AECOM
715 Washington Boulevard
Williamsport, PA 17701

570.505.1674 tel
570.505.1682 fax

June 10, 2020

Pennsylvania Department of Environmental Protection
Regional Permit Coordination Office
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17101

Attention: Dominic Rocco

Reference: Texas Eastern Transmission, LP
Joint Permit Application
Conemaugh River Crossing Project
Westmoreland and Indiana Counties, Pennsylvania

Dear Mr. Rocco,

Texas Eastern Transmission, LP (Texas Eastern or TETLP), a wholly-owned subsidiary of Enbridge Energy Company, Inc. (Enbridge) is requesting authorization from the Pennsylvania Department of Environmental Protection (PADEP) and U.S. Army Corps of Engineers (USACE) under a Joint Permit Application to replace a segment of its Line 12 natural gas pipeline in Derry and Blacklick Townships, Westmoreland and Indiana Counties, Pennsylvania. This project includes more than 0.50 acres of temporary impact to jurisdictional wetlands and therefore requires a USACE review. This project is referred to as the Conemaugh River Crossing Project (Project). Texas Eastern has introduced this Project to PADEP and USACE as well as the Westmoreland County Conservation District (WCCD) and Indiana County Conservation District (ICCD) through pre-application meetings.

Please find enclosed an electronic copy of the Joint Permit Application for a PADEP Water Obstruction and Encroachment Permit and a USACE Section 404 Permit for your review. A check totaling $10,550 for the required fees is also included.

All work will be performed in accordance with Texas Eastern's submitted and approved Erosion and Sedimentation Control Plan (E&SCP) which is in compliance with the Federal Energy Regulatory Commission's (FERC) "Upland Erosion Control, Revegetation, and Maintenance Plan" and "Wetland and Waterbody Construction and Mitigation Procedures." A site-specific E&SCP will be submitted to the WCCD and ICCD for review and approval.

If you have any questions, please do not hesitate to contact Eileen Banach at (860) 888-2249 or eileen.banach@aecom.com or William Brett at (617) 560-1371 or william.brett@enbridge.com.

Yours sincerely,

Eileen Banach
AECOM
Biologist

William Brett
Texas Eastern
Supervisor, Environmental
Construction Permitting

Joint Application for Pennsylvania Water Obstruction and Encroachment Permit and U.S. Army Corps of Engineers Section 404 Permit

Conemaugh River Crossing Project
Westmoreland and Indiana Counties, Pennsylvania

June 2020

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Acronym List

ABACT ..... Antidegradation Best Available Combination of Technologies
WCCD ..... Westmoreland County Conservation District
BMPs ..... Best Management Practices
CEA ..... Comprehensive Environmental Assessment
CWA ..... Clean Water Act
E&SCP ..... Erosion and Sediment Control Plan
EA ..... Environmental Assessment
EA Form ..... Environmental Assessment Form
FERC ..... Federal Energy Regulatory Commission
GIF ..... General Information Form
HDD ..... Horizontal Directional Drill
HGM ..... Hydrogeomorphic Classification
ICCD ..... Indiana County Conservation District
JPA ..... Joint Permit Application
L2RAP ..... Level 2 Rapid Assessment Protocol
LOD ..... Limit of Disturbance
MLV ..... Mainline valve
NRCS ..... Natural Resource Conservation Service
OSHA ..... Occupational Safety and Health Administration
PA DCNR ..... Pennsylvania Department of Conservation and Natural Resources
PADEP ..... Pennsylvania Department of Environmental Protection
PCC ..... Palustrine Community Classification
PEM ..... Palustrine Emergent
PSS ..... Palustrine Scrub/Shrub
PFO ..... Palustrine Forested
PennDOT ..... Pennsylvania Department of Transportation
PFBC ..... Pennsylvania Fish and Boat Commission
PCC ..... Palustrine Community Classification
PGC ..... Pennsylvania Game Commission
PHMSA ..... USDOT Pipeline and Hazardous Materials Safety Administration
PNDI ..... Pennsylvania Natural Diversity Inventory
Project ..... Conemaugh River Crossing Project
SBU ..... Small Boring Units
S.R. ..... State Route
ROW ..... Right-of-Way
Texas Eastern ..... Texas Eastern Transmission, LP

USACE ..... United States Army Corps of Engineers

USDOT ..... United States Department of Transportation

USFWS ..... United States Fish and Wildlife Service

USGS ..... United States Geological Survey

Requirement A

General Information Form (GIF) and Permit Application

0210-PM-PIO0001 4/2018
Form

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

Related ID#s (If Known)		DEP USE ONLY
Client ID#	**APS ID#**	Date Received & General Notes
Site ID#	**Auth ID#**	
Facility ID#		

CLIENT INFORMATION

DEP Client ID#	Client Type / Code
257262	LLC

Organization Name or Registered Fictitious Name	Employer ID# (EIN)	Dun & Bradstreet ID#
Texas Eastern Transmission, LP	72-0378240	

Individual Last Name	First Name	MI	Suffix	SSN

Additional Individual Last Name	First Name	MI	Suffix	SSN

Mailing Address Line 1	Mailing Address Line 2
890 Winter Street, Suite 300	

Address Last Line – City	State	ZIP+4	Country
Waltham	MA	02451	USA

Client Contact Last Name	First Name	MI	Suffix
Brett	William	B	

Client Contact Title	Phone	Ext
Supervisor, Environmental Construction Permitting	(617) 560-1371	

Email Address	FAX
William.Brett@enbridge.com	

SITE INFORMATION

DEP Site ID#	Site Name
	Conemaugh River Crossing Project

EPA ID# **Estimated Number of Employees to be Present at Site** 10

Description of Site
Existing natural gas transmission utility corridor, from an access road directly north of Westinghouse Road to 0.2 mi east of Newport Road.

County Name	Municipality	City	Boro	Twp	State
Westmoreland	Derry	☐	☐	☒	PA
County Name	**Municipality**	**City**	**Boro**	**Twp**	**State**
Indiana	Blacklick	☐	☐	☒	

Site Location Line 1	Site Location Line 2
40 27’ 21.15” N, -79 17’ 57.81”W	Approx. 2.6 mi. north of Blairsville, PA

Site Location Last Line – City	State	ZIP+4
Blairsville	PA	15717

Detailed Written Directions to Site
From PADEP Southwest Regional Office: Take PA-28 S from Waterfront Dr., follow I-376 E and US-22 E to W. Ranson Ave. in Blairsville (44 mi). Take the exit towards PA-217/Blairsville from US-22E. Drive to Newport Rd/State Route 3009 in Black Lick Township(2.4 mi).

Site Contact Last Name	First Name	MI	Suffix
Brett	William	B	

Site Contact Title	Site Contact Firm
Supervisor, Environmental Construction Permitting	Enbridge

Email Address	Mailing Address Line 2
890 Winter Street, Suite 300	

Mailing Address Last Line – City	State	ZIP+4
Waltham	MA	02451

Phone	Ext	FAX	Email Address
(617) 560-1371			William.Brett@enbridge.com

NAICS Codes (Two- & Three-Digit Codes – List All That Apply)	6-Digit Code (Optional)
486	486210

Client to Site Relationship
LESOP Lessee/Operator

FACILITY INFORMATION

Modification of Existing Facility

		Yes	No
1.	**Will this project modify an existing facility, system, or activity?**	☒	☐
2.	**Will this project involve an addition to an existing facility, system, or activity?**	☒	☐

If "Yes", check all relevant facility types and provide DEP facility identification numbers below.

	Facility Type	DEP Fac ID#		Facility Type	DEP Fac ID#
☐	Air Emission Plant		☐	Industrial Minerals Mining Operation	
☐	Beneficial Use (water)		☐	Laboratory Location	
☐	Blasting Operation		☐	Land Recycling Cleanup Location	
☐	Captive Hazardous Waste Operation		☐	Mine Drainage Trmt/Land Recy Proj Location	
☐	Coal Ash Beneficial Use Operation		☐	Municipal Waste Operation	
☐	Coal Mining Operation		☒	Oil & Gas Encroachment Location	GP116505220-004
☐	Coal Pillar Location		☐	Oil & Gas Location	
☐	Commercial Hazardous Waste Operation		☐	Oil & Gas Water Poll Control Facility	
☐	Dam Location		☐	Oil & Gas Wastewater Storage Impoundment	
☐	Deep Mine Safety Operation -Anthracite		☐	Public Water Supply System	
☐	Deep Mine Safety Operation -Bituminous		☐	Radiation Facility	
☐	Deep Mine Safety Operation -Ind Minerals		☐	Residual Waste Operation	
☐	Encroachment Location (water, wetland)		☐	Storage Tank Location	
☐	Erosion & Sediment Control Facility		☐	Water Pollution Control Facility	
☐	Explosive Storage Location		☐	Water Resource	
			☐	Other:	

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Texas Eastern ROW west of Conemaugh River	40	27	21.15	-79	17	57.81

Horizontal Accuracy Measure	Feet --or-- Meters
Horizontal Reference Datum Code	☐ North American Datum of 1927 ☒ North American Datum of 1983 ☐ World Geodetic System of 1984
Horizontal Collection Method Code	GISDR
Reference Point Code	CNTAR
Altitude	Feet 725-900 --or-- Meters
Altitude Datum Name	☐ The National Geodetic Vertical Datum of 1929 ☒ The North American Vertical Datum of 1988 (NAVD88)
Altitude (Vertical) Location Datum Collection Method Code	TOPO
Geometric Type Code	POINT
Data Collection Date	**10/10/2019**
Source Map Scale Number	1 Inch(es) = **2000** Feet
--or--	Centimeter(s) = Meters

PROJECT INFORMATION

Project Name
Conemaugh River Crossing Project

Project Description
Replace a segment of Texas Eastern's existing Line 12 via conventional construction and HDD bore under one wetland and the Conemaugh River along an existing natural gas pipeline; install a new MLV and access road.

Project Consultant Last Name	First Name	MI	Suffix
Banach	Eileen	M	

Project Consultant Title			Consulting Firm	
Biologist			AECOM	
Mailing Address Line 1			**Mailing Address Line 2**	
715 Washington Boulevard				
Address Last Line – City			**State**	**ZIP+4**
Williamsport			PA	17701
Phone	**Ext**	**FAX**	**Email Address**	
860-888-2249		570-505-1682	Eileen.Banach@aecom.com	

Time Schedules	Project Milestone (Optional)
February 2021	Begin Construction
June 2021	End Construction

1.	**Have you informed the surrounding community and addressed any concerns prior to submitting the application to the Department?**	☒	Yes	☐	No
2.	**Is your project funded by state or federal grants?**	☐	Yes	☒	No

Note: If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.
Aspect of Project Related to Grant
Grant Source: _____
Grant Contact Person: _____
Grant Expiration Date: _____

3.	**Is this application for an authorization on Appendix A of the Land Use Policy? (For referenced list, see Appendix A of the Land Use Policy attached to GIF instructions)**	☒	Yes	☐	No

Note: If "No" to Question 3, the application is not subject to the Land Use Policy.
If "Yes" to Question 3, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

LAND USE INFORMATION

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

1.	**Is there an adopted county or multi-county comprehensive plan?**	☒	Yes	☐	No
2.	**Is there an adopted municipal or multi-municipal comprehensive plan?**	☒	Yes	☐	No
3.	**Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance?**	☒	Yes	☐	No

Note: If the Applicant answers "No" to either Questions 1, 2 or 3, the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 4 and 5 below.
If the Applicant answers "Yes" to questions 1, 2 and 3, the Applicant should respond to questions 4 and 5 below.

4.	**Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval?** If zoning approval has been received, attach documentation.	☐	Yes	☒	No
5.	**Have you attached Municipal and County Land Use Letters for the project?**	☐	Yes	☒	No

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	**Is this a coal mining project?** If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0.	☐	Yes	☒	No
1.1	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?**	☐	Yes	☐	No
1.2	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?**	☐	Yes	☐	No
1.3	**Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?**	☐	Yes	☐	No
1.4	**For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?**	☐	Yes	☐	No
1.5	**Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?**	☐	Yes	☐	No
1.6	**Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?**	☐	Yes	☐	No
2.0	**Is this a non-coal (industrial minerals) mining project?** If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0.	☐	Yes	☒	No
2.1	**Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?**	☐	Yes	☐	No
2.2	**Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?**	☐	Yes	☐	No
2.3	**Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?**	☐	Yes	☐	No
2.4	**For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?**	☐	Yes	☐	No
2.5	**Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?**	☐	Yes	☐	No

3.0	**Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well?** If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0.	☐	Yes	☒	No
3.1	**Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?**	☐	Yes	☐	No
3.2	**Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system?** If "Yes", discuss in *Project Description*.	☐	Yes	☐	No
3.3	**Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?**	☐	Yes	☐	No
4.0	**Will the project involve a construction activity that results in earth disturbance?** If "Yes", specify the total disturbed acreage. **4.0.1 Total Disturbed Acreage** 12.8 acres	☒	Yes	☐	No
5.0	**Does the project involve any of the following?** If "Yes", respond to 5.1-5.3. If "No", skip to Question 6.0.	☒	Yes	☐	No
5.1	**Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water?**	☒	Yes	☐	No
5.2	**Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland?**	☒	Yes	☐	No
5.3	**Floodplain Projects by the commonwealth, a Political Subdivision of the commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain?**	☒	Yes	☐	No
6.0	**Will the project involve discharge of stormwater or wastewater from an industrial activity to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?**	☐	Yes	☒	No
7.0	**Will the project involve the construction and operation of industrial waste treatment facilities?**	☐	Yes	☒	No
8.0	**Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations?** If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the *Project Description*, where applicable. **8.0.1 Estimated Proposed Flow (gal/day)**	☐	Yes	☒	No
9.0	**Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system?**	☐	Yes	☒	No
	9.0.1 Was Act 537 sewage facilities planning submitted and approved by DEP? If "Yes" attach the approval letter. Approval required prior to 105/NPDES approval.	☐	Yes	☐	No
10.0	**Is this project for the beneficial use of biosolids for land application within Pennsylvania?** If "Yes" indicate how much (i.e. gallons or dry tons per year). **10.0.1 Gallons Per Year (residential septage)** _____ **10.0.2 Dry Tons Per Year (biosolids)**	☐	Yes	☒	No

11.0	**Does the project involve construction, modification or removal of a dam?** If "Yes", identify the dam. **11.0.1 Dam Name**	☐	Yes	☒	No
12.0	**Will the project interfere with the flow from, or otherwise impact, a dam?** If "Yes", identify the dam. **12.0.1 Dam Name**	☐	Yes	☒	No
13.0	**Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?** If "Yes", identify each type of emission followed by the amount of that emission. **13.0.1 Enter all types & amounts of emissions; separate each set with semicolons.**	☐	Yes	☒	No
14.0	**Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year?** If "Yes", check all proposed sub-facilities.	☐	Yes	☒	No
	14.0.1 Number of Persons Served _____				
	14.0.2 Number of Employee/Guests _____				
	14.0.3 Number of Connections _____				
	14.0.4 Sub-Fac: Distribution System	☐	Yes	☐	No
	14.0.5 Sub-Fac: Water Treatment Plant	☐	Yes	☐	No
	14.0.6 Sub-Fac: Source	☐	Yes	☐	No
	14.0.7 Sub-Fac: Pump Station	☐	Yes	☐	No
	14.0.8 Sub Fac: Transmission Main	☐	Yes	☐	No
	14.0.9 Sub-Fac: Storage Facility	☐	Yes	☐	No
15.0	**Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery?**	☐	Yes	☒	No
16.0	**Is your project to be served by an existing public water supply?** If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project. **16.0.1 Supplier's Name** _____	☐	Yes	☒	No
	16.0.2 Letter of Approval from Supplier is Attached	☐	Yes	☐	No
17.0	**Will this project involve a new or increased drinking water withdrawal from a stream or other water body?** If "Yes", should reference both Water Supply and Watershed Management. **17.0.1 Stream Name**	☐	Yes	☒	No
18.0	**Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste?** If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed. **18.0.1 Type & Amount**	☐	Yes	☒	No
19.0	**Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities?**	☐	Yes	☒	No
20.0	**Does your project involve installation of a field constructed underground storage tank?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **20.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
21.0	**Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **21.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No

22.0	**Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **22.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
23.0	**Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **23.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
24.0	**Will the intended activity involve the use of a radiation source?**	☐	Yes	☒	No

CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

Type or Print Name Eileen Banach

Eileen Banach	Biologist	05/26/2020
Signature	**Title**	**Date**

3150-PM-BWEW0036A Rev. 8/2016

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
and
DEPARTMENT OF ARMY CORPS OF ENGINEERS
(Baltimore, Philadelphia, and Pittsburgh Districts)

JOINT APPLICATION FOR PENNSYLVANIA CHAPTER 105 WATER OBSTRUCTION AND ENCROACHMENT PERMIT AND U.S. ARMY CORPS OF ENGINEERS SECTION 404 PERMIT

Before completing this form, please read the step-by-step instructions and Section F Application Completeness Checklist provided with this Joint Permit package.

AGENCY USE ONLY

Application ID# (Assigned by DEP) _____ RECEIVED DATE _____ CHECK NO. _____

Program Application No. _____ REQUIRED APP. FEE _____ AMOUNT $_____

SECTION A. APPLICATION TYPE

STANDARD ☒ SMALL PROJECTS ☐

SECTION B. APPLICANT IDENTIFIER

Applicant Name: Texas Eastern Transmission, LP
Employer ID# (EIN): 72-0378240

Consulting Firm: AECOM Technical Services
Employer ID# (EIN): 95-2661922

SECTION C. PROJECT LOCATION DATA AND STATUS

Name of stream and/or body of water and Chapter 93 designation.
Conemaugh River-WWF

Corps District where project will occur.

☒ Pittsburgh (Ohio River Basin) ☐ Baltimore (Susquehanna River Basin) ☐ Philadelphia (Delaware River Basin)

Name of the U.S.G.S. 7 1/2 Minute Quadrangle Map where project is located: Blairsville, PA

Indicate location of project: Latitude 40° 27′ 21.15″ N; Longitude 79° 17′ 57.81″ W

Project type, purpose and need: Texas Eastern Transmission proposes to replace a segment of their existing 24-inch Line 12 high-pressure natural gas transmission pipeline system from an access road off of Westinghouse Road to 0.2 mi east of Newport Road. This project will ensure the continued safety and reliability of Texas Eastern's bulk natural gas transmission systems.

HAS ANY PORTION OF PROPOSED PROJECT BEEN AUTHORIZED? ☐ yes ☒ no _____ date authorized

If yes, attach description of those portions of the project that have been authorized and identify dates of authorization.

SECTION D. AQUATIC RESOURCE IMPACT TABLE

HAS ALL INFORMATION INCLUDED ON THE IMPACT TABLE BEEN PROVIDED? ☒ yes ☐ no

If NO, indicate the information not included and the reason. Also attach a completed Aquatic Resource Impact Table (3150-PM-BWEW0557) worksheet or equivalent.

- Project Information: See Requirement J
- Corps / 404: _____
- DEP / 105: _____

SECTION E. COMPLIANCE REVIEW

Yes	No	
☒	☐	Is the applicant (owner and/or operator) currently in violation of any permits issued by the Department? If yes, please provide:

1. Permit Number: See attached list
2. Nature of the violation (if any): _____
3. Status of violation (i.e., schedule for compliance, etc.): _____

SECTION F. APPLICATION COMPLETENESS CHECKLIST

Applicant must place an entry - Y = Yes, N = No, N/A = Not Applicable - in each left side column space. See Section 105.13 for additional details. If you are applying under the Small Projects Application format, place an entry in only those comments prefixed by an asterisk (*).

REQUIREMENT	Applicant Entry	DEP Use Only
a. GIF and permit application properly signed, sealed and witnessed	*Y	
b. Application Fee & Worksheet enclosed (see Section G.)	*Y	
c. Copies and proof of receipt - Act 14 notification - Acts 67/68/127	*Y	
d. Cultural Resource Notice (Notice, return receipt and PHMC review letter, as appropriate)	*Y	
e. PASPGP-5 Reporting Criteria Checklist	*Y	
f. Bog Turtle Habitat Screening (copy of "No Effect" determination from the Army Corps of Engineers OR copy of documented clearance from the US Fish and Wildlife Service)	*Y	
g. Pennsylvania Natural Diversity Inventory (signed PNDI Receipt showing Avoidance Measures or Potential Impacts and proof of delivery to the appropriate jurisdictional agency(ies) where further coordination is required, as appropriate)	*Y	
h. Plans (site plan including cross sections and profiles for Subsections 151, 191, 231, 261)	*Y	
i. Location map	Y	
j. Project description narrative including PNDI avoidance measures (if applicable)	*Y	
AND Aquatic Resource Impact Table	*Y	
k. Color photographs with map showing location taken	*Y	
l. Environmental Assessment form	*Y	
m. Erosion and Sediment Control Plan and approval letter	Y	
n. Hydrologic and hydraulic analysis	N/A	
o. Stormwater Management Analysis with consistency letter	Y	
p. Floodplain Management Analysis with consistency letter	N/A	
q. Risk Assessment	N/A	
r. Professional engineer's seal and certification	Y	
s. Alternative analysis	Y	
t. Mitigation plan	Y	

SECTION G. DETERMINATION OF APPLICATION FEES (DEP FEES ONLY)

The fee required for a project authorized under this permit shall be consistent with 25 PA Code §105.13 (relating to regulated activities – information and fees). To determine the application fee, please complete the Chapter 105 Fee(s) Calculation Worksheet (3150-PM-BWEW0553). Please provide the completed worksheet and a check for the applicable fee(s) made payable to the "Commonwealth of Pennsylvania Clean Water Fund."

SECTION H. ADJOINING PROPERTY OWNERS

Please list the name and address of all property owners whose land adjoins the project property.

NAME	ADDRESS
See attached list	

SECTION I. CERTIFICATION AND SIGNATURE (see instructions for clarification of signature requirements)

I certify under penalty of law that the information provided in this permit registration is true and correct to the best of my knowledge and information and that I possess the authority to undertake the proposed action. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (If any of the information and/or plans is found to be in error, falsified, and/or incomplete, this authorization/verification may be subject to modification, suspension, or revocation in accordance with applicable regulations.)

I certify that the project proposed in this application complies with and will be conducted in a manner that is consistent with the approved Coastal Zone Management program of the Commonwealth of Pennsylvania. (Only portions of Erie, Bucks, Philadelphia and Delaware Counties are in the Coastal Zone).

I grant permission to the agencies responsible for authorization of this work, or their duly authorized representative, to enter the project site for inspection purposes during working hours. I will abide by the conditions of the permit or license if issued and will not begin work without the appropriate authorization.

Signature of Applicant/Owner — Date: 5/27/20

William B. Brett, Supervisor, Environmental Construction Permitting
Typed / Printed Name & Title of Applicant/Owner

Signature of Witness

JAIME ARCHER
Typed / Printed Name & Title of Witness

SEAL

Commonwealth of Pennsylvania - Notary Seal
JAIME ARCHER, Notary Public
Dauphin County
My Commission Expires May 1, 2023
Commission Number 1290382

Conemaugh River Crossing Project - Property Owners

#	First Name	Last Name	Address	City	State	Zip
1	United States of America*		Villa Road	Blairsville	PA	15717
2	Livermore Cemetery		Rd 3	Blairsville	PA	15717
3	Gregory	Retallick	670 Livermore Rd	Blairsville	PA	15717
4	Rodger	Wertz	1309 Newport Rd	Blairsville	PA	15717
5	Henry	Rhea	678 Howard Rd	Blairsville	PA	15717
6	EQT Gathering LLC		625 Liberty Ave	Pittsburgh	PA	15222
7	Westinghouse Electric	Corp LLC	1000 Westinghouse Dr	Mars	PA	16066
8	Marion	Bolen	1948 Newport Rd	Blairsville	PA	15717

*Property owner and abutter of Project site

Texas Eastern, LP. Pennsylvania Department of Environmental Protection (PADEP) Compliance History: 2015 - Current

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Department Action Required and/or Status
2/6/2020	Delmont	Title V 65-00839B	Shutdown duration exceedance for the Solar Mars unit ID 118, and Solar Titan unit ID 119 during the CY 2019 compliance period. Missed NOx and CO test on Solar Titan unit ID 119 every 2,500 hour.	NOV Issued (Based on information so far, PADEP evaluating NOV). No further action needed.
2/4/2020	Uniontown	Title V 26-00413	Shutdown duration exceedance for the Solar Mars unit ID 102 during the CY2019 compliance period.	NOV Issued (Based on information so far, PADEP evaluating NOV). No further action needed.
2/5/2020	Lilly	Title V, 11-00258	An oil spill leak associated with Turbine#3 Oil return line was discovered on February 5,2020. Source of the oil leak has been identified and repaired. Source area impacts have been removed and further soil excavation is on-going. The cleanup activities to date include the identification and repair of the source of turbine oil leak (oil return line) and the removal of impacted soil.	Current remediation effort is ongoing. PADEP notification was made on February 6,2020.
01/15/2020	Entriken	31-05019	Penalties for Emissions violation for CO, NOx, and missed linearity identified in Continuous Source Monitoring Data for CY2018, 2019	Response submitted with operations data for exempt operation hours. Waiting on PADEP review
01/06/2020	Armagh	32-00230B	Penalties for Emissions violation for CO, NOx, and missed linearity identified in Continuous Source Monitoring Data for 1Q2017 to 3Q2019	Response submitted summarizing deficiency in data. Waiting on PADEP review
11/13/2019	Armagh	32-00230B	For one hour on November 13, the 3-hour average NOx emission was over the permit Representation. Inadequate pipeline load conditions caused unit to fall out of Dry Low NOx (DLN) mode of operation.	Deviation to be submitted. (Resubmittal of CY2019 ACC for Armagh)

Texas Eastern, LP. Pennsylvania Department of Environmental Protection (PADEP) Compliance History: 2015 – Current				
Date	**Location**	**Plan Approval/ Operating Permit#**	**Nature of Documented Conduct**	**Department Action Required and/or Status**
12/22/2019	Entriken	31-05019	GE Frame 5 Turbine (Source ID: 031A) operated out of DLN mode (12/19, 20 and 22), exceeding the hourly NOx emission limit.	Deviation reported in CY2019 ACC due January 30.
11/13/2019	Entriken	31-05019	Penalties for Emissions violation for NOx identified in Continuous Source Monitoring Data for CY2017. Duration of startup and shutdown for the ID 034(Solar Titan), was more than the permit limit during the (Jul-Dec 2019) compliance period.	Response submitted with operations data for exempt operation hours. Waiting on PADEP review
11/08/2019	Perulack	34-05002A	As required by 40 CFR 60 JJJJ (PA 34-05002A) for Source ID 031 (31501 - Coop Engine) a start of construction notification was not provided to state agency within 30 days of commencement of construction.	Deviation reported in CY2019 ACC due January 30.
08/14/2019	Perulack	34-05002A	As required by 40 CFR 60 JJJJ (PA 34-05002A) for Source ID 031 (31501 - Coop Engine) initial test notification 30 days prior to actual test and 15 day notification after completion of test was not provided to state agency.	Deviation reported in CY2019 ACC due January 30.
07/01/2019	Entriken	31-05019	Duration of startup and shutdown for the ID 034(Solar Titan), was more than the permit limit during the (Jan-June 2019) compliance period.	Required notification submitted.
05/11/2019	Delmont	65-00839	Duration of startup and shutdown for the ID 118(Solar Mars) and 119(Solar Titan), was more than the permit limit during the compliance period.	Required notification submitted.
05/08/2019	Holbrook	30-0077	The Solar Mars Unit (ID 125) ran out of DLN mode for less than one hour.	Required notification submitted.
4/17/2019	Armagh	32-00230	Based on site level requirements, daily facility inspections are required during source operation for fugitive, visible emissions. Record review showed missed daily inspections.	Deviation reported in CY2019 ACC due January 30.
04/10/2019	Perulack	Title V 34-05002	VOC concentration exceedance during 1-16-18 stack test.	NOV issued. Resolved 02/19/2020. (No further action required.)

Texas Eastern, LP. Pennsylvania Department of Environmental Protection (PADEP) Compliance History: 2015 – Current

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Department Action Required and/or Status
03/16/2019	Uniontown	26-00413	Duration of startup and shutdown for the ID 102(Solar Mars) was more than the permit limit during the (Jul-Dec 2019) compliance period.	Deviation reported in CY2019 ACC due January 30.
03/12/2019	Armagh / Delmont / Holbrook / Lilly	32-00230B/65-00839B/11-00258	Not complying with RACT requirements. Late annual compliance certification submittal for Lilly.	Notice of Assessment. Resolved.
03/8/2019	Entriken	31-05019	The hourly CO emissions were over the permit representation.	Required notification submitted.
02/27/2019	Entriken	31-05019	GE Frame 5 Turbine (Source ID: 031A) operated out of DLN mode, exceeding the hourly NOx emission limit.	Corrected
02/25/2019	Armagh	32-00230	For twelve hours NOx emissions were over permit representation	Corrected
02/6/2019	Lilly	Title V 11-00258	Late submittal of annual compliance certification and for not submitting email notification two weeks prior to stack test.	NOV issued. Resolved.
01/25/2019	Armagh	32-00230	For 25 hours CO emissions were over permit representation	Corrected
01/7/2019	Delmont	65-00839B	Missed NOx and CO test on Solar Titan 250 turbine every 2,500 hour.	Corrected
12/22/2018	Holbrook	30-00077	Delay during testing caused duration of startup for Solar Mars Unit to exceed representation.	Required notification submitted.
12/11/2018	Armagh	32-00230	For 4Q2017 and 1Q2018 linearity tests were not carried out on the analyzers. Successful linearity tests for analyzers were carried out in 4Q2018 on December 11, 2018.	. Identified in Response to CEMS data request
12/27/2018	Entriken	31-05019	'-For 1Q2018 and 4Q2018 >95% of the monitor hours are not valid due to missed linearity tests. (deviation from minimum data availability requirements). Successful linearity results for analyzers were carried out in 4Q2018 on 12/27/2018.	. Identified in Response to CEMS data request
Jan-June 2018	Perulack	34-05002	VOC emissions exceeded for units 31501, 31502 & 31503.	Corrected
10/8/2018	Lilly	11—00258	Late submittal of annual certification.	Corrected

Texas Eastern, LP. Pennsylvania Department of Environmental Protection (PADEP) Compliance History: 2015 - Current				
Date	**Location**	**Plan Approval/ Operating Permit#**	**Nature of Documented Conduct**	**Department Action Required and/or Status**
08/20/2018	Armagh	32-00230B	GE Frame 5 CO test result violation.	NOV Issued. Resolved.
06/22/2018	Bechtelsville	06-05034	MACT ZZZZ maintenance work practice not completed	Corrected. Deviation reported via ACC due July 2018
06/1/2018	Delmont	35-00839B	Duration of startup for the ID 119 (31103-Solar Titan 250), was more than the permit limit during the compliance period.	Deviation reported via ACC due July 2018
02/14/2018	Bernville	06-05033	E-mail notification not submitted to the department within 15 calendar days following completion of on-site testing.	The completed test report submitted on 2/21/2018. Compliance system was verified to make sure that the task associated with this requirement was accurate.
12/15/2017	Uniontown	26-00413	Extension Request denied for repairing leaking component	Corrected. Periodic update currently provided.
10/17/2017	Delmont	65-00839B	Source 119 test protocol not submitted	NOV issued. Resolved with test plan and control plan submitted
10/13/2017	Delmont	65-00839B	Demonstration of compliance with PA RACT	NOV issued. Resolved 01/01/2017.
09/26/2017	Uniontown	26-00413B	Annual LDAR assessment conducted on Oct 2, 2017 found a leaking flange near valve 29-87. The leak could not be repaired within the 15-day repair period. As required in the permit, a request for extension of repair was submitted to PADEP on December 7, 2017. PADEP requested follow up on these leaks on a semi-annual basis, we provide new values as to the current leak rate at the time of the semi-annual report and estimated gas leakage for the six-month time frame. PADEP understands that due to the location of the leak, we do not plan to repair unless an extreme circumstance presents itself or if we have to take the section of pipeline out of service, there is currently no plans to repair. The resolution to the NOV is that semi-annual reports will be submitted to PADEP regarding the leak rate. The semi-annual report was requested by PADEP in Nov 2018 and the first one submitted on 12/19/2018.	NOV issued. Plan submitted. Resolved on 12/19/2018.

Texas Eastern, LP. Pennsylvania Department of Environmental Protection (PADEP) Compliance History: 2015 - Current

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Department Action Required and/or Status
07/01/2017	Delmont	65-00839B	Compliance status not completed for Heater 113-FGH-3.	Deviation reported via Annual Compliance Certification due Jan 2018
07/01/2017	Perulack	34-05002	VOC emissions exceeded for Units 31501 & 31502.	Corrected
05/16/2017	Armagh	32-00230B	Demonstration of compliance with PA RACT not submitted.	NOV issued 3/15/2017. Resolved.
03/23/2017	Perulack	34-05002	RACT II VOC limit exceeded for unit 31503	Corrected 3/23/2017
01/01/2017	Perulack	34-05002	Compressor case vent VOC exceedances	Two NOVs issued. Resolved.
01/01/2017	Entriken	31-05019	RACT II compliance demonstration missed.	Test completed 3/4/2017; report submitted 4/7/2017
10/4/2016	Bernville	06-05033	Malfunction on 09/29/2016. Required report was submitted to PADEP on 10/10/2016; not within required timeframe.	Corrected; TETLP reviewed the internal procedures and re-trained personnel.
03/07/2016	Bechtelsville	06-05034	Emergency generator maintenance work practices were not completed.	Corrected. Deviation reported via Annual Compliance Certification due July 2016
03/07/2016	Bechtelsville	06-05034	Malfunction report was not submitted on time.	Corrected. Deviation reported via Annual Compliance Certification due July 2016
04/16/2015	Bernville	06-05033	Emergency generator inspection required by 40 CFR 63, Subpart ZZZZ, Table 2c was not performed within 365 days of the pervious inspection.	Corrected; TETLP revised operational procedures. Corrected. Deviation reported via Annual Compliance Certification due July 2015
02/04/2015	Delmont	INS00099	PADEP NPDES inspection of outfall 001 at the Delmont compressor station. PADEP was performing this inspection due to notification of an overflow that occurred at outfall 001 earlier in the week. While the inspector was onsite outfall 001 experienced another upset condition and was overflowing.	NOV issued. Resolved 9/24/2015.

Requirement B

Application Fee

PART ONE: WATER OBSTRUCTIONS AND ENCROACHMENTS

SECTION A. APPLICATION FEES

☒ **WATER OBSTRUCTION AND ENCROACHMENT PERMIT** (Joint Permit Application)

Some activities or structures within a project may also qualify for an accumulation of General Permit fees, please mark the box above indicating an Individual Water Obstruction and Encroachment Permit AND the corresponding fee(s) in the General Permit section below those. Activities or structures not qualifying for a General Permit fee must include a disturbance fee.

☒ Administrative Filing Fee[1]		$ 1,750	+	
☒ Temporary Disturbance ($400/0.1ac)	2.00 acres x $4,000 =	$ 8,000	+	
☒ Permanent Disturbance ($800/0.1ac)	0.10 acres x $8,000 =	$ 800		= $ 10,550
	WO&E FEE subtotal (a)			$ 10,550

☐ **GENERAL PERMIT(S)** (select activity/structure(s) below, see page 4 for "#" explanation)

Some activities or structures within a project requiring an Individual Water Obstruction and Encroachment Permit may qualify for an accumulation of General Permit fees, please mark the corresponding fee(s) below but not the box above indicating a General Permit.

☐ GP-1 Fish Habitat Enhancement Structures		$ 50		= $ ____
☐ GP-2 Small Docks and Boat Launching Ramps	____ (#) x	$ 175		= $ ____
☐ GP-3 Bank Rehabilitation, Bank Protection and Gravel Bar Removal	____ (#) x	$ 250		= $ ____
☐ GP-4 Intake and Outfall Structures	____ (#) x	$ 200		= $ ____
☐ GP-5 Utility Line Stream Crossings[2]	____ (#) x ____ (#) x	$ 250		= $ ____
☐ GP-6 Agricultural Crossings and Ramps	____ (#) x	$ 50		= $ ____
☐ GP-7 Minor Road Crossings[2]	____ (#) x	$ 350		= $ ____
☐ GP-8 Temporary Road Crossings[2]	____ (#) x	$ 175		= $ ____
☐ GP-9 Agricultural Activities		$ 50		= $ ____
☐ GP-10 Abandoned Mine Reclamation		$ 500		= $ ____
☐ GP-11 Maintenance, Testing, Repair, Rehabilitation, or Replacement of Water Obstructions and Encroachments[1]		$ 750	+	
☐ Temporary Disturbance ($400/0.1ac)	____.____ acres x $4,000 =	$ ____	+	
☐ Permanent Disturbance ($800/0.1ac)	____.____ acres x $8,000 =	$ ____		= $ ____
☐ GP-15 Private Residential Construction in Wetlands[1]		$ 750	+	
☐ Temporary Disturbance ($400/0.1ac)	____.____ acres x $4,000 =	$ ____	+	
☐ Permanent Disturbance ($800/0.1ac)	____.____ acres x $8,000 =	$ ____		= $ ____
	GP(s) FEE subtotal (b)			$ 0

PART ONE: SECTION A. APPLICATION FEE(S) subtotal (a+b=c) $ 10,550

SECTION B. OTHER FEES

☐ Environmental Assessment for Waived Activities (§105.13(c)(2)(iv))		$ 500		$ ____
☐ Amendment to Water Obstruction and Encroachment Permit				
☐ Major Amendment[1]		$ 500	+	
☐ Temporary Disturbance	____.____ acres x $4,000 =	$ ____	+	$ ____
☐ Permanent Disturbance	____.____ acres x $8,000 =	$ ____		= $ ____
☐ Minor Amendment		$ 250		$ ____

Transfer of Water Obstruction and Encroachment Permit *does not require submission of this form; see Application for Transfer of Permit / Submerged Lands License Agreement (3150-PM-BWEW-0016)*

PART ONE: SECTION B. OTHER FEE(S) subtotal (d) $ 0

PART ONE: FEE(S) TOTAL (c+d=e) $ 10,550

DEP USE ONLY			
FEE TOTAL:	_____	Permit / Authorization Number (s):	_____
Correct Amount:	_____	Check #: _____	_____
Check Amount:	_____	Payable to: _____	_____

TABLE 1
CHAPTER 105 FEE DETERMINATION

Crossing Number	Resource ID	Classification	Fee Determination Method		Fee Impact Units	
			Waived	Joint Permit	Temporary Disturbance (ac)	Permanent Disturbance (ac)
1	W-BJM-011	PEM/PSS	–	X	1.36	–
2	W-BJM-010	PEM/PSS/PFO	–	X	0.60	–
3	W-CMS-016	PEM	–	X	–	0.03
4	S-JLK-037 (watercourse)	PER	–	X	–	0.01
4	S-JLK-037 (floodway)	PER	–	X	–	0.01
		Total=	**0**	**1**	**1.96**	**0.05**

Fee Determination Method	Application Fees	Fee Units	Cost
Temporary Disturbance	$4,000 / ac	2.00	$8,000
Permanent Disturbance	$8,000 / ac	0.10	$800
Joint Permit Application Fee	$1,750	1	$1,750
		Total Cost =	**$10,550**

Requirement C

Acts 14/67/68/127 Notifications and Receipts

AECOM
625 West Ridge Pike, Suite E-100
Conshohocken, PA 19428

610.832.3500 tel
610.832.3501 fax

May 6, 2020 Via FedEx: 7703 9953 8842

Blacklick Township Commissioners
132 Hill Road
Blairsville, PA 15717
Phone: 724-459-7131

Re: Texas Eastern Transmission, LP
Joint Permit Application
Conemaugh River Crossing Project
Indiana and Westmoreland Counties, Pennsylvania

Dear Commissioners:

AECOM has been retained by Texas Eastern Transmission, LP (Texas Eastern or TETLP) to provide design and permitting services. This notice is to inform you of Texas Eastern's intent to replace an existing segment of natural gas pipeline via Horizontal Direction Drill (HDD) beneath the Conemaugh River under a Joint Permit Application for a Water Obstruction and Encroachment Permit and U.S. Army Corps of Engineers Section 404 Permit from the Pennsylvania Department of Environmental Protection (PADEP) for the following project:

Project Name:	Conemaugh River Crossing Project
Project Description:	HDD bore under the Conemaugh River to replace a section of Line 12, a 24-inch diameter natural gas pipeline
Applicant Name:	Texas Eastern Transmission, LP
Applicant Contact:	Mr. William B. Brett 890 Winter Street, Suite 300 Waltham, MA 02451 Phone: 617-560-1371
Site Location:	40.45588 N / -79.29939 W
Municipality/County:	Derry Township, Westmoreland County and Blacklick Township, Indiana County, PA

Enclosed are a Location Map and a copy of the General Information Form (GIF), completed by AECOM on behalf of the applicant. PADEP invites you to review the attached form and to comment on the accuracy of answers provided, with regard to land use aspects of this project. Please be specific to PADEP and focus on the relationship to local ordinances. If you wish to submit comments to PADEP, you must respond within 30 days to the PADEP regional office referenced in this letter. If you do not submit comments by the end of the comment period, PADEP will assume that there are no substantive conflicts and proceed with the normal application review process.

This letter is intended to satisfy the requirements of Pennsylvania Acts 14, 67, 68, and 127 and the Pennsylvania Municipalities Planning Code. Section 1905-A of the Commonwealth

Administrative Code, as amended by Act 14, requires that each applicant for a PADEP permit must give written notice to the municipality(ies) and the county(ies) in which the permitted activity is located. The written notices shall be received by the municipality(ies) and county(ies) at least 30 days before the PADEP may issue or deny the permit.

Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Please submit any comments concerning this project within 30 days from the date of receipt of this letter to the PADEP, Regional Permit Coordination Office, Rachel Carson State Office Building, P.O Box 69206, Harrisburg, PA 17106.

For more information about this land use review process, please contact me at 610-832-3500 or visit www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

Bernard P. Holcomb

Bernard Holcomb
Project Manager
AECOM

Enclosures: Location Map, General Information Form

From: Reich, Donna
To: Banach, Eileen; Haight, Shannon
Subject: FW: [EXTERNAL] FedEx Shipment 770399538842 Delivered
Date: Thursday, May 07, 2020 4:10:35 PM

From: TrackingUpdates@fedex.com <TrackingUpdates@fedex.com>
Sent: Thursday, May 07, 2020 3:37 PM
To: Reich, Donna <donna.reich@aecom.com>
Subject: [EXTERNAL] FedEx Shipment 770399538842 Delivered

Your package has been delivered

Tracking # 770399538842

Ship date:
Wed, 5/6/2020

Donna REich
AECOM
CONSHOHOCKEN, PA 19428
US

Delivered

Delivery date:
Thu, 5/7/2020 3:36 pm

Att: Commissioners
Blacklick Township
Commissioners
132 Hill Road
BLAIRSVILLE, PA 15717
US

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number:	770399538842
Status:	Delivered: 05/07/2020 3:36 PM Signed for By: Signature Release on file
Reference:	60624893.4
Signed for by:	Signature Release on file
Delivery location:	BLAIRSVILLE, PA
Service type:	FedEx Priority Overnight®
Packaging type:	FedEx® Envelope
Number of pieces:	1
Weight:	0.50 lb.
Special handling/Services:	Deliver Weekday
Standard transit:	5/7/2020 by 12:00 pm

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 2:37 PM CDT on 05/07/2020.

All weights are estimated.

To track the latest status of your shipment, click on the tracking number above.

Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

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Thank you for your business.

AECOM
625 West Ridge Pike, Suite E-100
Conshohocken, PA 19428

610.832.3500 tel
610.832.3501 fax

April 28, 2020 Via FedEx: 7703 4670 4765

Derry Township Commissioners
5321 Route 982
Derry, PA 15627
Phone: 724-694-8835

Re: Texas Eastern Transmission, LP
Joint Permit Application
Conemaugh River Crossing Project
Indiana and Westmoreland Counties, Pennsylvania

Dear Commissioners:

AECOM has been retained by Texas Eastern Transmission, LP (Texas Eastern or TETLP) to provide design and permitting services. This notice is to inform you of Texas Eastern's intent to replace an existing segment of natural gas pipeline via Horizontal Direction Drill (HDD) beneath the Conemaugh River under a Joint Permit Application for a Water Obstruction and Encroachment Permit and U.S. Army Corps of Engineers Section 404 Permit from the Pennsylvania Department of Environmental Protection (PADEP) for the following project:

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Applicant Contact:	Mr. William B. Brett 890 Winter Street, Suite 300 Waltham, MA 02451 Phone: 617-560-1371
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Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Please submit any comments concerning this project within 30 days from the date of receipt of this letter to the PADEP, Regional Permit Coordination Office, Rachel Carson State Office Building, P.O Box 69206, Harrisburg, PA 17106.

For more information about this land use review process, please contact me at 610-832-3500 or visit www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

Bernard P. Holcomb

Bernard Holcomb
Project Manager
AECOM

Enclosures: Location Map, General Information Form

From: Reich, Donna
To: Banach, Eileen; Haight, Shannon
Subject: FW: [EXTERNAL] FedEx Shipment 770346704765 Delivered
Date: Friday, May 01, 2020 10:52:19 AM

From: TrackingUpdates@fedex.com <TrackingUpdates@fedex.com>
Sent: Friday, May 01, 2020 10:52 AM
To: Reich, Donna <donna.reich@aecom.com>
Subject: [EXTERNAL] FedEx Shipment 770346704765 Delivered

Your package has been delivered

Tracking # 770346704765

Ship date:
Thu, 4/30/2020

Donna Reich
AECOM
CONSHOHOCKEN, PA 19428
US

Delivered

Delivery date:
Fri, 5/1/2020 10:47 am

Attn: Commissioners
Derry Township
Commissioners
5321 Route 982
Derry Township Municipal Bldg
DERRY, PA 15627
US

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number:	770346704765
Status:	Delivered: 05/01/2020 10:47 AM Signed for By: Signature not required
Reference:	60624893.4
Signed for by:	Signature not required
Delivery location:	DERRY, PA
Delivered to:	Residence
Service type:	FedEx Priority Overnight®
Packaging type:	FedEx® Envelope
Number of pieces:	1
Weight:	0.50 lb.
Special handling/Services:	Deliver Weekday
	Residential Delivery
Standard transit:	5/1/2020 by 12:00 pm

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:51 AM CDT on 05/01/2020.

All weights are estimated.

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Thank you for your business.

AECOM
625 West Ridge Pike, Suite E-100
Conshohocken, PA 19428

610.832.3500 tel
610.832.3501 fax

April 28, 2020 Via FedEx: 7703 4674 0627

Indiana County Commissioners
825 Philadelphia Street
Indiana, PA 15701
Phone: 724-465-3953

Re: Texas Eastern Transmission, LP
Joint Permit Application
Conemaugh River Crossing Project
Westmoreland and Indiana Counties, Pennsylvania

Dear Commissioners:

AECOM has been retained by Texas Eastern Transmission, LP (Texas Eastern or TETLP) to provide design and permitting services. This notice is to inform you of Texas Eastern's intent to replace an existing segment of natural gas pipeline via Horizontal Direction Drill (HDD) beneath the Conemaugh River under a Joint Permit Application for a Water Obstruction and Encroachment Permit and U.S. Army Corps of Engineers Section 404 Permit from the Pennsylvania Department of Environmental Protection (PADEP) for the following project:

Project Name:	Conemaugh River Crossing Project
Project Description:	HDD bore under the Conemaugh River to replace a section of Line 12, a 24-inch diameter natural gas pipeline
Applicant Name:	Texas Eastern Transmission, LP
Applicant Contact:	Mr. William B. Brett 890 Winter Street, Suite 300 Waltham, MA 02451 Phone: 617-560-1371
Site Location:	40.45588 N / -79.29939 W
Municipality/County:	Derry Township, Westmoreland County and Blacklick Township, Indiana County, PA

Enclosed are a Location Map and a copy of the General Information Form (GIF), completed by AECOM on behalf of the applicant. PADEP invites you to review the attached form and to comment on the accuracy of answers provided, with regard to land use aspects of this project. Please be specific to PADEP and focus on the relationship to local ordinances. If you wish to submit comments to PADEP, you must respond within 30 days to the PADEP regional office referenced in this letter. If you do not submit comments by the end of the comment period, PADEP will assume that there are no substantive conflicts and proceed with the normal application review process.

This letter is intended to satisfy the requirements of Pennsylvania Acts 14, 67, 68, and 127 and the Pennsylvania Municipalities Planning Code. Section 1905-A of the Commonwealth

Administrative Code, as amended by Act 14, requires that each applicant for a PADEP permit must give written notice to the municipality(ies) and the county(ies) in which the permitted activity is located. The written notices shall be received by the municipality(ies) and county(ies) at least 30 days before the PADEP may issue or deny the permit.

Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Please submit any comments concerning this project within 30 days from the date of receipt of this letter to the PADEP, Regional Permit Coordination Office, Rachel Carson State Office Building, P.O Box 69206, Harrisburg, PA 17106.

For more information about this land use review process, please contact me at 610-832-3500 or visit www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

Bernard P. Holcomb

Bernard Holcomb
Project Manager
AECOM

Enclosures: Location Map, General Information Form

From: Reich, Donna
To: Banach, Eileen; Haight, Shannon
Subject: FW: [EXTERNAL] FedEx Shipment 770346740627 Delivered
Date: Friday, May 01, 2020 11:18:16 AM

From: TrackingUpdates@fedex.com <TrackingUpdates@fedex.com>
Sent: Friday, May 01, 2020 11:05 AM
To: Reich, Donna <donna.reich@aecom.com>
Subject: [EXTERNAL] FedEx Shipment 770346740627 Delivered

Your package has been delivered

Tracking # 770346740627

Ship date:		Delivery date:
Thu, 4/30/2020		Fri, 5/1/2020 11:03 am
Donna Reich AECOM CONSHOHOCKEN, PA 19428 US	Delivered	**Attn: Commissioners** Indiana County Commissioners 825 Philadelphia St INDIANA, PA 15701 US

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number:	770346740627
Status:	Delivered: 05/01/2020 11:03 AM Signed for By: E.LYCHALK
Reference:	60624893.4
Signed for by:	E.LYCHALK
Delivery location:	INDIANA, PA
Delivered to:	Guard/Security Station
Service type:	FedEx Priority Overnight®
Packaging type:	FedEx® Envelope
Number of pieces:	1
Weight:	0.50 lb.
Special handling/Services:	Deliver Weekday
Standard transit:	5/1/2020 by 12:00 pm

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Thank you for your business.

AECOM
625 West Ridge Pike, Suite E-100
Conshohocken, PA 19428

610.832.3500 tel
610.832.3501 fax

April 28, 2020

Via FedEx: 7703 4657 6302

Westmoreland County Commissioners
Main Office
2 N Main Street
Greensburg, PA 15601
Phone: 724-830-3106

Re: Texas Eastern Transmission, LP
Joint Permit Application
Conemaugh River Crossing Project
Westmoreland and Indiana Counties, Pennsylvania

Dear Commissioners:

AECOM has been retained by Texas Eastern Transmission, LP (Texas Eastern or TETLP) to provide design and permitting services. This notice is to inform you of Texas Eastern's intent to replace an existing segment of natural gas pipeline via Horizontal Direction Drill (HDD) beneath the Conemaugh River under a Joint Permit Application for a Water Obstruction and Encroachment Permit and U.S. Army Corps of Engineers Section 404 Permit from the Pennsylvania Department of Environmental Protection (PADEP) for the following project:

Project Name:	Conemaugh River Crossing Project
Project Description:	HDD bore under the Conemaugh River to replace a section of Line 12, a 24-inch diameter natural gas pipeline
Applicant Name:	Texas Eastern Transmission, LP
Applicant Contact:	Mr. William B. Brett 890 Winter Street, Suite 300 Waltham, MA 02451 Phone: 617-560-1371
Site Location:	40.45588 N / -79.29939 W
Municipality/County:	Derry Township, Westmoreland County and Blacklick Township, Indiana County, PA

Enclosed are a Location Map and a copy of the General Information Form (GIF), completed by AECOM on behalf of the applicant. PADEP invites you to review the attached form and to comment on the accuracy of answers provided, with regard to land use aspects of this project. Please be specific to PADEP and focus on the relationship to local ordinances. If you wish to submit comments to PADEP, you must respond within 30 days to the PADEP regional office referenced in this letter. If you do not submit comments by the end of the comment period, PADEP will assume that there are no substantive conflicts and proceed with the normal application review process.

This letter is intended to satisfy the requirements of Pennsylvania Acts 14, 67, 68, and 127 and the Pennsylvania Municipalities Planning Code. Section 1905-A of the Commonwealth Administrative Code, as amended by Act 14, requires that each applicant for a PADEP permit must give written notice to the municipality(ies) and the county(ies) in which the permitted activity is located. The written notices shall be received by the municipality(ies) and county(ies) at least 30 days before the PADEP may issue or deny the permit.

Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Please submit any comments concerning this project within 30 days from the date of receipt of this letter to the PADEP, Regional Permit Coordination Office, Rachel Carson State Office Building, P.O Box 69206, Harrisburg, PA 17106.

For more information about this land use review process, please contact me at 610-832-3500 or visit www.depweb.state.pa.us (Keyword: Land Use Reviews).

Sincerely,

Bernard P. Holcomb

Bernard Holcomb
Project Manager
AECOM

Enclosures: Location Map, General Information Form

From: Reich, Donna
To: Banach, Eileen; Haight, Shannon
Subject: FW: [EXTERNAL] FedEx Shipment 770346576302 Delivered
Date: Friday, May 01, 2020 10:24:10 AM

From: TrackingUpdates@fedex.com <TrackingUpdates@fedex.com>
Sent: Friday, May 01, 2020 9:41 AM
To: Reich, Donna <donna.reich@aecom.com>
Subject: [EXTERNAL] FedEx Shipment 770346576302 Delivered

Your package has been delivered

Tracking # 770346576302

Ship date:
Thu, 4/30/2020

Donna Reich
AECOM
CONSHOHOCKEN, PA 19428
US

Delivered

Delivery date:
Fri, 5/1/2020 9:36 am

Attn: Commissioners
Westmoreland County Commissioners
2 N Main St
Main Office
GREENSBURG, PA 15601
US

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number:	770346576302
Status:	Delivered: 05/01/2020 09:36 AM Signed for By: M.DELUGOS
Reference:	60624893.4
Signed for by:	M.DELUGOS
Delivery location:	GREENSBURG, PA
Delivered to:	Shipping/Receiving
Service type:	FedEx Priority Overnight®
Packaging type:	FedEx® Envelope
Number of pieces:	1
Weight:	0.50 lb.
Special handling/Services:	Deliver Weekday
Standard transit:	5/1/2020 by 10:30 am

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0210-PM-PIO0001 4/2018
Form

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

Related ID#s (If Known)		DEP USE ONLY
Client ID#	**APS ID#**	Date Received & General Notes
Site ID#	**Auth ID#**	
Facility ID#		

CLIENT INFORMATION

DEP Client ID#	**Client Type / Code**			
257262	LLC			
Organization Name or Registered Fictitious Name		**Employer ID#** (EIN)	**Dun & Bradstreet ID#**	
Texas Eastern Transmission, LP		72-0378240		
Individual Last Name	**First Name**	**MI**	**Suffix**	**SSN**
Additional Individual Last Name	**First Name**	**MI**	**Suffix**	**SSN**
Mailing Address Line 1		**Mailing Address Line 2**		
890 Winter Street, Suite 300				
Address Last Line – City	**State**	**ZIP+4**	**Country**	
Waltham	MA	02451	USA	
Client Contact Last Name	**First Name**	**MI**	**Suffix**	
Brett	William	B		
Client Contact Title		**Phone**	**Ext**	
Supervisor, Environmental Construction Permitting		(617) 560-1371		
Email Address		**FAX**		
William.Brett@enbridge.com				

SITE INFORMATION

DEP Site ID#	**Site Name**				
	Conemaugh River Crossing Project				
EPA ID#	**Estimated Number of Employees to be Present at Site**	10			
Description of Site					
Existing natural gas transmission utility corridor, from an access road directly north of Westinghouse Road to 0.2 mi east of Newport Road.					
County Name	**Municipality**	**City**	**Boro**	**Twp**	**State**
Westmoreland	Derry	☐	☐	☒	PA
County Name	**Municipality**	**City**	**Boro**	**Twp**	**State**
Indiana	Blacklick	☐	☐	☒	
Site Location Line 1		**Site Location Line 2**			
40 27’ 21.15” N, -79 17’ 57.81”W		Approx. 2.6 mi. north of Blairsville, PA			
Site Location Last Line – City	**State**	**ZIP+4**			
Blarsville	PA	15717			
Detailed Written Directions to Site					
From PADEP Southwest Regional Office: Take PA-28 S from Waterfront Dr., follow I-376 E and US-22 E to W. Ranson Ave. in Blairsville (44 mi). Take the exit towards PA-217/Blairsville from US-22E. Drive to Newport Rd/State Route 3009 in Black Lick Township(2.4 mi).					
Site Contact Last Name	**First Name**	**MI**	**Suffix**		
Brett	William	B			
Site Contact Title		**Site Contact Firm**			
Supervisor, Environmental Construction Permitting		Enbridge			
Email Address		**Mailing Address Line 2**			
890 Winter Street, Suite 300					

Mailing Address Last Line – City	State	ZIP+4
Waltham	MA	02451

Phone	Ext	FAX	Email Address
(617) 560-1371			William.Brett@enbridge.com

NAICS Codes (Two- & Three-Digit Codes – List All That Apply)	6-Digit Code (Optional)
486	486210

Client to Site Relationship
LESOP Lessee/Operator

FACILITY INFORMATION

Modification of Existing Facility	Yes	No
1. Will this project modify an existing facility, system, or activity?	☒	☐
2. Will this project involve an addition to an existing facility, system, or activity?	☒	☐

If "Yes", check all relevant facility types and provide DEP facility identification numbers below.

	Facility Type	DEP Fac ID#		Facility Type	DEP Fac ID#
☐	Air Emission Plant		☐	Industrial Minerals Mining Operation	
☐	Beneficial Use (water)		☐	Laboratory Location	
☐	Blasting Operation		☐	Land Recycling Cleanup Location	
☐	Captive Hazardous Waste Operation		☐	Mine DrainageTrmt/LandRecyProjLocation	
☐	Coal Ash Beneficial Use Operation		☐	Municipal Waste Operation	
☐	Coal Mining Operation		☒	Oil & Gas Encroachment Location	GP116505220-004
☐	Coal Pillar Location		☐	Oil & Gas Location	
☐	Commercial Hazardous Waste Operation		☐	Oil & Gas Water Poll Control Facility	
☐	Dam Location		☐	Oil & Gas Wastewater Storage Impoundment	
☐	Deep Mine Safety Operation -Anthracite		☐	Public Water Supply System	
☐	Deep Mine Safety Operation -Bituminous		☐	Radiation Facility	
☐	Deep Mine Safety Operation -Ind Minerals		☐	Residual Waste Operation	
☐	Encroachment Location (water, wetland)		☐	Storage Tank Location	
☐	Erosion & Sediment Control Facility		☐	Water Pollution Control Facility	
☐	Explosive Storage Location		☐	Water Resource	
			☐	Other:	

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Texas Eastern ROW west of Conemaugh River	40	27	21.15	-79	17	57.81

Horizontal Accuracy Measure Feet *--or--* Meters

Horizontal Reference Datum Code
- ☐ North American Datum of 1927
- ☒ North American Datum of 1983
- ☐ World Geodetic System of 1984

Horizontal Collection Method Code GISDR

Reference Point Code CNTAR

Altitude Feet 725-900 *--or--* Meters

Altitude Datum Name
- ☐ The National Geodetic Vertical Datum of 1929
- ☒ The North American Vertical Datum of 1988 (NAVD88)

Altitude (Vertical) Location Datum Collection Method Code TOPO

Geometric Type Code POINT

Data Collection Date 10/10/2019

Source Map Scale Number 1 Inch(es) = **2000** Feet
--or-- Centimeter(s) = Meters

PROJECT INFORMATION

Project Name
Conemaugh River Crossing Project

Project Description
Replace a segment of Texas Eastern's existing Line 12 via HDD bore under one wetland and the Conemaugh River along an existing natural gas pipeline; install a new MLV and access road.

Project Consultant Last Name	First Name	MI	Suffix
Holcomb	Bernard		

DRAFT

Project Consultant Title			Consulting Firm	
Project Manager			AECOM	
Mailing Address Line 1			**Mailing Address Line 2**	
625 West Ridge Pike, Suite E-100				
Address Last Line – City			**State**	**ZIP+4**
Conshohocken			PA	19428
Phone	**Ext**	**FAX**	**Email Address**	
610-832-3500		610-832-3501	Bernard.Holcomb@aecom.com	

Time Schedules	Project Milestone (Optional)
February 2021	Begin Construction
June 2021	End Construction

1.	**Have you informed the surrounding community and addressed any concerns prior to submitting the application to the Department?**	☒	Yes	☐	No
2.	**Is your project funded by state or federal grants?**	☐	Yes	☒	No

Note: If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.
Aspect of Project Related to Grant
Grant Source: _____
Grant Contact Person: _____
Grant Expiration Date: _____

3.	**Is this application for an authorization on Appendix A of the Land Use Policy? (For referenced list, see Appendix A of the Land Use Policy attached to GIF instructions)**	☒	Yes	☐	No

Note: If "No" to Question 3, the application is not subject to the Land Use Policy.
If "Yes" to Question 3, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

LAND USE INFORMATION

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

1.	**Is there an adopted county or multi-county comprehensive plan?**	☒	Yes	☐	No
2.	**Is there an adopted municipal or multi-municipal comprehensive plan?**	☒	Yes	☐	No
3.	**Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance?**	☒	Yes	☐	No

Note: If the Applicant answers "No" to either Questions 1, 2 or 3, the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 4 and 5 below.
If the Applicant answers "Yes" to questions 1, 2 and 3, the Applicant should respond to questions 4 and 5 below.

4.	**Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval?** If zoning approval has been received, attach documentation.	☐	Yes	☒	No
5.	**Have you attached Municipal and County Land Use Letters for the project?**	☐	Yes	☒	No

DRAFT

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	**Is this a coal mining project?** If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0.	☐	Yes	☒	No
1.1	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?**	☐	Yes	☐	No
1.2	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?**	☐	Yes	☐	No
1.3	**Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?**	☐	Yes	☐	No
1.4	**For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?**	☐	Yes	☐	No
1.5	**Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?**	☐	Yes	☐	No
1.6	**Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?**	☐	Yes	☐	No
2.0	**Is this a non-coal (industrial minerals) mining project?** If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0.	☐	Yes	☒	No
2.1	**Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?**	☐	Yes	☐	No
2.2	**Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?**	☐	Yes	☐	No
2.3	**Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?**	☐	Yes	☐	No
2.4	**For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?**	☐	Yes	☐	No
2.5	**Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?**	☐	Yes	☐	No

DRAFT

3.0	**Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well?** If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0.	☐	Yes	☒	No
3.1	**Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?**	☐	Yes	☐	No
3.2	**Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system?** If "Yes", discuss in *Project Description*.	☐	Yes	☐	No
3.3	**Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?**	☐	Yes	☐	No
4.0	**Will the project involve a construction activity that results in earth disturbance?** If "Yes", specify the total disturbed acreage. **4.0.1 Total Disturbed Acreage** 12.8 acres	☒	Yes	☐	No
5.0	**Does the project involve any of the following?** If "Yes", respond to 5.1-5.3. If "No", skip to Question 6.0.	☒	Yes	☐	No
5.1	**Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water?**	☒	Yes	☐	No
5.2	**Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland?**	☒	Yes	☐	No
5.3	**Floodplain Projects by the commonwealth, a Political Subdivision of the commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain?**	☒	Yes	☐	No
6.0	**Will the project involve discharge of stormwater or wastewater from an industrial activity to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?**	☐	Yes	☒	No
7.0	**Will the project involve the construction and operation of industrial waste treatment facilities?**	☐	Yes	☒	No
8.0	**Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations?** If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the *Project Description*, where applicable. **8.0.1 Estimated Proposed Flow (gal/day)**	☐	Yes	☒	No
9.0	**Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system?**	☐	Yes	☒	No
	9.0.1 Was Act 537 sewage facilities planning submitted and approved by DEP? If "Yes" attach the approval letter. Approval required prior to 105/NPDES approval.	☐	Yes	☐	No
10.0	**Is this project for the beneficial use of biosolids for land application within Pennsylvania?** If "Yes" indicate how much (i.e. gallons or dry tons per year). **10.0.1 Gallons Per Year (residential septage)** _____ **10.0.2 Dry Tons Per Year (biosolids)**	☐	Yes	☒	No

DRAFT

11.0	**Does the project involve construction, modification or removal of a dam?** If "Yes", identify the dam. **11.0.1 Dam Name**	☐	Yes	☒	No
12.0	**Will the project interfere with the flow from, or otherwise impact, a dam?** If "Yes", identify the dam. **12.0.1 Dam Name**	☐	Yes	☒	No
13.0	**Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?** If "Yes", identify each type of emission followed by the amount of that emission. **13.0.1 Enter all types & amounts of emissions; separate each set with semicolons.** **Facility will be a minor source for all pollutants with levels less than following:** • **Nitrogen Oxides (NOX) – 100 tons;** • **Carbon Monoxide (CO) – 100 tons;** • **Sulfur Oxides (SOX) – 100 tons;** • **Particulate Matter – 100 tons;** • **Volatile Organic Compounds (VOC) – 50 tons;** • **Individual Hazardous Air Pollutant (HAP) – 10 tons; and** • **Total Hazardous Air Pollutants (HAP) – 25 tons**	☐	Yes	☒	No
14.0	**Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year?** If "Yes", check all proposed sub-facilities. **14.0.1 Number of Persons Served** _____ **14.0.2 Number of Employee/Guests** _____ **14.0.3 Number of Connections** _____	☐	Yes	☒	No
	14.0.4 Sub-Fac: Distribution System	☐	Yes	☐	No
	14.0.5 Sub-Fac: Water Treatment Plant	☐	Yes	☐	No
	14.0.6 Sub-Fac: Source	☐	Yes	☐	No
	14.0.7 Sub-Fac: Pump Station	☐	Yes	☐	No
	14.0.8 Sub Fac: Transmission Main	☐	Yes	☐	No
	14.0.9 Sub-Fac: Storage Facility	☐	Yes	☐	No
15.0	**Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery?**	☐	Yes	☒	No
16.0	**Is your project to be served by an existing public water supply?** If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project. **16.0.1 Supplier's Name** _____	☐	Yes	☒	No
	16.0.2 Letter of Approval from Supplier is Attached	☐	Yes	☐	No
17.0	**Will this project involve a new or increased drinking water withdrawal from a stream or other water body?** If "Yes", should reference both Water Supply and Watershed Management. **17.0.1 Stream Name**	☐	Yes	☒	No
18.0	**Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste?** If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed. **18.0.1 Type & Amount** Disposal of sewage approx. 1000 gal/day. Residual waste from 50 employees per day	☐	Yes	☒	No
19.0	**Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities?**	☐	Yes	☒	No
20.0	**Does your project involve installation of a field constructed underground storage tank?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **20.0.1 Enter all substances & capacity of each; separate each set with semicolons.** 3- Sewage Storage Tanks – Total 5,000 gallons	☐	Yes	☒	No

DRAFT

21.0	**Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **21.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
22.0	**Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **22.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
23.0	**Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. **23.0.1 Enter all substances & capacity of each; separate each set with semicolons.** Liquid Natural Gas – 6 million gallons 2 – Firewater – 1.7 million gallons each	☐	Yes	☒	No
24.0	**Will the intended activity involve the use of a radiation source?**	☐	Yes	☒	No

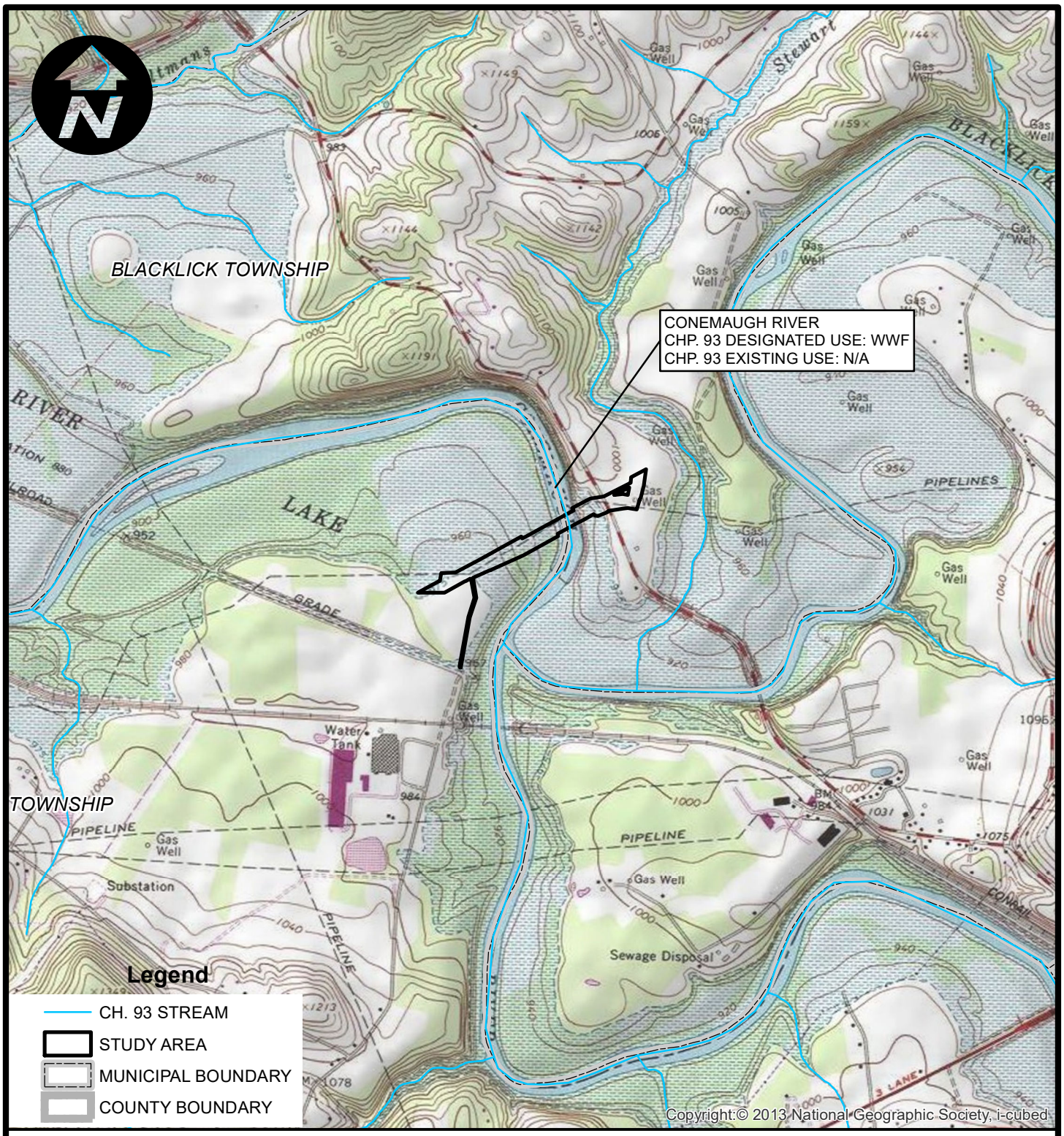
CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

Type or Print Name Bernard Holcomb

	Project Manager	05/01/2020
Signature	**Title**	**Date**

DRAFT



USGS QUAD NAME: BLAIRSVILLE, PA
BLACKLICK TOWNSHIP, INDIANA COUNTY AND DERRY TOWNSHIP, WESTMORELAND COUNTY, PA
SITE CENTER: 40° 27' 21.15" N AND 79° 17' 57.81" W

TOPO SOURCE: SEAMLESS DIGITAL RASTER GRAPHIC-N.P.S. NATURAL PHYSICAL MAP & U.S.G.S. TOPOGRAPHIC MAP 2013, NATIONAL GEOGRAPHIC SOCIETY, ICUBED

AECOM

FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE 120
PITTSBURGH, PA 15220

ENBRIDGE

TEXAS EASTERN TRANSMISSION, LP

PREPARED BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	DRAWING NO.
JAS	MAB	SLH	4/23/2020	1 " = 2,000 '	**FIGURE 1**
			Page 1 of 1	PROJECT NO. 60594173	LOCATION MAP 2020 INTEGRITY PROGRAM CONEMAUGH RIVER CROSSING PROJECT INDIANA AND WESTMORELAND COUNTIES, PENNSYLVANIA

Requirement D

Cultural Resource Notice and Proof of Receipt

CULTURAL RESOURCES

Texas Eastern has a Categorical Exclusion (attached) for all work conducted in their existing easements. The current Categorical Exclusion will expire at the end of 2020; Texas Eastern will obtain a new Categorical Exclusion for the next coverage period. A Phase I archaeological survey (attached) has been conducted for those areas outside of the existing easement and submitted to the Pennsylvania State Historic Preservation Office (SHPO) for review. The SHPO response affirming the results of that survey is included herein.

TEXAS EASTERN TRANSMISSION, LP
Attn.: Sabrina Hepburn
890 Winter Street, Suite 300
Waltham, MA 02451

617-560-1424

Spectra Energy Partners

October 26, 2015

RECEIVED ON
OCT 30 '15
BUREAU FOR
HISTORIC PRESERVATION

Serena Bellew
Deputy State Historic Preservation Officer
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, Pennsylvania 17120-0093

Re: Texas Eastern Transmission, LP
Historic and Archaeological Categorical Exclusion Agreement for Pipeline Construction/Maintenance Activities in Pennsylvania
Pennsylvania SHPO ER #2003-0548-042-H

Dear Ms. Bellew:

Texas Eastern Transmission, LP (Texas Eastern), a wholly-owned subsidiary of Spectra Energy Partners, LP, is requesting a categorical exclusion renewal for a five (5) year period extending from January 1, 2016 through December 31, 2020 for pipeline construction and maintenance activities in Pennsylvania. Enclosed please find a copy of the current agreement which expires at the end of this year, along with a consultation agreement with similar language to that included in the previous agreement. If you concur with this request, please sign and date the enclosed agreement and return it to the following address:

Texas Eastern Transmission, LP
Attn.: Sabrina Hepburn
890 Winter Street, Suite 300
Waltham, MA 02451

All written correspondence should be directed to the above address. Texas Eastern believes that this agreement will continue to facilitate Texas Eastern's operations in Pennsylvania while still protecting potentially significant cultural resources.

If you have any questions or require additional information, please do not hesitate to contact Gregory R. Dubell at 401-575-0624 or gdubell@palinc.com. We appreciate your time and attention to this matter.

Sincerely,

Sabrina Hepburn

Sabrina Hepburn
Supervisor
Environmental Construction Permitting

Enclosures

HISTORIC AND ARCHAEOLOGICAL REVIEW PROCEDURES FOR PROJECTS IN PENNSYLVANIA – JANUARY 1, 2016 THROUGH DECEMBER 31, 2020

TEXAS EASTERN TRANSMISSION, LP

1. Where the Texas Eastern Transmission, LP (Texas Eastern) right-of-way (ROW) is maintained (i.e., periodic mowing) and has been previously disturbed by the original installation, then, for the following types of projects, there will be no contact with the Pennsylvania Historical and Museum Commission – Bureau for Historic Preservation, the office of the State Historic Preservation Officer (SHPO):

    a. construction and other activities on existing ROW, including the installation and maintenance, relocation, replacement, or abandonment and removal of receipt and delivery taps, meters, regulators, valves, pipe, points of delivery (POD), and other auxiliary pipeline facilities, as well as investigatory activities within existing, previously disturbed ROW;
    b. construction maintenance, relocation, replacement and/or abandonment projects within existing, previously-disturbed, and generally fenced compressor and metering and regulating (M&R) stations, yards and gas processing plants, and the installation of field compressors or dehydrators on an existing ROW;
    c. use of existing access roads and existing ROW as access to all construction and/or maintenance projects including minor maintenance or upgrades such as adding gravel, re-grading, and side trimming (pruning) of trees; and
    d. the acquisition of existing facilities by lease or purchase (no new ROW required).

2. A transmittal letter is required to serve as documentation of consultation with the Pennsylvania SHPO for projects not in the categories described in Stipulation 1:

    a. Texas Eastern will provide the Pennsylvania SHPO with a project description, a project map, a summary of its cultural resources review, and any other material helpful to the SHPO in making its recommendations for the project.

3. For projects located on Federal lands, the land managing agency or lead federal agency will be consulted.

Identification of Historic Properties

For construction and maintenance activities beyond the horizontal and vertical limits of prior ground disturbance, Texas Eastern will put forth an adequate effort to identify historic properties within the area of potential effect and begin consultation with the Pennsylvania SHPO as required under Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800). Additionally, in the event of an unanticipated discovery, the attached Unanticipated Discovery Plan will be followed.

Termination of This Agreement

This Agreement shall be in effect for five (5) years, extending from January 1, 2016 through December 31, 2020. At the written request of either party, this Agreement may be reviewed for possible modification at any time.

Reporting

Texas Eastern will provide the Pennsylvania SHPO a summary of all the projects completed under this agreement on an annual basis, including USGS quadrangle maps showing the location(s) of all projects identified in the summary report. This report shall be submitted by January 31st for each year during the five (5) year agreement.

Sabrina Hepburn 10/26/2015

Sabrina Hepburn Date
Supervisor, Environmental Construction Permitting
Texas Eastern Transmission, LP

Nov 9, 2015

Serena Bellew Date
Deputy State Historic Preservation Officer
Pennsylvania SHPO

May 6, 2020

Janna Napoli
Senior Archaeologist
AECOM
681Andersen Drive, Suite 400
Pittsburgh, PA 15220

Re: ER 2020-0684-042-B; FERC: Archaeological Negative Survey Form, Phase I Archaeological Survey, Line 12 Anomaly Project, Westmoreland and Indiana Counties, Pennsylvania

Dear Ms. Napoli,

Thank you for submitting additional information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

This report meets our standards and specifications as outlined in Guidelines for Archaeological Investigations in Pennsylvania (SHPO 2017) and the Secretary of the Interior's Guidelines for Archaeological Documentation. We agree with the recommendations of this report and, in our opinion, no further archaeological work is necessary for this project.

If you need further information concerning archaeological issues, please consult Casey Hanson at chanson@pa.gov or (717) 772-0923.

Sincerely,

Douglas C. McLearen, Chief
Division of Environmental Review

AECOM

April 10, 2020

Mr. Douglas McLearen
Pennsylvania Historical & Museum Commission
Pennsylvania State Historic Preservation Office
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093

RE: ER # 2020-0684-042
Archaeological Negative Survey Report
Texas Eastern Transmission, LP Line 12 Anomaly Project, Westmoreland and Indiana Counties, Pennsylvania

Dear Mr. McLearen:

AECOM performed a Phase I archaeological survey for the above-named project on behalf of Texas Eastern Transmission, LP (Texas Eastern). No archaeological sites were identified within the project's area of potential effects; therefore, AECOM recommends that the project will have no effect on historic properties and that no further archaeological investigation is warranted in the APE. The results of the archaeological survey are documented in an Archaeological Negative Survey Form, which has been uploaded to the Cultural Resources Geographic Information System for your review and comment.

If you have any questions regarding the project, please contact me at (717) 796-8019 or via e-mail at andrew.wyatt@aecom.com.

Yours truly,

AECOM

Andrew Wyatt, M.A.
Senior Archaeologist

AECOM
100 Sterling Parkway, Suite 205
Mechanicsburg, PA 17050
Tel: 717.796.8019
Fax: 717.795.8280

cc: William Brett (Texas Eastern), Eileen Banach (AECOM)

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

Negative Survey Form

(This form may be used if the Phase I guidelines have been followed and no cultural resources have been identified.)

1. Project Identification:

ER Number: 2020-0684-042

Project Name &/or Agency Tracking #: Line 12 Anomaly Project

Agency: FERC **Applicant:** Texas Eastern Transmission, LP

Preparers Name and affiliation: Janna Napoli, MAA, and Michael Way, BS

Date Prepared: April 8, 2020

Project Area County/Municipality (list all)

County	Municipality
Westmoreland Indiana	Derry Twp. Blacklick Twp.

2. Project Setting: (check all that apply)

☐ urban/suburban; ☒ rural
☐ upland; ☒ floodplain/terrace (☒ active; ☒ stable terrace)

7.5" USGS Quadrangle(s) Name (list all):

Name	Date
Blairsville	1981

Physiographic Zone(s)(list All. Use DCNR Map 13 compiled by W.D. Sevon, Fourth Edition, 2000.):

Physiographic Zone
Appalachian Plateaus Province, Pittsburgh Low Plateau Section

Project Area Drainage(s), (list all) (Sub-basin and Watershed can be obtained from CRGIS):

Sub-basin	Watershed	Major Stream	Minor Stream
Lower Allegheny River (18)	D	Conemaugh River	Blacklick Creek

3. Basic Field Conditions:

(Text fields will expand as needed. Please be complete)

Area of APE / Project Area in hectares: 3.69 Hectares tested: 3.69

General Description of APE / Project Area: Due to a detected anomaly, Texas Eastern Transmission, LP (Texas Eastern) will relocate or replace their existing Line 12 across the Conemaugh River from Derry Township, Westmoreland County to Blacklick Township, Indiana County using either a conventional open-cut or horizontal directional drill (HDD) method (Attachment A, Figure 1). The majority of the workspace in either case will be located in Texas Eastern's previously disturbed and maintained right-of-way (ROW) where activities are covered under their categorical exclusion agreement with the Pennsylvania State Historic Preservation Office (PA SHPO) (Attachment A, Figure 2). Approximately 3.69 hectares (~9.1 acres) of additional workspace outside of Texas Eastern's ROW will also be required. The additional workspace on the east side of the Conemaugh River will be used for spoil

stockpiling and equipment, and possibly some excavation if an HDD is employed. On the west side of the Conemaugh River, the additional workspace will be used for construction vehicle movement and spoil stockpiling after tree clearance; no excavation will take place. The Phase I archaeological survey was conducted in an approximately 3.69 hectares (~9.1 acres) Study Area that accommodates the additional workspace outside of Texas Eastern's ROW. The Study Area served as the area of potential effects (APE) for the Project.

Type of Proposed Project / Impact: Pipeline replacement

Date of field investigation(s): December 17,18, 2019; January 8, 2020; and March 5, 2020

Description of Field Conditions including percentage of surface visibility: Phase I Survey was conducted on four cloudy days during the winter. There was no surface soil visibility in the Study Area due to vegetation.

4. Previously Recorded Archaeological Sites within APE / Project Area and not relocated by this project:

PASS Site Number	Reason not re-located
None	Not Applicable

5. Survey Methodology: (check all that apply to the entire project; attach any supporting documents)

☒ PASS file Research ☐ Contacted Local Historical Association/Commission/Park/Etc.
☐ Informant Data ☒ Historic Records/Maps/Photos ☒ SCS Soil Maps
☐ Surface Survey ☐ Geomorphological Borings ☒ STPs
☐ Test Units ☐ Geomorphological Trenches ☐ Remote Sensing
Other: _____

Professional Geomorphologist was ☐ Present or ☒ Not Present During Field Investigations

Name: _____ Affiliation: _____

Formal Geomorphological Report Prepared: ☐ Yes ☒ No

6. Results: (Describe both the design and the results of every methodology checked in **5.** Include the size and condition of the area tested by each.)

PASS File Research

Review of the PA SHPO's Cultural Resources Geographic Information System (CRGIS) identified 11 recorded archaeological sites and seven previous archaeological surveys within a 1.6-kilometer (1.0-mile) radius of the Study Area (Tables 1 and 2). Of the 11 sites, three are mapped in close proximity to the Study Area (36IN0004, 36IN0188, 36IN0318). Sites 36IN004 and 36IN0318, located approximately 50 meters (~160 feet) to the north and east of the Study Area, respectively, are small Native American open habitation sites. No diagnostic artifacts were recovered from either site, and neither has been evaluated for listing in the National Register of Historic Places. Site 36IN0188, the purported location of Newport village (ca. 1790-1800), was investigated prior to construction of Texas Eastern's Delmont Loop (Line 27) in 1981 (Mitchum 1983). Twenty-four one-meter-square (3.3-foot square) test units were excavated at 10-meter (33-foot) intervals in the 23-meter (75-foot) wide ROW for Line 27 west of Conemaugh River. A total of 282 historic artifacts and nine Native American artifacts were recovered from the plowzone in 19 of the test units (Mitchum 1983:36-37). Although several artifacts were recovered that spanned the late eighteenth through early nineteenth century, no features could be conclusively linked with Newport village and no further archaeological investigations were recommended (Mitchum 1983:39). Phase I archaeological survey for Texas Eastern's Line 27 covered high terrace settings on the east bank of the Conemaugh River and did not identify archaeological sites near the Study Area (McHugh 1982). The remaining sites listed in Table 1 consist of small Native American open habitation sites and a historic domestic site and are mapped within 0.2 to 1.64 kilometers (0.15 miles to 0.99 miles) of the Study Area.

The PA SHPO's Pre-Contact Predictive Model (Model) ranks the Study Area as having a mix of high and medium probability for Native American archaeological sites that generally conforms to non-statistical models of Native American site locations in western Pennsylvania.

Table 1: Recorded Archaeological Sites within 1.6 Kilometers (1.0 Mile) of the Study Area

Site #	Temporal Period	Site Type	NR Status	Landform
36IN0003	Prehistoric: Components Unknown	Open Habitation	Unevaluated	Low Terrace
36IN0004	Prehistoric: Components Unknown	Open Habitation	Unevaluated	High Terrace
36IN0005	Prehistoric: Components Unknown	Open Habitation	Unevaluated	High Terrace
36IN0014	Prehistoric: Components Unknown	Open Habitation	Unevaluated	High Terrace
36IN0188	Prehistoric: Components Unknown Historic: Late 18th-Early 19th c.	Open Habitation/ Domestic Village	Unevaluated	High Terrace
36IN0316	Prehistoric: Components Unknown	Open Habitation	Unevaluated	High terrace
36IN0318	Prehistoric: Late Archaic	Open Habitation	Unevaluated	High Terrace
36IN0401	Prehistoric: Components Unknown	Open Habitation	Unevaluated	Middle Slope
36WM0004	Prehistoric: Components Unknown	Open Habitation	Unevaluated	High Terrace
36WM0530	Prehistoric: Components Unknown	Isolated Find	Unevaluated	High Terrace
36WM1055	Historic: 19th-20th c.	Farmstead	SHPO-Not Eligible	Middle Slope

Table 2: Archaeological Surveys within 1.6 Kilometers (1.0 Mile) of the Study Area

ER #	Title	Reference	Sites identified	Distance from Study Area
1981-0119-042-B	*Cultural Resources Survey, Texas Eastern Transmission Corporation's Pipeline Rights of Way, Berks, Blair, Cambria, Dauphin, Juniata, Lebanon, Montgomery, Perry, and Westmoreland Counties*	McHugh, W. (1982)	15	0.02 km (0.01 mi)
1981-0119-042-C	*Additional Cultural Resources Investigations, Phase III Expansion of the SS-II Pipeline Rights-of-Way, Berks, Blair, Dauphin, Indiana, Lebanon, and Perry Counties*	Mitchum, B. (1983)	5	0.02 km (0.01 mi)
1991-1835-063-S	*Phase I Archaeological Survey, Route 119 South Improvement Project Wetland Mitigation, Burrell Township, Indiana County.*	Espenshade, C. (2000)	0	0.56 km (0.35 mi)
1999-8018-042-C	*Phase I Archaeological Study, Conemaugh Dam Trail, Conemaugh River Lake, Indian and Westmoreland Counties*	Campbell, D. (1999)	0	0.42 km (0.26 mi)
2012-1771-042-B	*Phase I Archaeological Survey, Proposed H-400 Gathering Line, Indiana and Armstrong Counties*	Shreckengost, B. (2012)	6	0.53 km (0.33 mi)
2012-1771-042-D	*Negative Survey Form, Addendum I, Proposed H-400 Gathering Line, Indiana and Armstrong Counties*	Hood, A. (2012)	0	1.38 km (0.86 mi)
2014-0223-129-B	*Phase I Archaeological Report, Derry Connector Pipeline and Compressor Station, Derry Township, Westmoreland County*	McKissick, J. (2013)	1	1.38 km (0.86 mi)

Historic Maps

The 1867 *Atlas of Westmoreland County Pennsylvania* (Attachment A, Figure 3), the 1871 *Atlas of Indiana County Pennsylvania* (Attachment A, Figure 4), twentieth-century topographic maps (Attachment A, Figures 5, 6), and modern aerials provided by Google Earth® were examined in order to determine whether nineteenth or early-twentieth century structures may be present within the Study Area. No structures are depicted in the Study Area on

any of the historic maps or aerials. Newport village, however, is mapped in close proximity to the Study Area on the 1871 map (Attachment A, Figure 4). The village is labeled as "Old Newport or The deserted Village." The area depicted corresponds to the mapped location of Site 36IN0188 in CRGIS.

Soils

Soils in the Study Area include mapping units of the Monongahela series (SSURGO 2019). On the west side of the Conemaugh River, Monongahela silt loam, 3 to 8 percent slopes is mapped on a high terrace and floodplain. These mapping units are separated by an area of Monongahela silt loam, 8 to 15 percent slopes which corresponds to the terrace riser between the high terrace and floodplain. On the Conemaugh River's east side, Monongahela silt loam, 8 to 15 percent slopes is mapped from the river bank east to Newport Road. West of Newport Road, Monongahela silt loam, 3 to 8 percent slopes are mapped on another high terrace The Monongahela series consists of moderately deep moderately well drained soils that formed in old alluvium from soils derived largely from acid sandstone and shale. They are frequently found on terraces and toeslopes of Glacial Lake Monongahela (ca. 22,000 to 800,000 years ago) (Harper 2002). The typical soil profile consists of Ap-BA-Bt-Btx1-Btx2-Btx3-C horizons that can extend up to 1.65 meters (5.4 feet) below ground surface (bgs). Based on its pre-Wisconsinan age, archaeological sites in Monongahela series soils on the high terraces would be restricted to the plowzone and upper subsoil.

Fieldwork Methods and Results

Archaeological fieldwork was conducted on December 17 through 18, 2019; January 8, 2020; and March 5, 2020. The Study Area encompassed a total of 3.69 hectares (~9.1 acres) (Attachment A, Figure 7a, b, c). The Study Area covered additional temporary workspace outside of Texas Eastern's ROW. Survey Section (Section) 1 was located west of the Conemaugh River, Section 2 was located east of the Conemaugh River. A total of 164 shovel test pit (STP) locations were pre-plotted in a handheld Global Positioning System. STPs were plotted in west- to east-trending transects spaced 15 meters (49.2 feet) apart. STPs were spaced at 15-meter (49.2-foot) intervals along each transect. In-field assessment of archaeological sensitivity, previous disturbance, and other factors guided the decision on which STPs were excavated, or if judgmental testing was necessary to adequately sample a given area. The survey strategy is discussed further in Attachment C. Survey coverage is depicted in Attachment A, Figures 7a and 7b.

STPs measuring 0.57 meters in diameter (1.9 feet) were excavated by natural soil strata. All excavated soils were screened through six-millimeter (0.25-inch) hardware mesh for systematic artifact recovery. Archaeologists recorded data for each STP (Munsell readings, soil textures, artifact number and type) on standardized forms. Landforms and disturbance were documented with digital photographs. At the conclusion of field investigations, all excavated areas were backfilled, leveled, and left as close to original condition as possible.

Section 1 was located west of the Conemaugh River and included three distinct landforms. A high terrace extended from the western boundary of Section 1 to the vicinity of STP A14 (Attachment A, Figure 7a, b; Attachment B, Photograph 1). The terrace is relatively level and rises approximately 21 meters (~70 feet) above the Conemaugh River. From STP A14 to STP A16, a steep terrace riser descends to the Conemaugh River floodplain. The floodplain surface is approximately 1.8 meters (~6 feet) above the Conemaugh River near STP A34 and rises to approximately 18 meters (~60 feet) above the river near the terrace riser (Attachment B, Photograph 2). In December 2019, flooding extended from the river bank to STPs A24 and B22 (Attachment B, Photograph 3). Soils were saturated to the base of the terrace riser; therefore, excavation was restricted to the high terraces on both sides of the river. By January, floodwaters had receded approximately 100 meters (~30 meters) to the vicinity of STPs A29 and B27. The Conemaugh Dam, located 5.5 kilometers (~3.4 miles) northwest of the Study Area, provides flood protection for the lower Conemaugh Valley. When rainfall, melting snow, or stream flows indicate

the possibility of flooding, run-off is retained behind the Conemaugh Dam and stored until it can be released without increasing flood conditions downstream of the dam.

The high terrace and floodplain in the Study area were covered by deciduous trees and a moderately dense understory. A large wetland was located within the westernmost portion of the section, which consisted of tall grasses and other wetland vegetation with frequent standing water (Attachment B, Photographs 4 and 5). Texas Eastern's cleared ROW abutted the Study Area. A total of 94 STPs were pre-plotted in Section 1. Of these, five were not excavated due to excessive slope on the terrace riser and disturbance from an existing access road, and 21 were not excavated due to flooding or standing water. STPs on the high terrace displayed a 0.15 to 0.3-meter (0.49 to 0.98-foot) Ap horizon underlain by a Bt horizon, which is consistent with typical Monongahela series soil profiles. STP A7 and is representative of the soil profile encountered on the high terrace (Attachment A: Figure 8a). STP A7 consisted of a 0.15-meter (0.49 feet) brown (10YR 4/3) weak granular silt loam Ap horizon underlain by a brownish yellow (10YR 6/6) strong subangular blocky silty clay loam Bt horizon. Both horizons contained less than five percent pebbles. Soils within the wetland consisted of a 0.23 to 0.31-meter (0.75 feet to 1.02 feet) weak silt loam Ap horizon underlain by a silty clay loam B horizon. Water within STPs was encountered at varying depths, between 0.03 meters and 0.21 meters (0.09 feet and 0.69 feet). STP D3 was representative of the soil profile encountered in the wetland (Attachment A: Figure 8a). STP D3 contained a 0.31 meter (1.02 feet) dark brown (10YR 3/3) weak silt loam Ap horizon with iron oxide underlain by a light yellowish brown (10YR 6/4) silty clay loam B horizon. Water began to saturate the sides of STP D3 at a depth of 0.21 meters (0.69 feet).

Floodplain soils consisted of a 0.21 meter to 0.8 meter (0.69 feet to 2.62 feet) structureless silt loam AC horizon underlain by a weak subangular blocky silty clay loam Bw horizon. Water seepage in the STPs was encountered at varying depths across the floodplain. Depth to infiltrating water in the STPs ranged from 0.7 meters (0.36 feet) bgs on distal portions of the floodplain to 0.11 meters (0.4 feet) bgs near the STP 27. STP B19 and B20 were representative of STPs on the floodplain (Attachment B, Figure 8b). STP B19 contained a 0.50-meter (1.64-foot) brown (10YR 4/3) structureless silt loam AC horizon underlain by a strong brown (7.5YR 5/8) weak subangular blocky silty clay loam Bw horizon. Excavation terminated on cobbles at 0.73 meters (2.39 feet) bgs. Water began to saturate the sides of STP B19 at a depth of 0.45 meters (1.48 feet). The soil profile exposed in STP B20 was similar to that of STP B19, except that the AC horizon in STP B20 was deeper and cobbles were not contacted. Based on its lack of structure, the AC horizon is composed of modern flood sediment. No artifacts were recovered from Section 1 and no archaeological sites were identified.

Section 2 began 42 meters (138 feet) east of the Conemaugh River and was bisected by Newport Road (Attachment A, Figure 7c). Slopes exceeding 15 percent were present between the Conemaugh River and Newport Road (Attachment B: Photograph 6). The slope was covered in deciduous trees and a moderately dense understory. A level, high terrace lies approximately 26 meters (~85 feet) above the Conemaugh River and extends east from Newport Road to the eastern boundary of Section 2. The portion of Section 2 on the high terrace is wooded east to STPs C7 and D6 and was in cut corn interspersed with tree lines to the eastern end of the section (Attachment B, Photograph 7).

A total of 70 STPs were pre-plotted in Section 2. Of these, 14 were not excavated due to excessive slope or road disturbance. Soils on the high terrace consisted of a 0.2 meter to 0.4-meter (0.66 to 1.3-foot) silt loam Ap horizon underlain by a well-developed Bt horizon. STP F5 displayed a typical soil profile for the high terrace, consisting of a 0.28-meter (0.92-foot) brown (10YR 4/3) weak, granular silt loam Ap horizon underlain by a yellowish brown (10YR 5/8) silty clay loam Bt horizon with strong, subangular block structure (Attachment A: Figure 8c). Both horizons contained less than 5 percent rock fragments. STP C5 was representative of the variability of the depth of the Ap horizon. STP C5 displayed a 0.20-meter (0.66-foot) brown (10YR 4/3) weak granular silt loam Ap horizon underlain by a yellowish brown (10YR 5/8) silty clay loam Bt horizon with strong, subangular blocky structure (Attachment A: Figure 8c). Both horizons contained less than 5 percent rock fragments. No artifacts were recovered

from Section 2 and no surface indications of 36IN0188 were observed. No archaeological sites were identified in Section 2.

Summary

A total of 124 STPs were excavated in the Study Area. No artifacts were recovered, and no archaeological sites were identified. Although testing on the Conemaugh River floodplain did not reach clear C horizon deposits, the landform is mantled by a 0.5- to 0.7-meter (1.6- to 2.3-foot) thick deposit of modern flood deposits. The floodplain will be used for construction vehicle movement and spoil stockpiling after vegetation is removed; no excavation will take place. Based on these findings, AECOM recommends that the Project will have no effect on historic properties and that no further archaeological investigations are warranted within the Study Area.

7. Statewide Pre-Contact Probability Model Analysis: (Use the model from CRGIS to determine portions of the project area that were located within each sensitivity tier and list all testing methods used within each tier. If more than one method was used, estimate the percentage of the tier tested by each method. In the Sites Located section, include Isolated Finds for which a number is assigned.)

Sensitivity Tier	Area within this Tier	Percent of Total Project Area	Method(s) Used to test this tier (Use list from 5 above. Include % if multiple.)	Number of Sites Located
High	28,908 sq. m.	73 %	Shovel testing	0
Moderate	9,900 sq. m.	25 %	Shovel testing	0
Low	792 sq. m.	2 %	Shovel testing	0

8. Required Attachments:

☒ 7.5' USGS Quadrangle Map delineating APE / Project Area
☒ Project map showing testing strategy(ies)
☒ Testing strategy justification / predictive model
☒ Supporting photographs with descriptions of view and view direction
☐ Engineering / Project Plans if prepared
☐ Geomorphological Report if prepared
☒ Representative excavation profiles and descriptions

Bibliography

Harper, John A.
2002 Lake Monongahela: Anatomy of an Immense Ice Age Pond. Pennsylvania Geologist 32(1):2-2.

McHugh, William P.
1982 *A Comprehensive Report on a Cultural Resources Survey of Texas Eastern Transmission Corporation's Pipeline Rights-of-Way in Pennsylvania*. Prepared by GAI Consultants, Incorporated, Monroeville, Pennsylvania for Texas Eastern Transmission Corporation, Houston Texas. PA SHPO ER # 1981-0119-042.

Mitchum, Beverly
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Pomeroy, A.
1867 *Atlas of Westmoreland County, Pennsylvania: from actual surveys and under the direction of S. N. & D. G. Beers*. A. Pomeroy, Philadelphia. Electronic document, http://www.usgwarchives.net/maps/pa/county/westmo/1867/, accessed October 28, 2019.

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n.d. *Conemaugh River Lake*. Electronic document, https://www.lrp.usace.army.mil/Missions/Recreation/Lakes/Conemaugh-River-Lake/, accessed October 28, 2019.

United States Geological Survey (USGS)
1902 Latrobe 7.5" Topographic Quadrangle Map. Reston, Virginia, 1946.

1964 Blairsville 7.5" Topographic Quadrangle Map. Reston, Virginia, 1972.

Attachment A
Figures

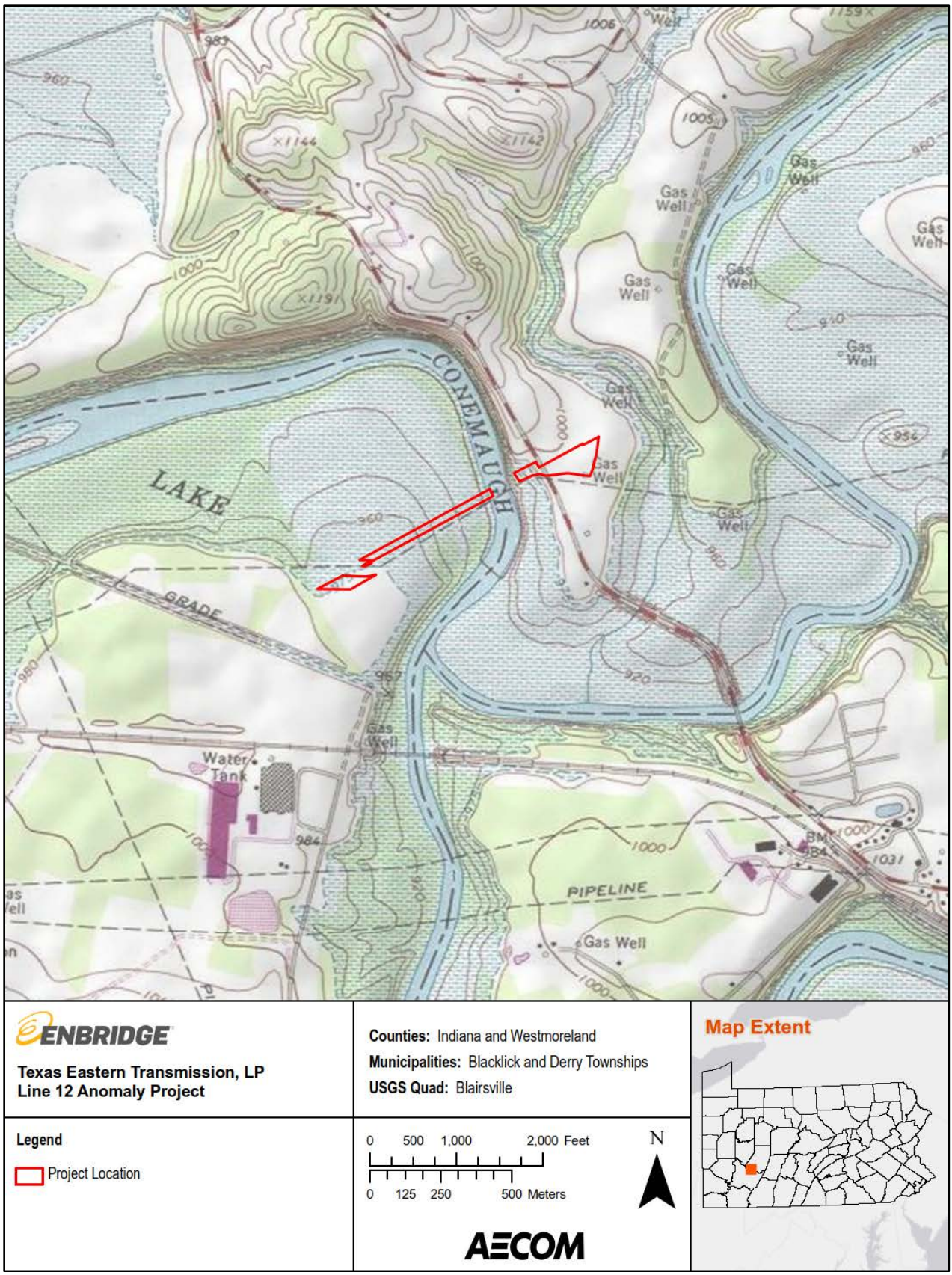


Figure 1: Project location.

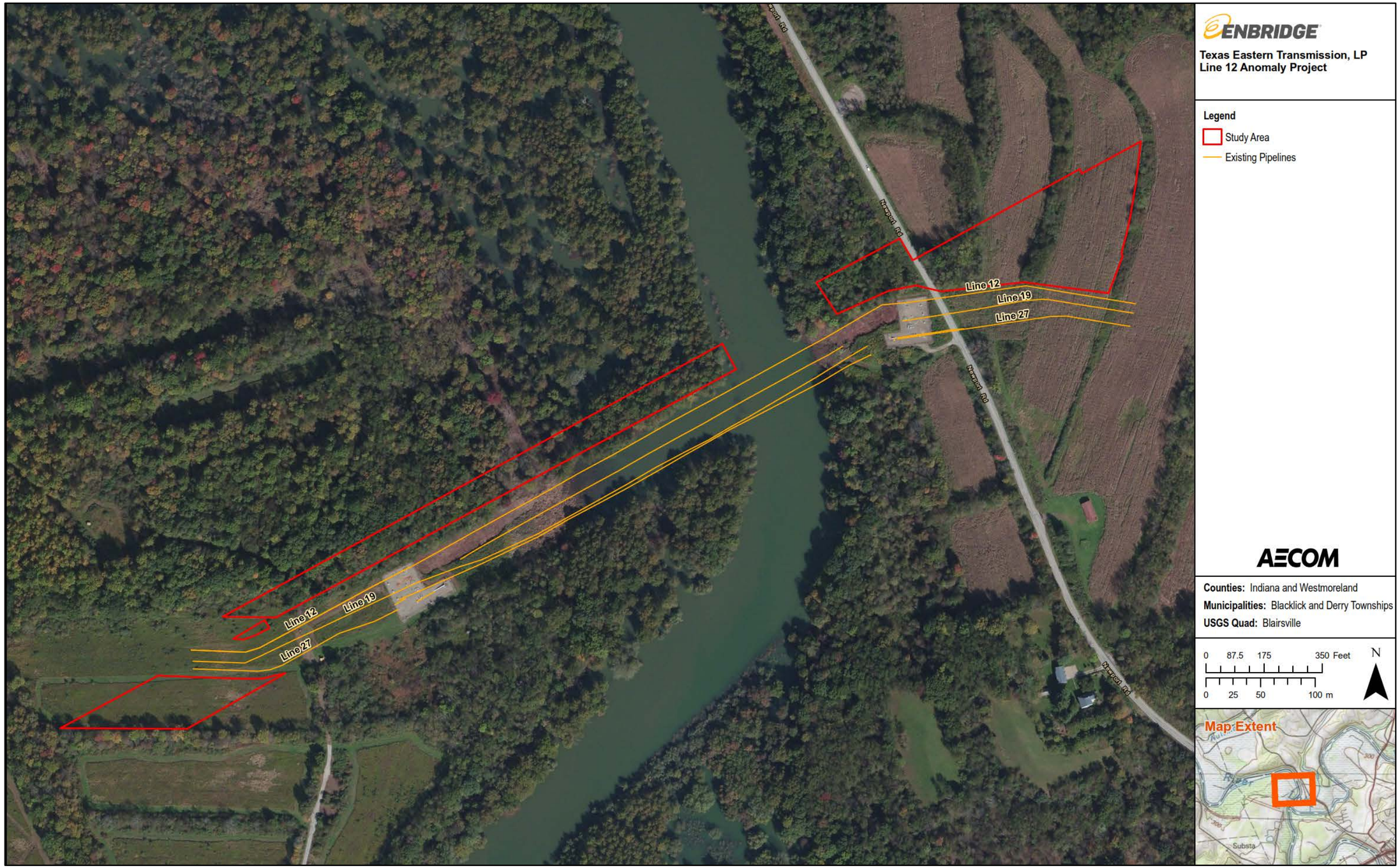


Figure 2: Aerial view of Study Area and existing pipelines.

