



Transcontinental Gas Pipe Line Company, LLC

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**NORTHEAST SUPPLY
ENHANCEMENT PROJECT**

**REQUIREMENT J - ENVIRONMENTAL ASSESSMENT FORM:
MODULE S4 - MITIGATION PLAN**

PADEP CHAPTER 105/USACE SECTION 404 JOINT PERMIT APPLICATION

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TABLE OF CONTENTS

1.0 FORESTED WETLAND IMPACTS	2
2.0 FORESTED RIPARIAN FLOODWAY IMPACTS.....	2
3.0 PFO WETLAND PLANTINGS.....	3
4.0 PLANTING MONITORING	3
5.0 MONITORING PLAN	4
5.1 Monitoring Schedule.....	4
5.2 Onsite Wetland and Riparian Monitoring Plan.....	4
5.2.1 Performance Standards.....	4
5.2.2 Adaptive Management Plan.....	5
5.2.2.1 Plant Survival	5
5.2.2.2 Noxious Plant Species Control	5
5.3 Stream Monitoring.....	6
5.3.1 Monitoring Procedures.....	6
5.3.2 Photographic Documentation	6
5.3.3 Detailed Assessments and Datasheets.....	6
5.3.4 Success Criteria.....	7
5.3.5 Adaptive Management.....	7
6.0 WETLAND SEEDING PLAN	7
7.0 RESTRICTIVE LAYER RESTORATION PLAN.....	8
8.0 VERNAL POOL RESTORATION PLAN	13
9.0 REFERENCES.....	14

Drawings Sheet 1 of 2 – Crossing 4: W-T02-001C-1 Planting Plan
 Sheet 1 of 2 – Crossing 2 – WB-T02-012 Restoration Plan

PROJECT OVERVIEW

Transcontinental Gas Pipe Line Company, LLC (Transco) has prepared a Mitigation Plan for the Northeast Supply Enhancement Project – Quarryville Loop (Project) as part of the Joint Permit Application for the United States Army Corps of Engineers (USACE) and Pennsylvania Department of Environmental Protection (PADEP). The Project will take place in Drumore, East Drumore, and Eden Townships, Lancaster County, Pennsylvania. The proposed Mitigation Plan includes onsite restoration at Crossing 4 in Eden Township, within the temporary workspace associated with forested components of W-T02-001C-1 at Milepost 1685.7.

During construction, impacts to wetland areas will be minimized by employing the wetland construction procedures specified in the Project's Chapter 102 and 105 applications.

1.0 FORESTED WETLAND IMPACTS

There will be unavoidable temporary and permanent impacts to palustrine forested (PFO) communities. Table 1 summarizes these impacts. Transco proposes maintaining a 10-foot corridor over the pipeline with an herbaceous cover, rather than tree or shrub plantings. This 10-foot corridor is described in Section D (Post-Construction Maintenance) of Exhibit 30 (Project-Specific Wetland and Waterbody Construction and Mitigation Procedures) and the Site Restoration Plan. The herbaceous corridor over the pipeline is required for periodic maintenance surveys to prevent corrosion.

Table 1. Wetland Impacts Within and Outside of 10-ft Maintenance Corridor (Resource Crossing 4)				
Crossing 4 Wetland ID	Wetland Type	Acreage within the 10-ft Herbaceous Corridor (Permanent Conversion to PEM)	Acreage outside the 10-ft Herbaceous Corridor (Replanted/Restored)	Total Acreage
W-T02-001C	PFO	0.001	0.063	0.064
W-T02-010B	PSS	0.001	0.125	0.127

Mitigation for temporary impacts to the PFO wetland will include replanting this area with native wetland trees and seeding with a native herbaceous species seed mix. Permanent impacts to PFO wetlands include the conversion of this wetland type to palustrine emergent (PEM) wetlands through seeding with a native herbaceous species seed mix.

2.0 FORESTED RIPARIAN FLOODWAY IMPACTS

Approximately 0.05 acres of forested riparian floodways exist within the Permanent Easement and 0.13 acres exist within the temporary workspace. A total of 0.18 acres of forested riparian floodways will be impacted. Riparian Buffer Impact Areas are shown on the Site Restoration Plan.

Temporarily impacted forested riparian buffers will involve onsite replanting. After the completion of construction, riparian buffers within the ROW will be restored to pre-construction contours. Forested riparian buffers were mapped using aerial imagery for perennial and intermittent watercourses. Impacted forested riparian buffers will be replanted with native live stakes, bare root or container tree species outside the permanent maintained ROW up to 5 feet from the pipeline centerline. A ten-foot-wide herbaceous corridor will remain over the pipeline and in between existing pipelines to allow for pipeline maintenance.

The vegetative design of the forested riparian buffers includes native tree species that were selected based on the Department of Environmental Protection's Riparian Forest Buffer Guidance, document number 394-5600-001 and observations of woody vegetation within riparian buffers during field surveys. The trees selected for forested riparian buffer replanting are listed below:

RIPARIAN BUFFER REPLANTING SPECIES LIST			
Common Name	Scientific Name	Status	Stratum
Pin Oak	<i>Quercus palustris</i>	FACW	Tree
Swamp White Oak	<i>Quercus bicolor</i>	FACW	Tree
Boxelder	<i>Acer negundo</i>	FACW	Tree
Eastern Hemlock	<i>Tsuga canadensis</i>	FACU	Tree
Blackgum	<i>Nyssa sylvatica</i>	FAC	Tree
American Sycamore	<i>Platanus occidentalis</i>	FACW	Tree

3.0 PFO WETLAND PLANTINGS

This section describes the proposed plantings to mitigate for the temporary and permanent impacts to the PFO wetland, both within and outside of the 10-foot maintenance corridor.

PFO portions of wetland W-T02-001C-1 in Crossing 4 that are located within the temporary workspace outside of the 10-foot corridor (0.038 acres) will be planted with native trees (herein referred to as the replanting area). The replanting area will be planted at a density of 435 stems per acre, which is equivalent to 18 trees, using a variety of trees from the list below. Sheet 1 of 2 – Crossing 4: W-T02-001C-1 Planting Plan outlines the location where the planting is to take place. The trees will be provided with shelters and support stakes. Fertilizer and rodenticide tablets may be used at each planting to help jump start growth and protect against predation from herbivores. To further mitigate browse pressure and improve survivability, trees with a minimum caliper size of 1 to 1.5 inches (8 – 12 foot tall) will be planted. This size range is selected based on industry standards and field experience indicating reduced susceptibility to herbivore damage and improved establishment success. At least three of the following species should be planted in the restoration area:

- Pin Oak (*Quercus palustris*)
- Swamp White Oak (*Quercus bicolor*)
- Boxelder (*Acer negundo*)
- Eastern Hemlock (*Tsuga canadensis*)
- Blackgum (*Nyssa sylvatica*)
- American Sycamore (*Platanus occidentalis*)

In accordance with the delineation report and site-specific ecological conditions, priority will be given to planting Pin Oak (*Quercus palustris*) and Boxelder (*Acer negundo*), as these species are naturally present in the area and are expected to enhance restoration success. Should the above plants be unavailable at the time of planting to obtain a mix of three separate species, an alternative will be proposed for the site and approved by PADEP and/or USACE prior to planting.

4.0 PLANTING MONITORING

Planting and prevention of noxious weed and invasive plant species (prevention methodology),

will be considered successful if the density and cover of noxious weed and invasive plant species does not exceed the density and cover of that on adjacent, undisturbed lands.

Where noxious weed and invasive plant species populations in disturbed areas exceed the density of adjacent, undisturbed locations, Transco will consult with a state-certified applicator and applicable regulating agency to choose the most effective method of control (i.e., herbicide, mechanical, etc.) in accordance with Exhibit 38 – Noxious Weed and Invasive Plant Management Plan.

5.0 MONITORING PLAN

Transco has developed this 5-Year Monitoring Plan to support post-construction restoration. This plan addresses temporary and permanent impacts to wetlands, riparian buffers, and stream resources resulting from construction activities in Pennsylvania.

The Monitoring Plan includes the following:

- A detailed monitoring schedule
- Defined parameters for success
- Adaptive management procedures to address restoration challenges.

5.1 Monitoring Schedule

Monitoring will be conducted as follows:

- Twice annually (spring and fall) for the first two calendar years following construction
- Annually for the subsequent 3 years

Monitoring results will be submitted to the Pennsylvania Department of Environmental Protection (PADEP) on an annual basis.

5.2 Onsite Wetland and Riparian Monitoring Plan

Monitoring of the onsite wetland and riparian buffers shall take place biannually for two years and annually for the remaining three years after planting to determine the success of the replanting areas. During the monitoring, the survival of trees and shrubs will be counted and documented. Any threats to the replanting areas will be documented and remedial measures will be recommended. Photographs will be taken at representative crossings to document the success of the replanting areas. The monitoring reports will include, at a minimum, the following information:

- a) Dates of inspection and names of inspectors;
- b) Photographic Documentation;
- c) Hydrology indicators (wetlands);
- d) Vegetation data
 - a. Percent coverage of hydrophytic species (wetlands);
 - b. Inventory of plant species (wetlands); and,
 - c. Stem count survival for replanted areas.
- e) Identification of any problems that may require remedial measures.

5.2.1 Performance Standards

Performance standards have been established for the onsite wetland and riparian replanting areas. These standards will be used to determine the success of the replanting efforts. By monitoring the sites as proposed in the monitoring plan and comparing results to the performance

standards, a determination of success can be evaluated. For the purposes of this Plan, the term “invasive plant” is used to encompass those plants specifically defined and regulated as noxious under federal or state law and does not include the plant list identified by the Pennsylvania Department of Conservation and Natural Resources, as all of these species are not subject to state regulation (PADCNr n.d.).

The performance standards are as follows:

- Planted trees and shrubs shall meet 85% survival throughout the 5-year monitoring period;
- Riparian plantings shall provide no less than 60% uniform canopy cover upon maturation and shall be appropriate for geographic location;
- The entire wetland and riparian revegetated areas will have at least 85% cover of hydrophytic species (FAC, FACW, and/or OBL);
- Invasive species or noxious weed percent aerial cover, if present, does not exceed the abundance of invasive species in the adjacent areas that were not disturbed by construction, and;
- The site will maintain hydrology for both wetland and water resources.

Additionally, Transco will evaluate whether the activities authorized by this permit caused any loss of hydrology and will submit an evaluation to the Department for review.

5.2.2 Adaptive Management Plan

A qualified professional with documented experience in tree and shrub planting will oversee the project. If plant species or spacing requirements need to be modified during the project, the consultant shall notify PADEP of the modifications and reasons that were necessary to achieve the overall success of the site.

For any areas not progressing towards performance standards, appropriate remedial actions or measures, as outlined below, will be implemented.

5.2.2.1 Plant Survival

The planting plan was developed with the knowledge that specific tree and shrub species need to be selected that survive in wetlands and riparian zones. Several potential challenges to the success of plantings have been identified. These challenges relate to competition from other vegetation, predation by deer and meadow voles, and mortality from excessively wet soils.

To prevent competition with other vegetation, herbicide application is proposed as remedial measure and will be applied at the base of trees and shrubs.

Predation due to deer browse and meadow vole girdling is a noted concern for newly planted woody vegetation. Tree and shrub shelters will protect woody vegetation from browsing. Also, each planted tree / shrub will include the application and reapplications of Repellex tablets (animal repellent).

If the survival rate does not meet performance standards, replanting will take place. Replanting will be based upon best professional judgment when determining the conditions that may have resulted in the low survival rate.

5.2.2.2 Noxious Plant Species Control

Noxious plant species will be documented during all monitoring events. As needed, herbicides will be utilized to control the density of noxious plant species to remain within the threshold of the permit standards.

5.3 Stream Monitoring

The stream monitoring component of the NESE Project is designed to confirm that all watercourse crossings and associated riparian areas are restored to their pre-construction condition. The primary objectives are to:

- Evaluate the physical and biological recovery of stream channels and banks
- Confirm the reestablishment of natural hydrology and sediment transport
- Detect and address erosion, instability, or invasive species presence
- Ensure compliance with PADEP and USACE permit conditions

Monitoring will be conducted over a five-year period to capture both short-term recovery and long-term ecological trends.

Stream monitoring will follow the same schedule as other resource types:

- Biannual inspections (spring and fall) for the first two calendar years post-construction
- Annual inspections (fall) for the subsequent three years

5.3.1 Monitoring Procedures

Monitoring will be conducted using a combination of visual assessments, quantitative measurements, and geospatial documentation. All data will be collected by qualified environmental professionals and managed using GIS-based platforms to ensure spatial accuracy and consistency across monitoring events.

At each stream crossing, the following parameters will be documented:

- Presence or absence of excess fill or construction debris
- Condition and removal status of temporary erosion and sediment controls (e.g., silt fence, filter sock)
- Evidence of invasive or noxious plant species
- Bank stability, including signs of slumping, undercutting, or erosion
- Vegetative cover on banks, including species composition and percent cover
- Restoration of streambed material, with a minimum of six inches of native substrate
- Channel morphology, including sinuosity, bankfull width, and slope
- Hydrologic indicators such as flow continuity, pooling, and groundwater interaction

5.3.2 Photographic Documentation

Each stream crossing will be photo-documented from fixed upstream and downstream locations at the pipeline centerline. These photographs will be taken during each monitoring event and used to visually track changes in channel form, bank stability, and vegetation establishment over time.

5.3.3 Detailed Assessments and Datasheets

If a stream crossing fails to meet success criteria for two or more consecutive years, a detailed assessment will be triggered. This assessment will include:

- Perceived causes of criteria not being met
- Completion of electronic datasheets capturing all physical and biological parameters
- Additional photo documentation from multiple angles
- Evaluation of hydrologic function and sediment transport
- Identification of restoration deficiencies and proposed corrective actions

These datasheets will be standardized across all crossings to ensure consistency and

comparability.

5.3.4 Success Criteria

Stream restoration will be considered successful when the following conditions are met:

- The stream channel contains at least six inches of native streambed material
- Pre-construction contours and sinuosity are restored and maintained
- Banks are stabilized with native vegetation or approved erosion control materials
- No evidence of hydrologic loss or secondary impacts (e.g., channel incision, altered flow paths)
- Invasive species are absent or present at levels below those in adjacent undisturbed areas
- All temporary erosion and sediment controls have been removed following stabilization

5.3.5 Adaptive Management

If monitoring reveals that a stream crossing is not progressing toward success, adaptive management actions will be implemented. These may include:

- Regrading of banks to restore slope and stability
- Installation of additional erosion control measures (e.g., coir logs, riprap, live staking)
- Supplemental planting of native vegetation to increase cover and root reinforcement
- Hydrologic modifications to restore flow patterns or address pooling and scour

All adaptive measures will be documented in the monitoring report and evaluated in subsequent inspections to determine effectiveness.

6.0 WETLAND SEEDING PLAN

Wetlands impacted by the project will be seeded upon final restoration with Ernst PA Piedmont Province FACW Mix (ERNMX-261) at a rate of 20 pounds per acre. This seed mix has been selected as it provides a variety of native, herbaceous species to promote vegetative diversity within the wetlands. Below are the details of the seed mix, and their relative percentages within the mix:

TABLE S4-1 - PA PIEDMONT PROVINCE FACW MIX		
PERCENTAGE OF MIX COMPOSITION	SCIENTIFIC NAME	COMMON NAME
28.00%	<i>Carex vulpinoidea</i>	Fox Sedge
17.20%	<i>Panicum anceps</i>	Beaked Panicgrass
12.00%	<i>Elymus virginicus</i>	Virginia Wildrye
10.00%	<i>Carex lurida</i>	Lurid Shallow Sedge
4.00%	<i>Carex lupulina</i>	Hop Sedge
4.00%	<i>Carex scoparia</i>	Blunt Broom Sedge
4.00%	<i>Verbena hastata</i>	Blue Vervain
3.00%	<i>Juncus effusus</i>	Soft Rush
2.00%	<i>Onoclea sensibilis</i>	Sensitive Fern
2.00%	<i>Scirpus polyphyllus</i>	Many Leaved Bulrush
1.00%	<i>Asclepias incarnata</i>	Swamp Milkweed
1.00%	<i>Aster puniceus</i>	Purplestem Aster
1.00%	<i>Aster umbellatus</i>	Flat Topped White Aster

TABLE S4-1 - PA PIEDMONT PROVINCE FACW MIX		
PERCENTAGE OF MIX COMPOSITION	SCIENTIFIC NAME	COMMON NAME
1.00%	<i>Bidens cernua</i>	Nodding Bur Marigold
1.00%	<i>Carex intumescens</i>	Bladder Sedge
1.00%	<i>Eupatorium coelestinum</i>	Mistflower
1.00%	<i>Eupatorium perfoliatum</i>	Boneset
1.00%	<i>Glyceria canadensis</i>	Rattlesnake Grass
1.00%	<i>Polygonum pensylvanicum</i>	Pennsylvania Smartweed
1.00%	<i>Vernonia gigantea</i>	Giant Ironweed
1.00%	<i>Zizia aurea</i>	Golden Alexanders
0.50%	<i>Symphyotrichum novae-angliae</i>	New England Aster
0.50%	<i>Eupatorium fistulosum</i>	Joe Pye Weed
0.50%	<i>Helenium autumnale</i>	Common Sneezeweed
0.50%	<i>Mimulus ringens</i>	Square Stemmed Monkeyflower
0.50%	<i>Sisyrinchium angustifolium</i>	Narrowleaf Blue Eyed Grass
0.30%	<i>Ludwigia alternifolia</i>	Seedbox

7.0 RESTRICTIVE LAYER RESTORATION PLAN

A study of soils containing fragipan layers, bedrock, and other restrictive layers was completed for the pipeline route. All soils located on the pipeline route were first identified and then reviewed to determine which soils contain a restrictive layer utilizing the Natural Resource Conservation Service (NRCS) Web Soil Survey, Soil Survey Geographic Database (SSURGO) data set for the project area. The results of this review are shown below in Table S4-2 – Project Soils Summary Table.

TABLE S4-2 – PROJECT SOILS SUMMARY TABLE					
Soil Mapping Unit	SOIL SERIES NAME	FRAGIPAN PRESENT	FRAGIPAN DEPTH	DEPTH TO BEDROCK	SOIL TEXTURE
Ba	Baile silt loam	No	—	5 to 10 feet	Silty Clay Loam, Loam
CbA	Chester silt loam, 0 to 3 percent slopes	No	—	6 to 10 feet	Silt Loam, Silty Clay Loam
CbB	Chester silt loam, 3 to 8 percent slopes	No	—	6 to 10 feet	Silt Loam, Silty Clay Loam
CbC	Chester silt loam, 8 to 15 percent slopes	No	—	6 to 10 feet	Silt Loam, Silty Clay Loam
GbB	Glenelg silt loam, 3 to 8 percent slopes	No	—	6 to 10 feet	Clay Loam, Loam
GbC	Glenelg silt loam, 8 to 15 percent slopes	No	—	6 to 10 feet	Clay Loam, Loam
GbD	Glenelg silt loam, 15 to 25 percent slopes	No	—	6 to 10 feet	Clay Loam, Loam
GdB	Glenville silt loam,	Yes	15 to 30 inches	> 60 inches	Silt Loam, Channery

TABLE S4-2 – PROJECT SOILS SUMMARY TABLE

Soil Mapping Unit	SOIL SERIES NAME	FRAGIPAN PRESENT	FRAGIPAN DEPTH	DEPTH TO BEDROCK	SOIL TEXTURE
	3 to 8 percent slopes				Loam
MaB	Manor silt loam, 3 to 8 percent slopes	No	—	> 72 inches	Loam, Sandy Loam
MaC	Manor silt loam, 8 to 15 percent slopes	No	—	> 72 inches	Loam, Sandy Loam
MaD	Manor silt loam, 15 to 25 percent slopes	No	—	> 72 inches	Loam, Sandy Loam
MbD	Manor very stony silt loam, 15 to 25 percent slopes	No	—	> 72 inches	Loam, Sandy Loam
MdF	Manor very stony silt loam, 25 to 60 percent slopes	No	—	> 72 inches	Loam, Sandy Loam
Nd	Newark silt loam	No	—	> 60 inches	Silt Loam
Ud	Udorthents, loamy	No	—	Varies	Varies
W	Water	No	—	N/A	—

No soils were identified as a clay within the Project area. Bedrock was identified within each of the soils series to be located at a minimum of 5 feet (60 inches) below the surface, with a range indicating its location of greater than 5 feet deep. A fragipan was identified in only one soil series, the Glenville Silt Loam. Below is a description of the Glenville soil series, as defined by National Cooperative Soil Survey (NCSS, 2008):

Glenville silt loam – 3 to 8% slopes, extremely stony (GdB): The Glenville soil consists of very deep moderately well drained or somewhat poorly drained soils formed primarily in colluvium or residuum affected by soil creep that is weathered from phyllite, micaceous schist, granitic gneiss and other acid crystalline rocks. A fragipan is located from 15 to 30 inches from the soil surface. The depth to bedrock is more than 60 inches. The taxonomic class is a Fine-loamy, mixed, active, mesic Aquic Fragiudults. A representative Glenville soil profile includes:

Ap--0 to 9 inches, dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; slightly acid; abrupt smooth boundary. (7 to 10 inches thick)

Bt1--9 to 16 inches, yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common distinct clay films on faces of peds and in pores; 5 percent channers; very strongly acid; clear wavy boundary.

Bt2--16 to 19 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common distinct light brownish gray (10YR 6/2) iron depletions on faces of peds and common many prominent strong brown (7.5YR 5/8) masses of oxidized iron between peds; common distinct clay films on faces of peds; 5 percent gravel channers; very strongly acid; clear wavy boundary. (Combined thickness of Bt is 15 to 50 centimeters thick)

Btx--19 to 25 inches, brown (10YR 5/3) silt loam; weak coarse prismatic structure parting to moderate thick platy structure; very firm, brittle, slightly sticky, slightly plastic; common distinct

clay films throughout; many distinct light brownish gray (10YR 6/2) iron depletions on vertical faces of peds and common many prominent strong brown (7.5YR 5/8) masses of oxidized iron between peds; 10 percent gravel; moderately acid; gradual wavy boundary. (15 to 40 centimeters thick)

Btgx--25 to 33 inches; light brownish gray (10YR 6/2), and brown (10YR 5/3) silt loam; weak coarse prismatic structure parting to moderate very thick platy structure; very firm and brittle; slightly sticky and slightly plastic; common distinct clay films on bottom faces of peds; few distinct gray (10YR 6/1) iron depletions and common distinct yellowish brown (10YR 5/4) masses of oxidized iron on vertical faces of peds; 10 percent quartzite channers; common mica flakes; moderately acid; gradual wavy boundary. (0 to 40 centimeters thick)

BC--33 to 39 inches, yellowish brown (10YR 5/4) silt loam; weak coarse subangular blocky structure parting to weak medium subangular blocky; firm, slightly sticky and slightly plastic; many faint pale brown (10YR 6/3) iron depletions on vertical faces of peds; 10 percent quartzite channers common fine mica flakes; moderately acid; gradual wavy boundary.

C--39 to 82 inches; yellowish brown (10YR 5/4) channery loam; massive; friable, nonsticky and nonplastic; many prominent strong brown (7.5YR 5/8) masses of oxidized iron on vertical faces of peds and common distinct grayish brown (10YR 5/2) iron depletions on vertical faces of peds; many fine mica flakes; 15 percent quartzite channers; moderately acid.

Based on the soils summarized above, impacted wetlands were then reviewed to determine which soil series each wetland is within and to determine if a restrictive layer bedrock layer is present. The results of this review are shown below in Table S4-3 – Wetlands with Restrictive Layers Summary. Data represented in the table below is based on the SSURGO data and wetland delineation data, as indicated.

TABLE S4-3 – WETLAND SOILS AND RESTRICTIVE LAYERS

WETLAND NAME	MILEPOST	CROSSING NUMBER	SOIL MAPPING UNIT	SOIL SERIES	FRAGIPAN PRESENT?	FRAGIPAN DEPTH	RESTRICTIVE LITHIC/ PARALITHIC BEDROCK PRESENT	DEPTH TO BEDROCK	SOIL TEXTURES WITHIN PROFILE	DRAINAGE CLASS
W-T02-006	1681.5	1	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	> 60 inches	Silt Loam, Channery Loam	Moderately Well Drained
W-T02-012	1683.5	2	MbF ¹	Manor very stony silt loam, 25 to 60 percent slopes	No	—	Yes	> 72 inches	Loam, Sandy Loam	Well Drained
W-T02-008	1685	3	GbB	Glenelg silt loam, 3 to 8 percent slopes	No	-	No	6 to 10 feet	Clay Loam 0 - 30", Loam	Well Drained
W-T02-001 ³	1685.7	4	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	> 60 inches	Silt Loam, Channery Loam	Moderately Well Drained
	1685.6		CbB	Chester silt loam, 3 to 8 percent slopes	No	—	No	6 to 10 feet	Silt Loam, Silty Clay Loam	Well Drained
W-T02-005 ⁴	1687.4	7	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	> 60 inches	Silt Loam, Channery Loam	Moderately Well Drained
W-T02-009	1688.1	8	Ba ²	Baile silt loam	No	—	Yes	5 to 10 feet	Silty Clay Loam, Loam	Poorly Drained
W-T02-010	1688.45	9	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	> 60 inches	Silt Loam, Channery Loam	Moderately Well Drained
	1688.5		Ba ²	Baile silt loam	No	—	Yes	5 to 10 feet	Silty Clay Loam, Loam	Poorly Drained
W-T06-001 ⁵	1688.7	10	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	> 60 inches	Silt Loam, Channery Loam	Moderately Well Drained
	1688.7		Ba ²	Baile silt loam	No	—	Yes	5 to 10 feet	Silty Clay Loam, Loam	Poorly Drained

TABLE S4-3 – WETLAND SOILS AND RESTRICTIVE LAYERS

WETLAND NAME	MILEPOST	CROSSING NUMBER	SOIL MAPPING UNIT	SOIL SERIES	FRAGIPAN PRESENT?	FRAGIPAN DEPTH	RESTRICTIVE LITHIC/ PARALITHIC BEDROCK PRESENT	DEPTH TO BEDROCK	SOIL TEXTURES WITHIN PROFILE	DRAINAGE CLASS
W-T06-003	1689.3	11	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	> 60 inches	Silt Loam, Channery Loam	Moderately Well Drained
	1689.3		GbC	Glenelg silt loam, 8 to 15 percent slopes	No	—	No	6 to 10 feet	Clay Loam 0 - 30", Loam	Well Drained
W-T02-011	1690.5	12	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	6 to 10 feet	Silt Loam, Channery Loam	Moderately Well Drained
W-T06-004 ⁶	1690.9	13	GdB	Glenville silt loam, 3 to 8 percent slopes	Yes	15 to 30 inches	No	6 to 10 feet	Silt Loam, Channery Loam	Moderately Well Drained
	1690.9		Ba ²	Baile silt loam	No	—	Yes	5 to 10 feet	Silty Clay Loam, Loam	Poorly Drained

¹ Manor very stony silt loam, 25 to 60 percent slopes is listed by NRCS as having a paralithic bedrock layer present.

² Baile silt loam is listed by NRCS as having a lithic bedrock layer present.

³ A shallow aquitard and a textural restrictive layer was identified during the wetland delineation (W-T02-011).

⁴ A shallow aquitard and a textural change was identified during the wetland delineation (W-T02-005).

⁵ The fragipan was found during the wetland delineation (W-T06-001).

⁶ A shallow aquitard and a fragipan were identified during the wetland delineation (W-T06-004).

Based on this assessment, the following was identified:

1. All wetlands are at a minimum 5 feet (60 inches) above bedrock, with wetlands at crossings 2, 8, 9, 10, and 13 containing a restrictive layer of bedrock associated with the Baile silt loam and the Manor very stony loam soil series;
2. No clays were identified within the wetlands, only some have soils with clay components;
3. A fragipan may be present between 15 and 30 inches at Crossings 4, 7, 9, 10, and 12 associated with the Glenville Soil Series.

To mitigate for any potential lateral loss of hydrology within all wetlands, trench plugs will be placed in the pipeline trench, at the borders of each wetland. If bedrock is encountered, the trench plugs will contain the wetlands hydrology and no vertical hydrology loss is anticipated due to the bedrock continuing to act as a restrictive layer. When constructing thru the wetlands, top soil and sub soils will be segregated, if conditions are suitable, as described in the Wetland and Waterbody Construction and Mitigation Procedures. The soils will be placed back into the trench line in the same manner during pipeline restoration.

In addition to the trench plug installation to prevent lateral hydrology loss, the fragipans will be restored at the identified crossings. To complete the construction in these resources, the environmental inspector (EI) shall investigate the soils to determine at what depth the fragipan is located, within the provided 15-30 inch range. Once identified, a triple lift trench line technique will be employed to prevent the mixing of the fragipan soils with overlying soil. The lifts will include 1) topsoil, 2) B horizons not including Bx (fragipan), and 3) remainder of the trenching depth. This technique will ensure fragipan material is not incorporated into the near surface non-fragipan B horizon soil material. Excavated soils will be replaced in the opposite order as they were removed. Proper handling during excavation within fragipan soil units will be closely monitored by the EI to prevent unintentional mixing of the fragipan horizons with the overlying soil horizons.

8.0 VERNAL POOL RESTORATION PLAN

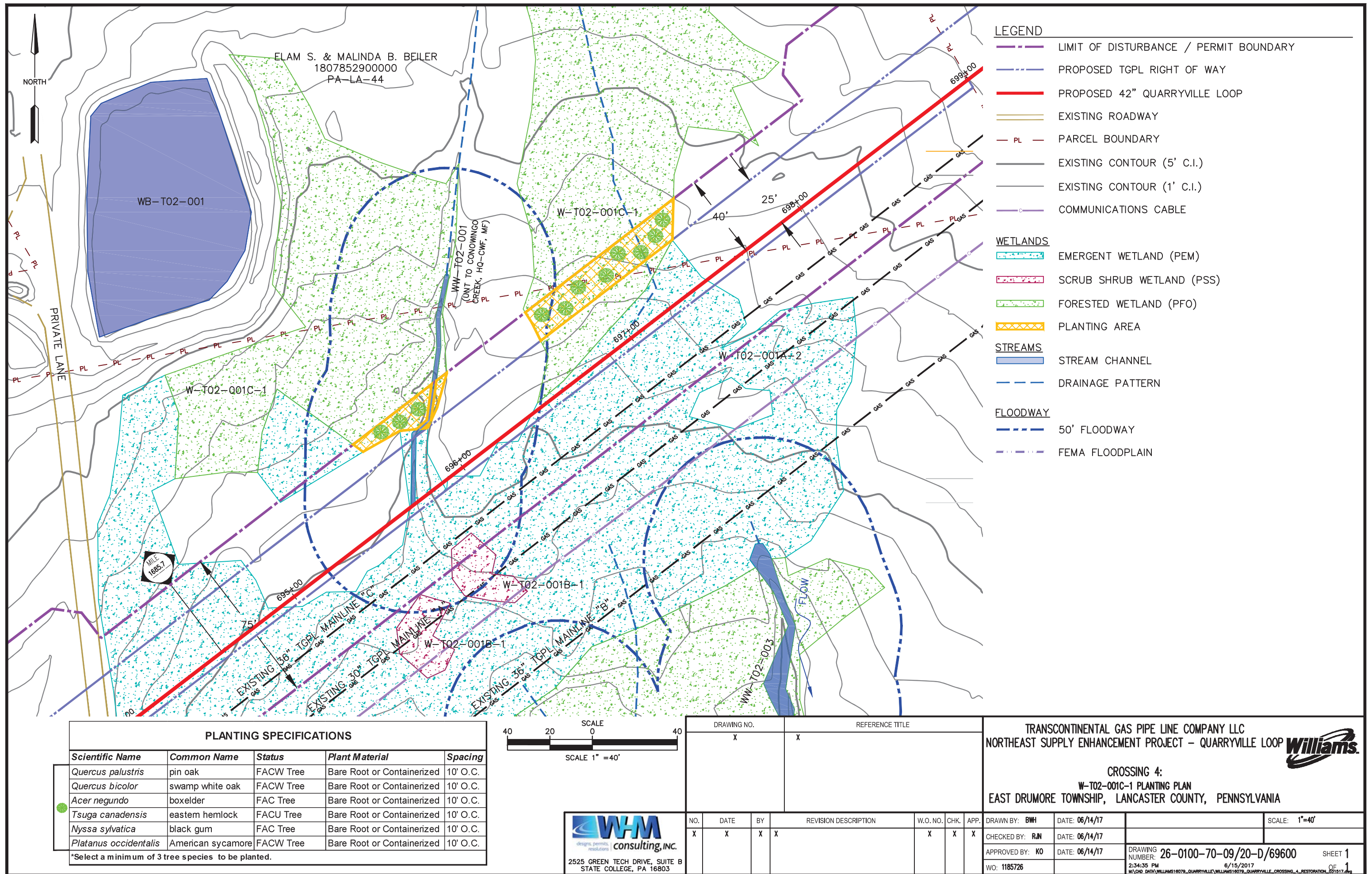
A vernal pool (WB-T02-012) was identified at Crossing 2 and will be impacted by the Project. The feature is approximately 65 feet long and 17 feet wide and 1 foot deep, in its deepest location. The feature is generally an open water portion of a larger wetland complex, W-T02-012. The feature retains its hydrology due to its concave, depression shape. It is located within the Fishing Creek floodplain, the likely groundwater hydrologic source for the vernal pool. Impacts to the vernal pool have been minimized to the extent possible during the route development process by co-locating the Quarryville Loop alongside an existing Transco pipeline right-of-way. A total of 184 square feet of the vernal pool will be impacted. The pipeline trench is not located within the vernal pool, only the Project's workspace. Sheet 2 of 2 – WB-T02-012 Restoration provides detail on the feature, including a plan view and cross sections.

To mitigate for impacts to the resource, Transco will minimize soil compaction by utilizing timber mats to cross the vernal pool and the surrounding wetland. The vernal pool is oval shaped, 17' wide at its widest point within the LOD and approximately 65 feet long. The timber mats (generally 12-16 feet long and 4-8 feet wide) will be placed across the vernal pool, in a manner that the long portions of the mat cross the depression (i.e. the 16-foot wide portion of the mat is placed over the short side of the vernal pool, minimizing compaction within the deepest portions). Pipeline excavation is not proposed within the vernal pool portion of the wetland, only Project workspace is sited here. When completing final restoration and removing the timber matting within the vernal pool, the EI will be onsite to ensure the site is restored to pre-construction elevations and contours, as shown on the provided Sheet 2 of 2. Non-disturbed portions of the vernal pool habitat should be utilized for reference during restoration, along with the pre-construction survey data. The

undisturbed portions of the vernal pool make it an adequate reference resource. Erosion and sediment controls will be installed surrounding the wetland to prevent sedimentation within the resource.

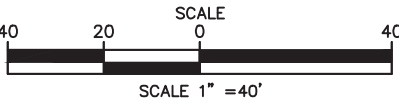
9.0 REFERENCES

National Cooperative Soil Survey (NCSS). "Web Site for Official Soil Series Descriptions and Series Classification." *USDA-NRCS Official Soil Series Description View By List*, United States Dept. of Agriculture—Natural Resources Conservation Service, Feb. 2008, soilseries.sc.egov.usda.gov.



- LEGEND
- LIMIT OF DISTURBANCE / PERMIT BOUNDARY
- PROPOSED TGPL RIGHT OF WAY
- PROPOSED 42" QUARRYVILLE LOOP
- EXISTING ROADWAY
- PARCEL BOUNDARY
- EXISTING CONTOUR (5' C.I.)
- EXISTING CONTOUR (1' C.I.)
- COMMUNICATIONS CABLE
- WETLANDS
- EMERGENT WETLAND (PEM)
- SCRUB SHRUB WETLAND (PSS)
- FORESTED WETLAND (PFO)
- PLANTING AREA
- STREAMS
- STREAM CHANNEL
- DRAINAGE PATTERN
- FLOODWAY
- 50' FLOODWAY
- FEMA FLOODPLAIN

PLANTING SPECIFICATIONS				
Scientific Name	Common Name	Status	Plant Material	Spacing
<i>Quercus palustris</i>	pin oak	FACW Tree	Bare Root or Containerized	10' O.C.
<i>Quercus bicolor</i>	swamp white oak	FACW Tree	Bare Root or Containerized	10' O.C.
<i>Acer negundo</i>	boxelder	FAC Tree	Bare Root or Containerized	10' O.C.
<i>Tsuga canadensis</i>	eastern hemlock	FACU Tree	Bare Root or Containerized	10' O.C.
<i>Nyssa sylvatica</i>	black gum	FAC Tree	Bare Root or Containerized	10' O.C.
<i>Platanus occidentalis</i>	American sycamore	FACW Tree	Bare Root or Containerized	10' O.C.
*Select a minimum of 3 tree species to be planted.				

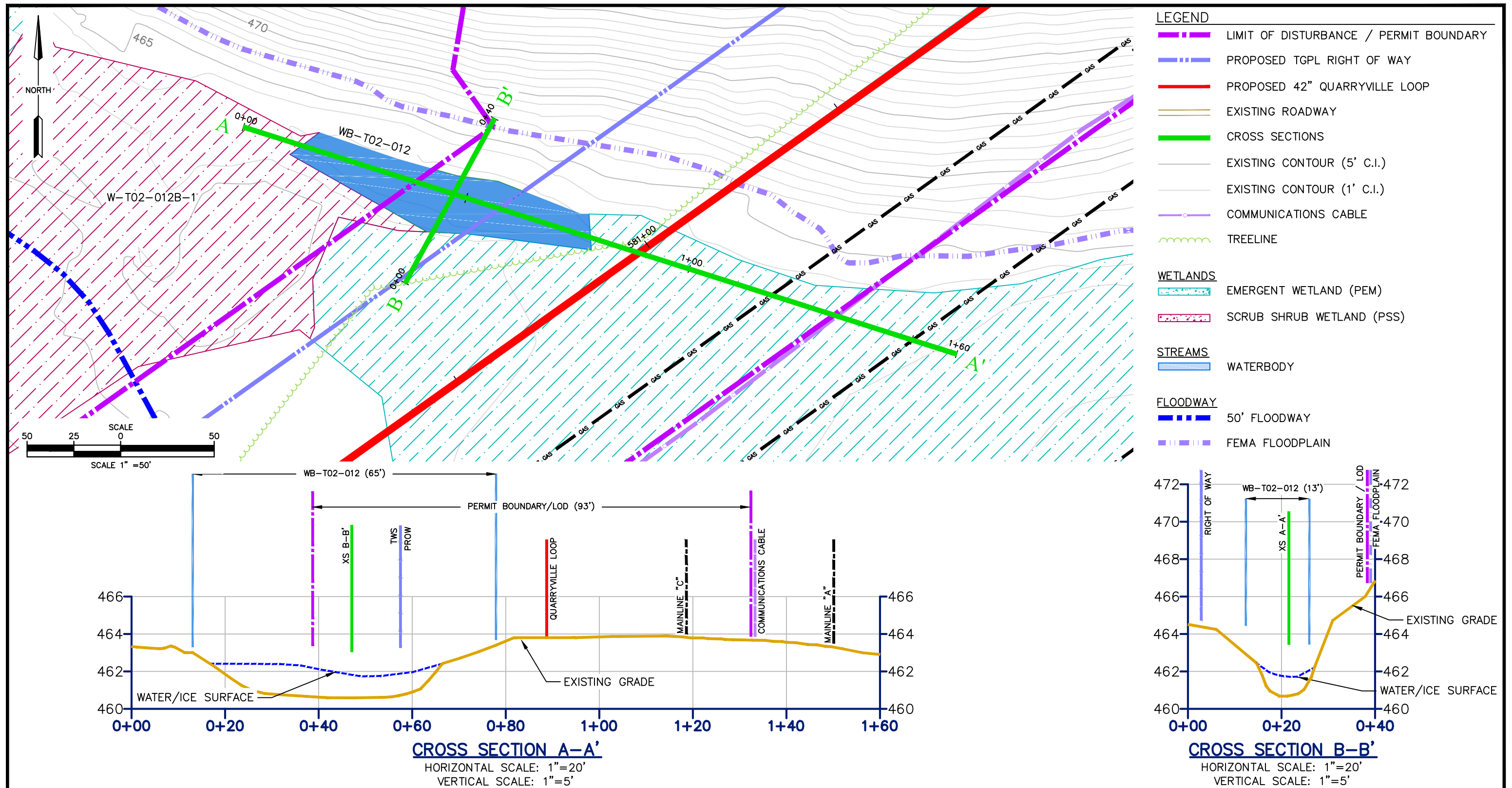


WM

consulting inc.

2525 GREEN TECH DRIVE, SUITE B
STATE COLLEGE, PA 16803

DRAWING NO.			REFERENCE TITLE				TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC NORTHEAST SUPPLY ENHANCEMENT PROJECT – QUARRYVILLE LOOP  CROSSING 4: W-T02-001C-1 PLANTING PLAN EAST DRUMORE TOWNSHIP, LANCASTER COUNTY, PENNSYLVANIA			
X			X							
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: BWI	DATE: 06/14/17		SCALE: 1"=40'
X	X	X	X	X	X	X	CHECKED BY: RJN	DATE: 06/14/17		
							APPROVED BY: KO	DATE: 06/14/17	DRAWING NUMBER: 26-0100-70-09/20-D/69600	SHEET 1
							WO: 1185726	2:34:35 PM 6/15/2017	OF 1	
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- NOTES:
- RESTORE VERNAL POOL TO PRE-CONSTRUCTION LIMITS, ELEVATIONS, AND CONTOURS UNDER OVERSIGHT OF ENVIRONMENTAL INSPECTOR. UTILIZE NON-IMPACTED PORTIONS OF THE VERNAL POOL AS A REFERENCE FOR FINAL CONDITIONS.
 - CROSS SECTION DATA WITHIN THE VERNAL POOL WAS COLLECTED 01/11/18 BY WHM CONSULTING AND SUPPLEMENTED WITH EXISTING CONTOUR SURVEY DATA. ICE CONDITIONS WERE PRESENT AT TIME OF SURVEY.

DRAWING NO.		REFERENCE TITLE		TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC NORTHEAST SUPPLY ENHANCEMENT PROJECT - QUARRYVILLE LOOP			
X		X		WB-T02-012 VERNAL POOL PLAN			
				DRUMORE TOWNSHIP, LANCASTER COUNTY, PENNSYLVANIA			
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: BWH DATE: 01/19/18 CHECKED BY: RJN DATE: 01/19/18 APPROVED BY: KO DATE: 01/19/18 WO: 1185726
							DATE: 01/19/18 DRAWING NUMBER: 26-0100-70-09/20-D/58100-VP 4:00:54 PM 1/19/2018 M:\CAD DATA\WILLIAMS16079_QUARRYVILLE\WILLIAMS16079_QUARRYVILLE_VERNAL_POOL_XS2_011918.dwg
SCALE: 1"=20'				SHEET 1 OF 1			

