APPENDIX C

FERC WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES