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

December 31, 2014

State of New Jersey Highlands Water Protection and Planning Council
Attn: Keri Benscoter
100 North Road (Route 513)
Chester, NJ 07903-2322

RE: Submission of Year 3 Post-construction Monitoring Report; Tennessee Gas Pipeline Company, 300 Line Project: New Jersey Highlands Region.
Docket No. CP09-444-000.
NJDEP File No. 0000-09-0038.1.

Dear Ms. Benscoter,

Tennessee Gas Pipeline Company, L.L.C. is pleased to submit the enclosed Year 3 Post-Construction Monitoring Report for the referenced project. This report documents Tennessee Gas' continued efforts to ensure compliance with all applicable environmental post-construction monitoring requirements. This report demonstrates our inspections of all disturbed wetlands, waterbodies, uplands, and open water buffer areas. These will continue to be monitored and reported annually until successful restoration is achieved.

If you have any questions concerning this filing, please contact Chris Cable at (518) 533-9847 or me at (303) 914-7621.

Respectfully submitted,

Dan Dell'Agnese
Environmental Project Manager

cc: R. Reilly, NJDEP Land Use Regulation Program
C. Cable, Tetra Tech, Inc.

TENNESSEE GAS PIPELINE COMPANY L.L.C.
300 LINE PROJECT- 325 LOOP
NEW JERSEY HIGHLANDS REGION

30-inch Loop 325, Sussex and Passaic Counties, New Jersey

POST-CONSTRUCTION MONITORING REPORT
YEAR 3

December 2014

Prepared for:

New Jersey Highlands Council
100 North Road
Chester, NJ 07930

Prepared by:

Tetra Tech, Inc.
285 Ellicott Street
Buffalo, New York 14203

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1.0 INTRODUCTION

Tennessee Gas Pipeline Company, L.L.C's ("Tennessee") 300 Line Project ("Project") entailed construction of approximately 127 miles of 30-inch pipeline, including 111 miles in northern Pennsylvania and 16 miles in northwestern New Jersey. The Pennsylvania portion of the Project comprises six pipeline loops while the New Jersey portion consists of a single loop, Loop 325. The Project was constructed and placed in-service on November 1, 2011, following receipt of authority from the Federal Energy Regulatory Commission ("FERC"). Environmental restoration activities continued through the spring of 2012, with supplemental planting occurring in 2013 and 2014.

Tennessee developed a Comprehensive Mitigation Plan ("CMP") in support of the Loop 325 segment of the Project located within New Jersey's Highlands Region in Sussex and Passaic Counties, New Jersey. Tennessee requested a determination from the New Jersey Highlands Council ("Council") and the New Jersey Department of Environmental Protection ("NJDEP") that the Loop 325 segment of the Project be exempt from the Highlands Water Protection and Planning Act, N.J.S.A. 13:20-1 et seq. ("Act"). The requested exemption was granted by the Council and the NJDEP. The CMP was developed to set forth a plan of construction and restoration by which Tennessee would avoid, minimize, and mitigate any impacts to Highlands Region resources so that there will be no net loss of such resources.

As part of the CMP, Tennessee agreed to provide copies to the Council of the Project's periodic status reports filed with the FERC (initially filed weekly, and now filed quarterly as of August 2012). Tennessee had provided and will continue to provide those reports to the Council. In addition, as discussed in Section 2.2.2 of the CMP, Tennessee agreed to prepare and provide to the Council an annual monitoring report, for three years following construction or until such time as wetland revegetation is successful, and to document the status of the open water buffer revegetation efforts in the Highlands Region. Also, as discussed in Section 2.2.6 of the CMP, Tennessee agreed to prepare and provide to the Council an annual monitoring report, for three years following construction, to document restoration of the Highlands resource areas in the Highlands Region, including examining areas for invasive species.

Tennessee has contracted with Tetra Tech, Inc. ("Tetra Tech") to provide post-construction monitoring for the Loop 325 segment of the Project located in the Highlands Region. This monitoring report has been prepared to comply with the monitoring requirements from the CMP, as outlined above, for the third year of restoration activities following completion of construction and placing the Project in-service. The post-construction monitoring discussed herein involved the completion of vegetation monitoring of the entire Right-of Way ("ROW") including all disturbed wetlands, waterbodies, uplands, and open water buffer areas in the Highlands Regions, as shown in the alignment sheets (set forth in Appendix A).

This report provides results of the 2014 monitoring including purpose and objectives (Section 3.0), survey area description (Section 4.0), monitoring methods (Section 5.0), monitoring results (Section 6.0), and a brief discussion of results (Section 7.0).

2.0 SUMMARY OF PROJECT REPORTS AND PERMITS

Sections within this report refer to three Project-specific environmental reports: the Environmental Construction Plan–New Jersey ("ECP"); the Mitigation Plan, and the No Net Loss Reforestation ("NNL") Plan. All three documents establish an overall plan for construction and restoration by which Tennessee would avoid, minimize, and mitigate impacts to resources so that there would be no net loss of such resources (TGP 2010). Each report covers either the entire Loop 325 segment of the 300 Line or a discrete section of it. Brief descriptions of the reports are provided below.

The ECP describes the basic environmental construction techniques that were implemented during the construction of Loop 325 and will be adhered to during post-construction restoration and maintenance activities. The ECP incorporated generally the provisions set forth in the FERC's "Wetland and Waterbody Construction and Mitigation Procedures" and FERC's "Upland Erosion Control, Revegetation and Maintenance Plan", with a few variations approved by the FERC, as well as the terms and conditions of the Mitigation Plan. The ECP further incorporated guidelines and recommendations, including those outlined in permits, from the U.S. Army Corps of Engineers ("USACE"), the U.S. Department of Agriculture, and the Natural Resources Conservation Service ("NRCS").

The Mitigation Plan pertains to the entire Loop 325 located in Sussex and Passaic Counties, New Jersey. Tennessee requested a determination from the New Jersey Highlands Council ("Council") and the New Jersey Department of Environmental Protection ("NJDEP") that the Loop 325 segment of the Project is exempt from the Highlands Water Protection and Planning Act, N.J.S.A. 13:20-1 et seq. In support of the exemption, Tennessee developed the Mitigation Plan to establish a plan of construction and restoration by which Tennessee would avoid, minimize, and mitigate any impacts to resources so that there will be no net loss of such resources. The requested exemption was granted by the Council and the NJDEP.

The CMP is similar to the Mitigation Plan but pertains to only those sections of the 325 Loop that are within the Highlands Region. The CMP outlined a plan of construction and restoration by which Tennessee would avoid, minimize, and mitigate any impacts to Highlands Region resources so that there would be no net loss of such resources.

The NNL Plan was developed in accordance with the New Jersey No Net Loss Reforestation Act and Program Guidelines. The NNL Plan describes the reforestation specifications in the Project area within state owned lands, including the Highlands Region. The NNL Plan, in combination with the Mitigation Plan and the CMP, created a reforestation plan to replant the majority of impacted forested areas within the temporary and additional temporary workspaces.

Other Project permits that pertain to freshwater wetland mitigation and/or restoration include: FERC Certificate of Public Convenience & Necessity, US Fish and Wildlife Service Clearance Letters, Bureau of Land Management- Right of Entry, New Jersey Historic Preservation Office Clearance, New Jersey DEP Land Use Regulation Program- Highlands Applicability and Water Quality Management Plan Consistency Determination, New Jersey DEP Division of Water Supply- Temporary Dewatering Permit, New Jersey DEP Land Use Regulation Program- Freshwater Wetlands and Flood Hazard Area Permits, New Jersey DEP Bureau of Water

Allocation- Short Term Water Use Permit by Rule, New Jersey Division of Fisheries and Wildlife-Water Lowering Permits, NJPDES GP – 5G3 Construction Activity Stormwater Permit (GP), and Stormwater Discharge from the Soil and Water Conservation Districts (referred to as "permits" in the remaining document).

3.0 PURPOSE AND OBJECTIVES

Tasks and objectives associated with the post-construction monitoring as outlined in the CMP include:

- Monitor and record the success of revegetation in the Highlands resource areas for the first three years post-construction (November 1, 2011 to October 31, 2014), or until revegetation is successful.
- Identify the presence of non-native species and determine if there is a need for treatment or additional restoration measures.
- Prepare a report suitable for filing with the New Jersey Highlands Commission identifying the status of the revegetation efforts on a yearly basis for three years post-construction. The purpose of this report is to document areas of successful revegetation. The report will include data on percent cover achieved and problem areas (e.g., weed invasion issues and poor vegetation).

4.0 SURVEY AREA

The monitoring program included a survey of all disturbed workspaces within FERC-approved permanent rights-of-way and temporary workspaces (collectively, "ROWs") for the Loop 325 segment of the Project, including all upland areas, wetlands, waterbodies, and open water buffer areas, as delineated prior to initiation of construction. This does not include temporarily used access roads as rights of entry have expired. Appendix A to this report provides the Project alignment sheets and temporary workspaces, along with aquatic resources identified.

5.0 METHODS

The monitoring effort focused on several key criteria established in the ECP and the Comprehensive Mitigation Plan for guidance to assess and evaluate restoration success. The methods developed for this effort were designed to meet a variety of success/compliance criteria as outlined in the ECP as well as the Comprehensive Mitigation Plan.

5.1 General

During this third post-construction monitoring year (November 1, 2013 to October 31, 2014), the ROW was monitored along the entire Project, including the Loop 325 segment. Tetra Tech used a two-person team led by a qualified biologist experienced in wetland delineation and linear natural gas pipeline project restoration to walk all portions of the ROW. A technician also familiar with pipeline restoration accompanied the biologist and provided Global Positioning System (GPS) support.

Parameters evaluated included grade, hydrology, percent vegetative cover, vegetation vigor, community composition, and evidence of nuisance weed invasion. Throughout the Loop 325 segment, the community on the disturbed ROW was compared with an undisturbed portion of the same or similar community located adjacent to the disturbed area. The field team made qualitative and quantitative assessments to determine successful revegetation based on criteria outlined in the ECP and applicable permits. Additional information such as the proper installation of slope breakers, restoration of stream bed, banks, and flow, and third party impacts were also collected to further evaluate the overall restoration of each aquatic feature. Appendix B to this report provides a listing and description of the parameters collected; GPS data was collected for all uplands, open water buffer areas, wetlands, and waterbodies.

Monitoring was performed to evaluate restoration success of uplands, wetlands, waterbodies, and open water buffer areas previously mapped during preconstruction surveys. Each waterbody and wetland feature evaluation was identified with a single GPS point recorded in the approximate center of the wetland or waterbody, and an individual field form completed within the GPS data logger for each feature. Each upland and open water buffer area was also identified with a GPS point and field form completed within the GPS data logger for that upland or open water buffer area. Each feature or area was identified as restored or not restored and additional data was collected to document the restoration or reasons for not meeting success criteria. Those resources not successfully restored were assigned priority values for remedial action. Remedial action ranged from high, requiring immediate action, to low, requiring monitoring next season (i.e., area is estimated to need an additional growing season to reach restoration criteria).

Tetra Tech formulated, maintained, and updated a monitoring results Microsoft Access database to store and track monitoring data. The database contained data entry fields that matched the associated GPS data dictionary developed to facilitate the accurate collection of monitoring data. Tetra Tech used GPS units to designate each monitored resource or area and spatially link this information to the project footprint. Although a GPS data dictionary was used to collect monitoring information, field forms were developed for the project in case of GPS malfunction.

5.2 Upland and Open Water Buffer Monitoring

In accordance with the ECP, Tennessee committed to completing three years of post-construction monitoring inspections of all disturbed areas to determine the success of upland revegetation; this included delineated open water buffer areas. All uplands and open water buffer areas were examined and the following tasks were implemented during the upland and open water buffer areas:

- Compared percent cover between off-ROW and on-ROW areas;
- Photo-documented each area; and
- Noted other pertinent observations such as wildlife use, eroded or unstable areas, noxious and invasive plants, and potential third party impacts.

5.3 Wetland Monitoring

The following tasks were implemented during the wetland monitoring:

- Observed and noted hydrological conditions such as inundation and saturation;
- Compared the percent cover, percent cover of hydrophytes, and distribution of hydrophytes between off-ROW and on-ROW wetland areas;
- Visually estimated wetland shape, topography, and area reduction or increase compared to preconstruction conditions (as shown on construction alignment sheets);
- Visually inspected the restoration of all waterbody crossings located within wetlands;
- Photo-documented each restored wetland; and,
- Noted other pertinent observations such as wildlife use, eroded or unstable areas, noxious and invasive plants, and potential third party impacts.

Tetra Tech monitored all areas previously identified as wetlands during preconstruction surveys and subsequently impacted by construction (some areas were avoided). The assessment of successful revegetation of each wetland was based on criteria in FERC Procedure VI.D.4 and USACE NWP 12 requirements. Specifically, wetland revegetation shall generally be considered successful if cover of herbaceous and/or woody species is at least 80 percent similar in type, density, and distribution of vegetation in adjacent wetlands undisturbed by construction. Problems noted with any of the attributes collected for wetlands resulted in the resource being identified as a problem area (i.e., not restored) and the appropriate priority level for remedial action assigned.

5.4 Waterbody Monitoring

The following tasks were implemented during waterbody monitoring:

- Visually estimated percent cover and success of vegetation restoration (e.g., ≥80% of the cover of the off-ROW cover);
- Visually inspected the restoration of all waterbody crossings (i.e., bed, banks, and flow);
- Photo-documented representative conditions of each restored area; and
- Noted other pertinent observations such as wildlife use, eroded or unstable areas, noxious and invasive plants, and potential third party impacts.

Tetra Tech monitored waterbodies previously identified during preconstruction surveys and subsequently impacted by construction (some areas were avoided). The assessment of successful revegetation of each waterbody was based on criteria in the FERC Procedures and USACE NWP 12 requirements. Problems noted with any of the attributes collected for waterbodies resulted in the resource being identified as a problem area (i.e., not restored) and the appropriate priority level for remedial action assigned.

5.3 Wetland Monitoring

The following tasks were implemented during the wetland monitoring:

- Observed and noted hydrological conditions such as inundation and saturation;
- Compared the percent cover, percent cover of hydrophytes, and distribution of hydrophytes between off-ROW and on-ROW wetland areas;
- Visually estimated wetland shape, topography, and area reduction or increase compared to preconstruction conditions (as shown on construction alignment sheets);
- Visually inspected the restoration of all waterbody crossings located within wetlands;
- Photo-documented each restored wetland; and,
- Noted other pertinent observations such as wildlife use, eroded or unstable areas, noxious and invasive plants, and potential third party impacts.

Tetra Tech monitored all areas previously identified as wetlands during preconstruction surveys and subsequently impacted by construction (some areas were avoided). The assessment of successful revegetation of each wetland was based on criteria in FERC Procedure VI.D.4 and USACE NWP 12 requirements. Specifically, wetland revegetation shall generally be considered successful if cover of herbaceous and/or woody species is at least 80 percent similar in type, density, and distribution of vegetation in adjacent wetlands undisturbed by construction. Problems noted with any of the attributes collected for wetlands resulted in the resource being identified as a problem area (i.e., not restored) and the appropriate priority level for remedial action assigned.

5.4 Waterbody Monitoring

The following tasks were implemented during waterbody monitoring:

- Visually estimated percent cover and success of vegetation restoration (e.g., ≥80% of the cover of the off-ROW cover);
- Visually inspected the restoration of all waterbody crossings (i.e., bed, banks, and flow);
- Photo-documented representative conditions of each restored area; and
- Noted other pertinent observations such as wildlife use, eroded or unstable areas, noxious and invasive plants, and potential third party impacts.

Tetra Tech monitored waterbodies previously identified during preconstruction surveys and subsequently impacted by construction (some areas were avoided). The assessment of successful revegetation of each waterbody was based on criteria in the FERC Procedures and USACE NWP 12 requirements. Problems noted with any of the attributes collected for waterbodies resulted in the resource being identified as a problem area (i.e., not restored) and the appropriate priority level for remedial action assigned.

6.0 RESULTS

6.1 New Jersey Highlands Analysis

In summary, 127 wetlands, waterbodies, uplands, and open water buffer areas were evaluated. These areas consisted of 44 wetlands, 24 waterbodies, 29 uplands, and 30 open water buffer areas (Table 1). Of the 127 resources, 93 were successfully restored and 34 were identified as areas of concern (Table 1). All 34 areas of concern were assigned low priority (Table 2). No medium or high priority areas were identified. Low priority areas generally require an additional growing season to allow the area to restore properly or were areas with invasive species present. Restoration is expected to be successful in Year 4 and no remedial action is required, aside from a scheduled invasive species treatment. These will be monitored during the Year 4 effort. Appendix C provides the Year 3 database output summaries; Appendix D provides photographic documentation of all areas inspected; Appendix E provides detailed maps of all areas analyzed.

6.2 Wetland Monitoring

Of the 44 wetlands evaluated, 14 were successfully restored and 30 were identified as areas of concern (Table 1). All 30 areas of concern were low priority and targeted for Year 4 monitoring and invasive species treatment (Table 2). No medium or high priority areas were recorded. Failure was attributable to not meeting one or more of the FERC criteria (i.e., $\geq$80% vegetation cover and/or $\geq$80% cover of hydrophytes, invasive species present). Table 3 provides a summary of wetland monitoring results.

6.3 Waterbody Monitoring

Of the 24 evaluated waterbodies, 20 were successfully restored and 4 were identified as areas of concern (Table 1). All 4 areas of concern were low priority (Table 2) and targeted for Year 4 monitoring. The primary reasons for failure of a waterbody included problems with vegetation cover and density, problems associated with erosion, and/or third-party caused problems.

One waterbody, stream S037, was noted as having rutting damage attributed to continued and persistent use of the ROW by ORV's. At the crossing area of the stream (which is limited to a single, well defined lane), the rutting has damaged the bed and banks of the stream which has in turn decreased vegetation cover on the banks in the affected area and caused the banks of the stream to become unstable and susceptible to erosion. ORV controls have been installed and this may be a historic use of the area. Tennessee will continue to monitor the area and review the ORV controls.

6.4 Upland and Open Water Buffer Monitoring

All 29 evaluated uplands and 30 evaluated open water buffer ("buffer") areas were successfully restored (Table 1).

6.5 Rare, Threatened, or Endangered Flora Monitoring

Pre-construction surveys identified three rare, threatened, or endangered (RTE) floral species within the confines of the proposed and existing pipeline ROWs. A single red spruce tree (*Picea rubens*) and a small population of softleaf sedge (*Carex disperma*) were identified on the proposed

Project ROW in W035. The tree and sedges were transplanted off-ROW outside of the limits of disturbance within wetland W035. The transplant sites were visited on August 18, 2014 to assess the health and condition of the two (2) species. The red spruce transplanting continues to appear successful, and straps and stabilization measures have been removed. The understory and some of the tree canopy surrounding the tree is dense, but the tree appears healthy and continues to grow. Biologists observed several different sedge species in the vicinity of where *C. disperma* was transplanted. This area will be revisited during the appropriate survey window in 2015 to confirm presence/absence of *C. disperma*. Six juvenile specimens of American-fly honeysuckle *(Lonicera canadensis)* were identified at approximate MP 12.52 in West Milford Township, Passaic County, New Jersey. The specimens were observed on the south side of the maintained ROW over the existing pipeline on an exposed rocky outcropping near the southern limits of the survey corridor. During the same monitoring period in August 2014, biologists attempted to locate this species in the given location, but were unable to locate any specimens. The red spruce, and those species that were not located during 2014, will be re-examined during the 2015 Year 4 monitoring event.

6.6 Non-Native Nuisance Species

In adherence to the Comprehensive Mitigation Plan, Tennessee will conduct 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. If vegetation cover is not successful or there is a need for noxious weed control measures, an experienced agronomist shall be used to determine the need for additional resource measures.

Throughout the New Jersey Highlands region, nuisance species were located in many areas adjacent to the ROW, primarily on the Tennessee number one line and in forest edges. These nuisance species have begun to colonize the new ROW in some areas. The most common invasive species found along the ROW edges were *Lythrum salicaria, Phragmities australis, Phalaris arundinacea, Rosa multiflora, Elaneagnus umbellate, Alliaria petiolata,* and *Berberis thunbergii.*

During the environmental monitoring, *Berberis thunbergii, Elaeagnus umbellate, Lythrum salicaria*, *Phalaris arundinacea, Phragmities australis,* and *Rosa multiflora* were found within the ROW. Most areas of the ROW that had invasive species also had invasives present off ROW in densities similar as what was surveyed on the ROW. The invasive species have begun to migrate further into the ROW and are becoming dominant in some areas. Many areas documented in this report are still similar to off ROW conditions, but there is concern of their spread impacting survival of the plantings.

Although it is believed that much of the invasive species spread is attributable to natural seeding or vegetative reproduction and not caused by construction activities, these areas will be included in a spring invasive species treatment plan to ensure that densities remain similar or less than what was found off ROW as well as provide suitable growing conditions for the plantings. The ROW will be evaluated again in Year 4 post-construction monitoring to monitor for any new species sightings or spread.

6.7 Quantitative Sampling

In adherence to the CMP, Tennessee performed quantitative sampling to determine the type and quantity of tree and shrub species naturally colonizing and re-sprouting in the construction ROW and quantitative sampling of the revegetation efforts to track survival rates and ensure supplemental plantings are completed to meet pre-determined survival thresholds.

During the spring of 2012, a large scale reforestation plan was implemented across the Loop 325. About 77,000 trees, shrubs, and herbaceous plants were planted in upland and wetland areas. This reforestation effort was again implemented in the spring and fall of 2014 with 28,930 trees and shrubs planted respectively. The No Net Loss Reforestation Plan, the Wetland Mitigation Plan, and the Comprehensive Mitigation Plan created a reforestation guide to replant the majority of impacted forested areas within the temporary and additional temporary workspaces. These areas must meet minimum survival percentages and care and replanting efforts must be completed to maintain goals ranging from 75 percent to 95 percent depending on size and location.

6.7.1 Volunteer and re-sprouting tree and shrub species

All plots were taken randomly within upland and buffer areas. Plot sizes were 11.8 feet or one percent of an acre. Not every area has an associated plot, primarily due to manicured lawn sites and similar vegetation types in adjacent areas. The plots completed create an accurate representation of volunteer and re-sprouting trees and shrubs throughout the New Jersey Highlands region of the Tennessee ROW.

Through the sampling, it was noted that the primary colonizing tree species are *Salix nigra* (black willow), *Alnus glutinosa* (European alder), *Alnus incana* (gray alder), *Acer rubrum* (red maple), and *Fraxinus pennsylvanica* (green ash) (Table 4). The growth of hydrophytic herbaceous vegetation has flourished in most areas, making it difficult to find colonizing tree and shrub species. Generally areas that had shorter herbaceous coverage with densities lower than 90 percent also had good re-sprouting/colonizing counts. This year, many re-sprouting and volunteer species were included in the tree and shrubs counts as they met the 18 inch height requirement set forth in the Mitigation Plan.

6.7.2 Planted Trees and Shrubs

Post construction monitoring on the replanting areas were first conducted in August 2012 and repeated in 2013 and 2014. This information is included in the *New Jersey Highlands Post Construction Monitoring Report-Year 2*. In addition to the location and survival information, the type of planting and number of trees per acre that were required is also included.

This stocking information from 2012 and 2013, along with information collected by Williams Forestry was used to conduct a replanting effort in May and June of 2014. In total 17,853 trees (16,190 seedlings and 1,663 container trees), plus 43 large caliper balled and burlapped trees were replaced in NNL areas. In October, a total of 7,984 trees (5,504 3ft to 4ft., and 2480 4ft. to 5ft) container trees were planted in CMP areas. In WMP areas, a total of 3,093 trees were replanted. This year's replanting efforts represents a replacement rate of 37 percent (28,930/77,913) of the original 2012 plantings. The forestry company, with approval from the State Forester, also replaced some of the species previously planted with species that are better adapted to stressors. Tree shelters and Coco mats were installed during this year's NNL planting event to aid in the

survival of the planted stock. After the May/June planting event, monitoring found some areas with 100% or more survival (some areas had over the mandatory tree and shrubs/acre). Table 5 includes data from three different monitoring surveys done; the first in April, second in August, and third in October of 2014.

7.0 DISCUSSION

Across the New Jersey Highlands, 73 percent (93/127) of the wetlands, waterbodies, uplands, and buffers met the criteria for successful restoration. Although 27 percent (34) of the resources failed to pass the Year 3 inspection, 100 percent (34/34) were identified as low priority areas. It is expected that with an additional growing season and invasive species treatment these areas will meet project requirements. These areas will be monitored again in Year 4 (2015) to determine if successful restoration has been achieved.

Approximately 32 percent (14/44) of the wetlands investigated were successfully restored with proper vegetation cover, density, and composition of hydrophytes. Of the 30 wetlands that failed to meet success criteria, all were recovering, and in need of another growing season or invasive species treatment to allow these areas to meet project requirements. These areas will again be evaluated for successful restoration in Year 4 (2015).

Approximately 83 percent (20/24) of the waterbodies investigated were successfully restored with proper restoration of bed, banks, flow, and vegetation. Three (3) of the four (4) waterbodies that failed to meet success criteria were recovering and in need of another growing season or invasive species treatment to meet project requirements. These areas will again be evaluated for successful restoration in Year 4 (2015). The one remaining area was identified as requiring remedial action and will be addressed by Tennessee personnel. Removal of an unnecessary silt fence will result in successful restoration.

One hundred percent of the uplands (29/29) and open water buffers (30/30) investigated were successfully restored with proper vegetation cover and density. These areas will be evaluated again for successful restoration in Year 4 (2015).

In summary, we believe the Year 3 monitoring purpose and objectives were met. Notable outcomes from the monitoring include:

1) A complete walkover and inspection of project including wetland and waterbodies to assess successful restoration was performed during the 2014 growing season.
2) A large number of parameters were collected for each evaluation to allow determination of successful restoration based on the Project ECP for New Jersey and USACE NWP 12 criteria.
3) Priority-level assignments to problem areas were used to facilitate remedial action response by TGP.

The results presented herein, on-going remedial actions, and continued monitoring will provide a sound foundation for coordinating and planning the Year 4 effort.

8.0 REFERENCES

Federal Energy Regulatory Commission (FERC). 2003a. Upland Erosion Control, Revegetation, and Maintenance Plan (Plan)

Federal Energy Regulatory Commission (FERC). 2003b. Wetland and Waterbody Construction and Mitigation Procedures (Procedures)

Tennessee Gas Pipeline Company (TGP). September, 2009. Comprehensive Mitigation Plan: Highlands Region.

Table 1. Year 3 post-construction monitoring results by resource type.

	Waterbodies	Wetlands	Uplands	Buffers	Total
Evaluated	24	44	29	30	127
Restored	20	14	29	30	93
Areas of Concern	4	30	0	0	34

Table 2. Year 3 post-construction monitoring areas of concern summary.

Priority	Waterbodies	Wetlands	Uplands	Buffers	Total
Low-Monitor Next Season	4	30	0	0	34

Table 3. Year 3 post-construction monitoring wetland restoration summary.

Description	#
Wetlands monitored	44
Wetlands restored	14
Wetlands failed	30
Impacted by invasive species spread	29
Wetlands with < 80% cover – hydrophytes[1]	1

[1] Wetland failed to meet FERC requirement if the type (i.e., hydrophytes) was less than 80 percent of the adjacent wetland.

Table 4. Year 3 post-construction quantitative re-sprouting/colonizing tree/shrub species

Sample Plot	Re-sprouting/Colonizing Trees and Shrubs in 11.8ft radius	Cover Type
B001-Sample	*Acer, fraxinus, salix*	Primarily clover
U001-Sample	No shrub or tree species found	Primarily grasses and forbs
B002-Sample	No shrub or tree species found	Primarily forbs and grasses
U002-Sample	No shrub or tree species found	Primarily grasses and forbs
B003- Sample	No shrub or tree species found	Primarily clover
U003-Sample	No shrub or tree species found	Primarily grasses
B004-Sample	No shrub or tree species found	Primarily grasses and forbs
U004-Sample	No shrub or tree species found	Primarily forbs
B005-Sample	No shrub or tree species found	Primarily grasses
U005-Sample	No shrub or tree species found	Primarily grasses
B006-Sample	No shrub or tree species found	Primarily grasses
U006-Sample	No shrub or tree species found	Residential lawn
B007-Sample	No shrub or tree species found	Residential lawn
U007-Sample	No shrub or tree species found	Residential lawn
B008-Sample	*Populus*	Primarily grasses and forbs
U008-Sample	No shrub or tree species found	Primarily grasses and forbs
B009-Sample	*Rhus*	Primarily grasses and forbs
U009-Sample	No shrubs or tree species found	Primarily grasses and forbs
B010-Sample	*Fraxinus* and *populus*	Primarily forbs
U010-Sample	No shrubs or tree species found	Primarily forbs
B011- Sample	No shrub or tree species found	Primarily clovers and forbs
U011-Sample	*Quercus* and *Acer*	Primarily grasses and clover
B012-Sample	*Quercus*	Primarily grasses and clover
U012-Sample	*Quercus* and *Rhus*	Primarily grasses and clover
B013-Sample	2 *Quercus*	Primarily grasses and forbs
U013- Sample	*Quercus*	Primarily clover and grasses
B014-Sample	*Quercus, Fagus, Kalmia*	Primarily grasses and clover
U014-Sample	No shrub or tree species found	Primarily grasses and clover
B015-Sample	*Quercus*	Primarily grasses and clover
U015-Sample	*Prunus, acer, quercus, fagus*	Primarily clovers and forbs
B016-Sample	No shrub or tree species found	Primarily grasses and clovers
U016-Sample	*Fagus, quercus, larix*	Primarily clovers and forbs
B017-Sample	*Quercus* and *Lindera*	Primarily clover
U017-Sample	*Acer* and *Quercus*	Primarily clover and forbs
B018-Sample	*Carya* and *Quercus*	Primarily clovers and forbs
U018-Sample	*Quercus* and *Lindera*	Primarily clovers
B019-Sample	*Pinus* and *Quercus*	Primarily cloves and grasses
U019-Sample	*Populus, Prunus, Rhus typhina*	Primarily forbs
B020-Sample	*Quercus, Fraxinus, Tsuga, Pinus*	Primarily forbs
U020-Sample	2 *Quercus*	Primarily grasses and forbs
B021-Sample	No shrubs or trees found	Mowed area – grasses and forbs
U021-Sample	No shrubs or trees found	Mowed area – forbs
B022-Sample	No tree or shrub species found	Primarily grasses and forbs
U022-Sample	*Tsuga, Quercus, Prunus*	Primarily grasses

B023-Sample	No tree or shrub species found	Primarily forbs
U023-Sample	*Pinus* and *Quercus*	Primarily grasses and clover
B024-Sample	*Quercus, Acer, Pinus*	Primarily grasses and forbs
U024-Sample	No tree or shrub species found	Primarily grasses and forbs
B025- Sample	*Quercus* and *Acer*	Primarily grasses and clover
U025-Sample	*Prunus* and *Quercus*	Primarily grasses and forbs
B026-Sample	*Prunus, Alnus, Quercus*	Primarily grasses and forbs
U026-Sample	*Quercus*	Primarily forbs
B027-Sample	*Quercus* and *Lindera*	Primarily grasses and forbs
U027-Sample	No shrubs or tree species found	Primarily forbs
B028-Sample	Unknown tree species	Primarily grasses and forbs
U028-Sample	No shrub or tree species found	Primarily forbs
B029- Sample	No tree or shrub species found	Primarily forbs
U029-Sample	No tree or shrub species found	Primarily grasses and forbs
B030-Sample	*Alnus* and *Salix*	Primarily trefoil and forbs
W003- Sample	15 *Rubus*, 4 *Salix nigra*	Primarily *Phragmities, Symphyotrichum, Solidago, Impatiens capensis*
W014-Sample	1 *Fraxinus pennsylvanica, 2 Salix nigra*	Primarily *Carex, Juncus, Scirpus, Lythrum salicaria,* and *Typha*
W016-Sample	5 *Acer rubrum*, 3 *Salix nigra*	Primarily *Lyrthum salicaria, Typha, Scirpus, Carex, and Glyceria*
W018- Sample	1 *salix nigra*, 1 *Salix discolor*	Primarily *Lythhrum salicaria, Solidago, Verbena, Phragmities, and Eupatorium*
W019-Sample	1 *Acer rubrum, 1 Alnus glutinosa*	Very dense *Carex, Scirpus, and Typha*
W021- Sample	No tree or shrub species found	Primarily *Solidago, Lythrum salicaria, Carex, and Phalaris arundinacea*
W022- Sample	Partially mowed. 1 *Liriodendron tulipifera*,, 1 *Rubus*	Primarily *Typha, Juncus, Carex, and Persicaria*
W027- Sample	15 *rubus, 2 Acer rubrum,* 2 *Spiraea alba*	Primarily *Panicum, Solidago, Scirpus,and Juncus*
W028- Sample	*~50 Acer rubrum, 4 Salix nigra,* 3 *Spiraea alba*	Primarily *Panicum, Scirpus, Carex*
W032- Sample	1 *Acer rubrum*, 2 *Rubus,* 3 *Spiraea alba*	Very dense *Carex, Juncus, Scirpus*
W035- Sample	3 *Alnus incana*, 2 *Alnus glutinosa*, 3 *Salix nigra*	Primarily *Phragmites, Carex, Juncus, Scirpus, and Typha*
W038- Sample	4 *Fraxinus pennsylvanica*, 5 *Acer rubrum*	Primarily *Typha, Leersia,* and *Scirpus*
W039- Sample	1 *Acer rubrum*	Primarily *Solidago, Euthamia, Carex,* and *Helenium autumnale*
W040A- Sample	2 *Alnus glutinosa,* 1 *Alnus incana,*, 2 *Betula*	Primarily *Phragmites, Scirpus, Euthamia,* and *Carex*
W041- Sample	2 *Salix nigra*	Primarily *Phragmites, Typha, Lythhrum salicaria, Carex,*, and *Eupatorium*
W042- Sample	3 *Populus*, 1 *Acer rubrum*, 2 *Betula*	Primarily *Phragmites, Juncus, Eupatorium Carex, Typha,* and *Scirpus*
W047- Sample	5 *Salix nigra*, 1 *Fraxinus pennsylvanica,* 2 *Alnus glutinosa,*	Primarily *Panicum, Carex, Juncus, Symphyotrichum,* and *Euthamia*
W047B- Sample	3 *Salix nigra*	Primarily *Carex, Juncus, Panicum,* and *Microstegium vimineum*
W048- Sample	12 *Vaccinium corymbosum,* 1 *Quercus bicolor*	Pribalrily *Vaccinium corymbosum, Typha, Juncus,* and *Microstegium vimineum*

W049- Sample	5 *Acer rubrum*, 3 *Alnus glutinosa,*	Primarily *Carex, Verbena hastate, Juncus,* and *Scirpus*
W052- Sample	No tree or shrub species found	Primarily *Carex, Juncus* and *Phragmities*
W054- Sample	1 *Fraxinus pennsylvanica*	Primarily *Carex, Juncus* and *Phragmities*
W072- Sample	1 *Rosa multiflora*	Primarily *Typha, Carex, Euthamia, Juncus,* and *Lythrum salicaria*
W121- Sample	3 *Spiraea alba,* 1 *Populus*	Primarily *Carex* and *Solidago*

Table 5. Year 3 Post-construction quantitative sampling of reforestation efforts

Mile Post		Plan	Planted Type	Planted Density (per acre)	April 2014 Monitoring Results				Survival Percent
Begin	End				Date	Plots	Tally	Total (per acre)	
1.49	1.70	CMP	Whip	600	NA	NA	NA	NA	NA
2.04	2.16	CMP	Whip	900	4/24/2014	2	12	600	67%
2.86	3.08	CMP	Whip	600	4/17/2014	12	31	258	43%
4.28	4.30	CMP	Whip	600	4/24/2014	2	8	400	67%
4.63	4.78	CMP	Seedling	900	4/24/2014	5	9	180	20%
5.26	5.38	NNL	Seedling	1210	4/24/2014	26	120	462	38%
5.38	5.41	NNL	Whip	900	4/24/2014	5	19	380	42%
6.50	8.41	CMP	Whip	600	4/17/2014	32	96	300	50%
8.41	8.45	CMP	Seedling	900	4/17/2014	2	8	400	44%
8.45	8.84	CMP	Whip	600	4/24/2014	8	44	550	92%
8.84	9.25	CMP	Seedling	900	4/24/2014	15	72	480	53%
9.25	9.59	NNL	Seedling	1210	4/24/2014	4	27	675	56%
9.59	9.72	NNL	Whip	900	4/24/2014	5	13	260	29%
9.94	12.79	NNL	Seedling	1210	4/18/2014	52	284	546	45%
12.79	13.00	CMP	Whip	600	4/18/2014	12	49	408	68%
13.00	13.20	CMP	Whip	900	4/18/2014	5	8	160	18%
13.36	14.11	CMP	Whip	600	4/23/2014	9	14	156	26%
14.81	15.49	NNL	Seedling	1210	4/18/2013	16	79	494	41%
1.00	15.47	WMP	Container	600	4/17/2014 - 4/24/2014	122	478	392	65%
					Overall Survival Percentage				**48%**

Mile Post		Plan	Planted Type	Planting Density (per acre)	August 2014 Monitoring Results				Percent Survival
Begin	End				Date	Plots	Tally	Total Trees (per acre)	
1.49	1.7	CMP	Whip	600	8/14/2014	8	32	600	100%
2.04	2.16	CMP	Whip	900	8/14/2014	7	25	536	60%
2.86	3.08	CMP	Whip	600	8/14/2014	16	149	1397	233%
4.28	4.30	CMP	Whip	600	8/14/2014	2	19	1425	238%
4.63	4.78	CMP	Seedling	900	8/13/2014	5	26	780	87%
5.26	5.38	NNL	Seedling	1210	8/13/2014	3	21	1050	87%
5.38	5.41	NNL	Whip	900	8/13/2014	7	29	621	69%
6.5	8.41	CMP	Whip	600	8/12/2014	28	134	718	120%
8.41	8.45	CMP	Seedling	900	8/12/2014	10	52	780	87%
8.45	8.84	CMP	Whip	600	8/12/2014	7	43	921	154%
8.84	9.25	CMP	Seedling	900	8/12/2014	14	135	1446	161%
9.25	9.59	NNL	Seedling	1210	8/13/2014	20	123	923	76%
9.59	9.72	NNL	Whip	900	8/13/2014	6	28	700	78%
9.94	12.79	NNL	Seedling	1210	8/11/2014	62	332	803	66%
12.79	13.00	CMP	Whip	600	8/10/2014	14	128	1371	229%
13.00	13.20	CMP	Whip	900	8/10/2014	12	119	1488	165%
13.36	14.11	CMP	Whip	600	8/10/2014	9	37	617	103%
14.81	15.49	NNL	Seedling	1210	8/10/2014	16	175	1641	136%
1.00	15.47	WMP	Container	600	8/10 - 8/14/2014	121	470	583	97%
					Overall Survival Percentage				123%

Mile Post		Plan	Planted Type	Planting Density (per acre)	October 2014 Monitoring Results				Percent Survival
Begin	End				Date	Plots	Tally	Total Trees (per acre)	
1.49	1.7	CMP	Whip	600	10/6/2014	9	34	567	94%
2.04	2.16	CMP	Whip	900	10/6/2014	7	39	836	93%
2.24	2.29	CMP	Whip	900	10/8/2014	6	39	975	108%
2.41	2.42	CMP	Whip	900	10/8/2014	6	33	825	92%
*2.86	3.08	CMP	Whip	-	-	-	-	-	NA
*4.28	4.3	CMP	Whip	-	-	-	-	-	NA
4.63	4.78	CMP	Seedling	900	10/7/2014	7	35	750	83%
5.26	5.38	NNL	Seedling	1210	10/7/2014	4	27	1013	84%
5.38	5.41	NNL	Whip	600	10/7/2014	8	43	806	134%
6.5	8.41	CMP	Whip	600	10/7/2014	30	203	1015	169%
8.41	8.45	CMP	Seedling	900	10/8/2014	10	65	975	108%
*8.45	8.84	CMP	Whip	-	-	-	-	-	NA
8.84	9.25	CMP	Seedling	900	10/8/2014	16	100	938	104%
9.25	9.59	NNL	Seedling	1210	10/8/2014	20	126	945	78%
9.59	9.72	NNL	Whip	600	10/8/2014	8	42	788	131%
9.94	11.22	NNL	Seedling	1210	10/8/2014	33	199	905	75%
11.4	12.79	NNL	Seedling	1210	10/7/2014	62	382	924	76%
12.79	13	CMP	Whip	600	10/7/2014	14	82	879	146%
13	13.2	CMP	Whip	900	10/7/2014	13	80	923	103%
*13.36	14.11	CMP	Whip	-	-	-	-	-	NA
14.81	15.49	NNL	Seedling	1210	10/8/2014	20	129	968	80%
*1	15.47	WMP	Container	-	-	-	-	-	NA
					Overall Survival Percentage				105%

*Areas not surveyed due to active/upcoming planting events.