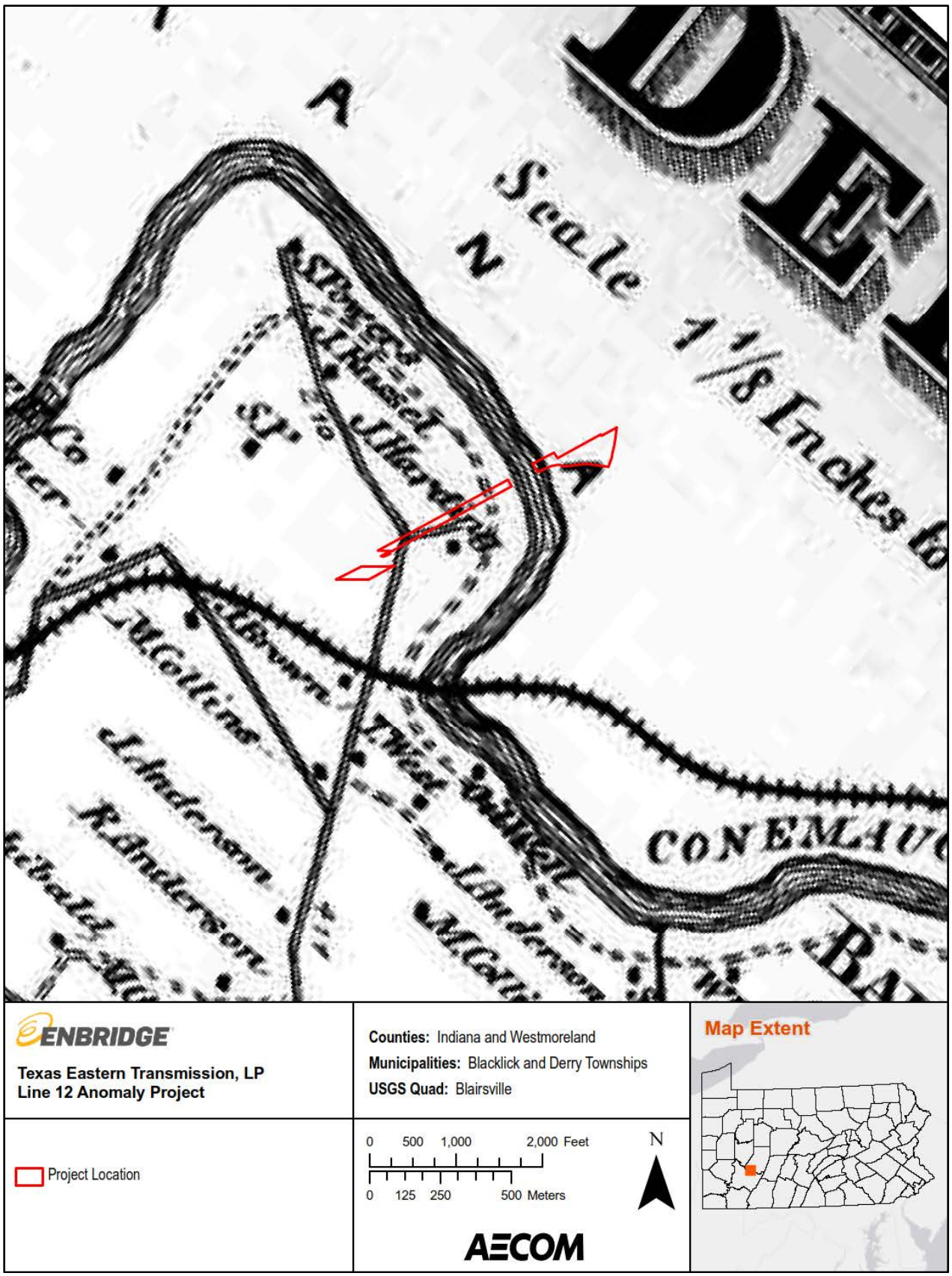
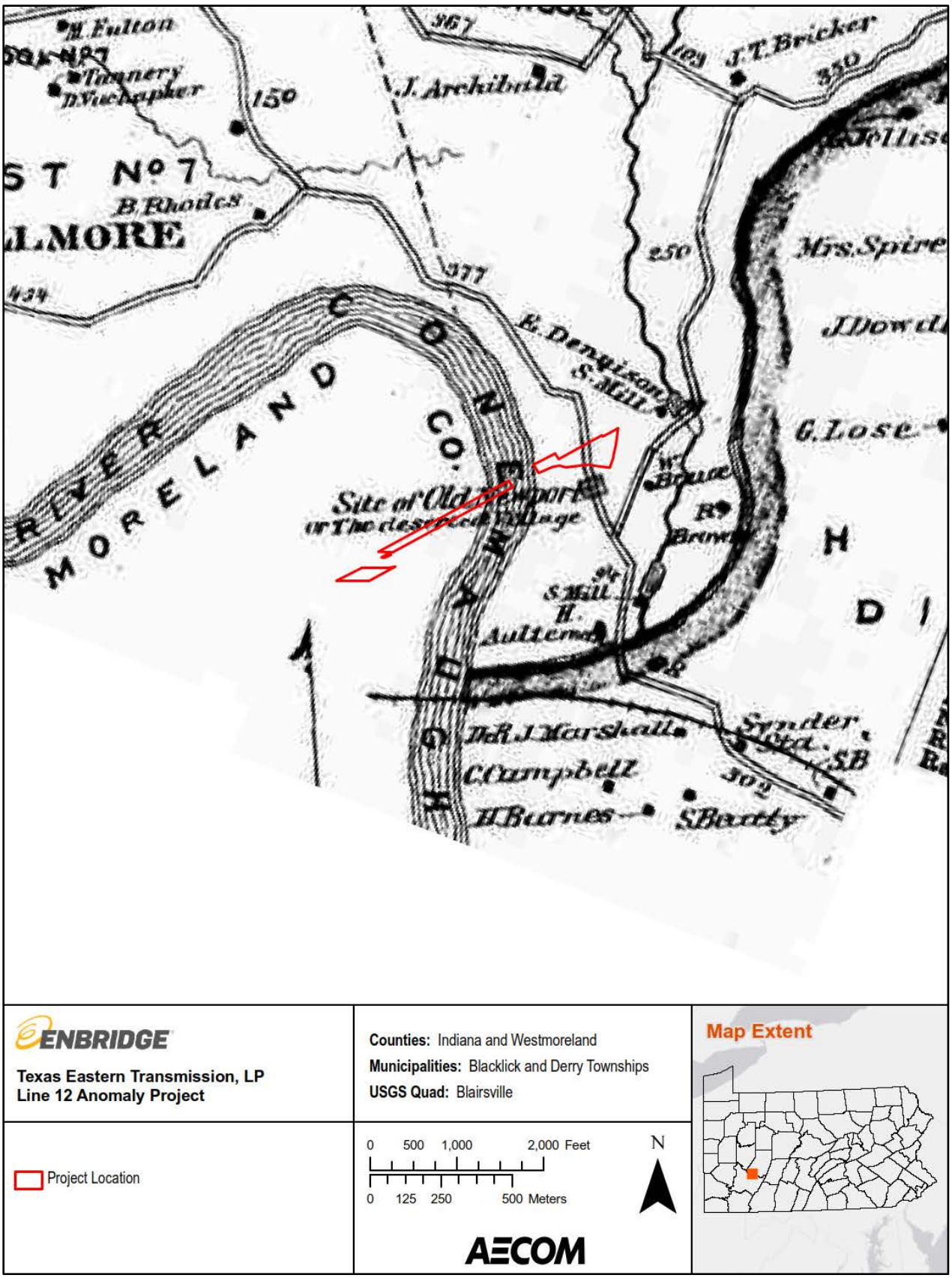


Figure 3: Approximate location of Study Area in 1867 (Pomeroy 1867)



ENBRIDGE

Texas Eastern Transmission, LP
Line 12 Anomaly Project

Counties: Indiana and Westmoreland
Municipalities: Blacklick and Derry Townships
USGS Quad: Blairsville

Map Extent

Project Location

0 500 1,000 2,000 Feet
0 125 250 500 Meters

N

AECOM

Figure 4: Approximate location of Study Area in 1871 (Beers 1871).

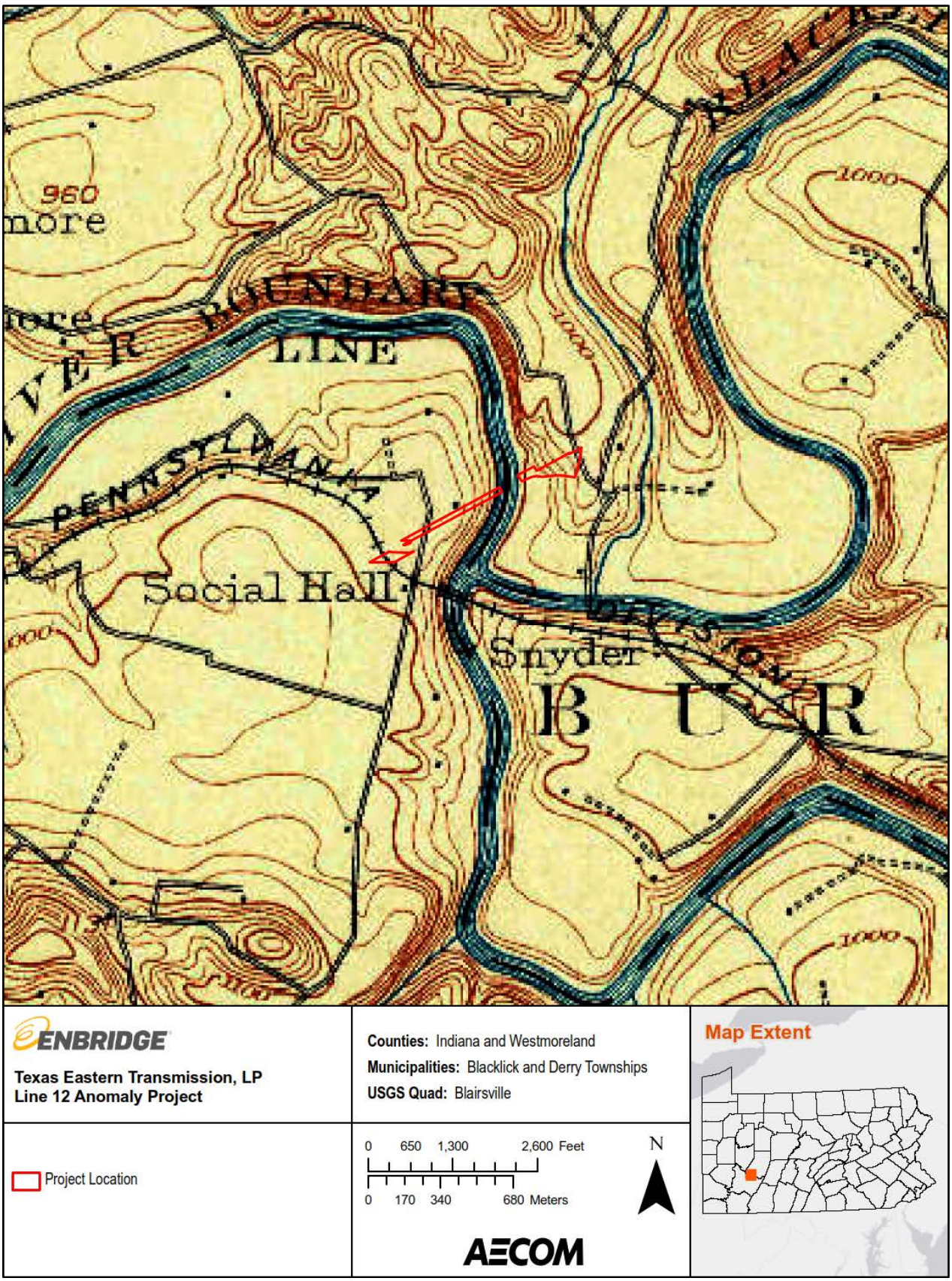


Figure 5: Location of Study Area in 1903 (USGS 1903).

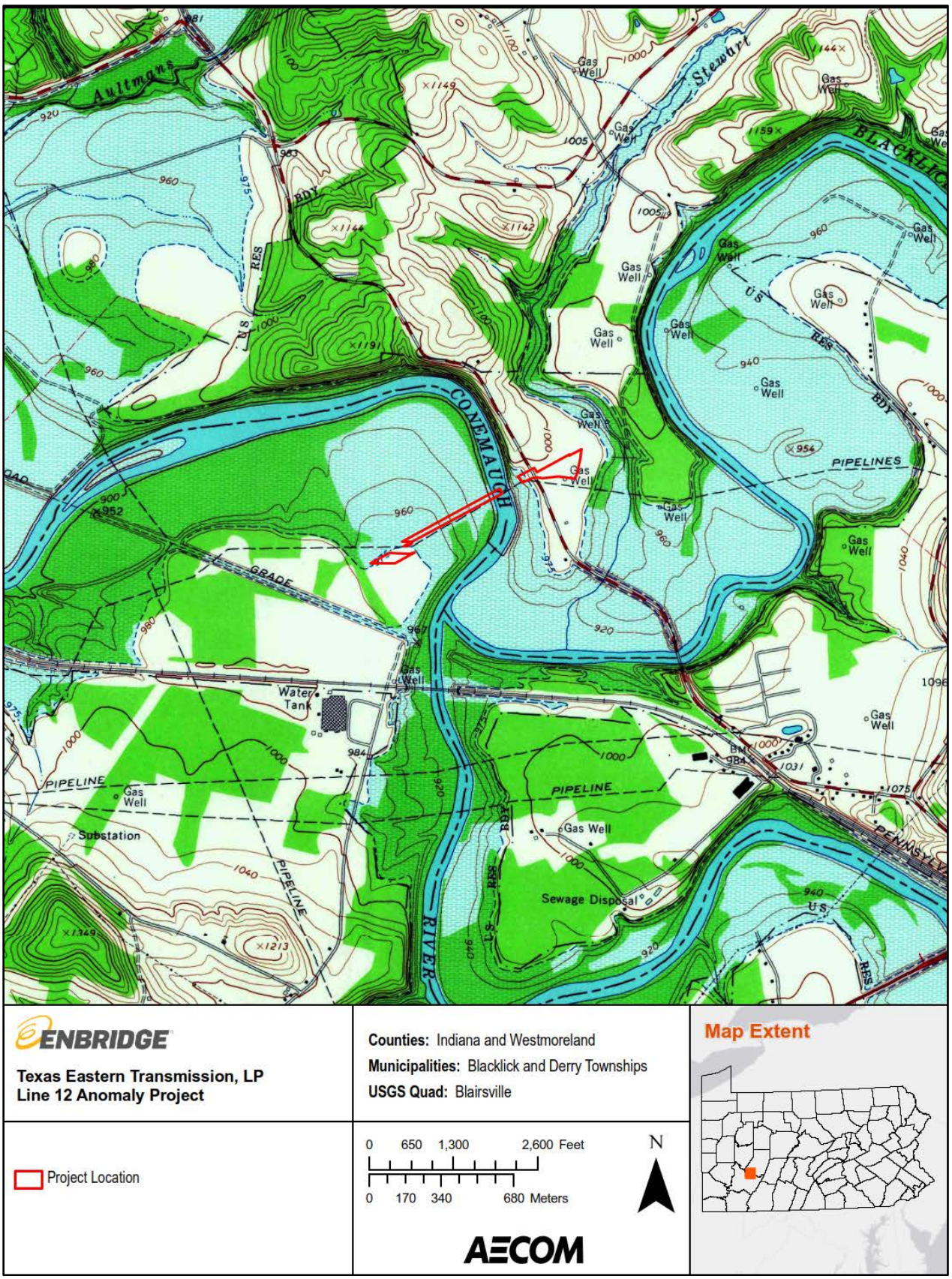


Figure 6: Location of Study Area in 1964 (USGS 1964).

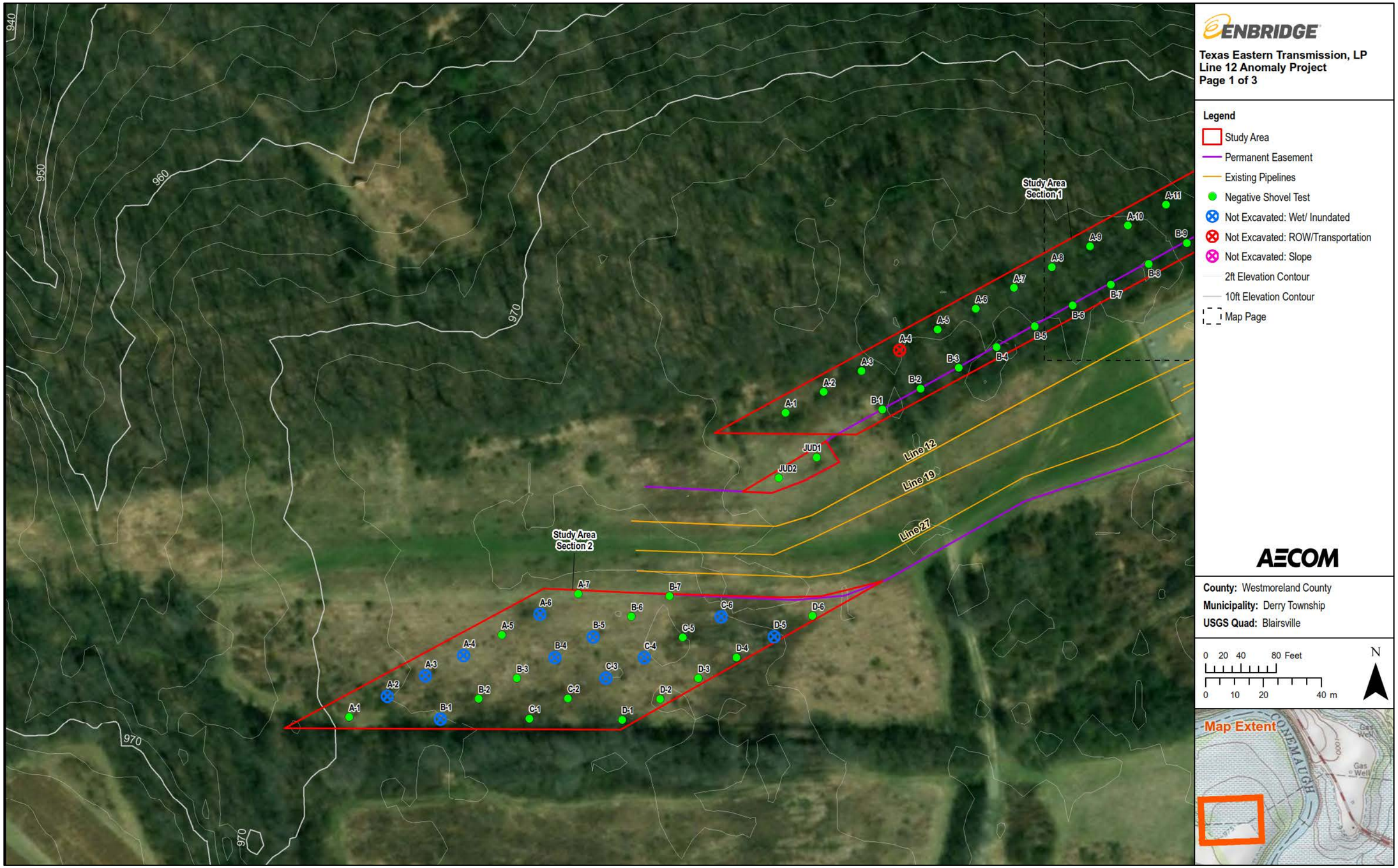


Figure 7a: Survey coverage map, Section 1.

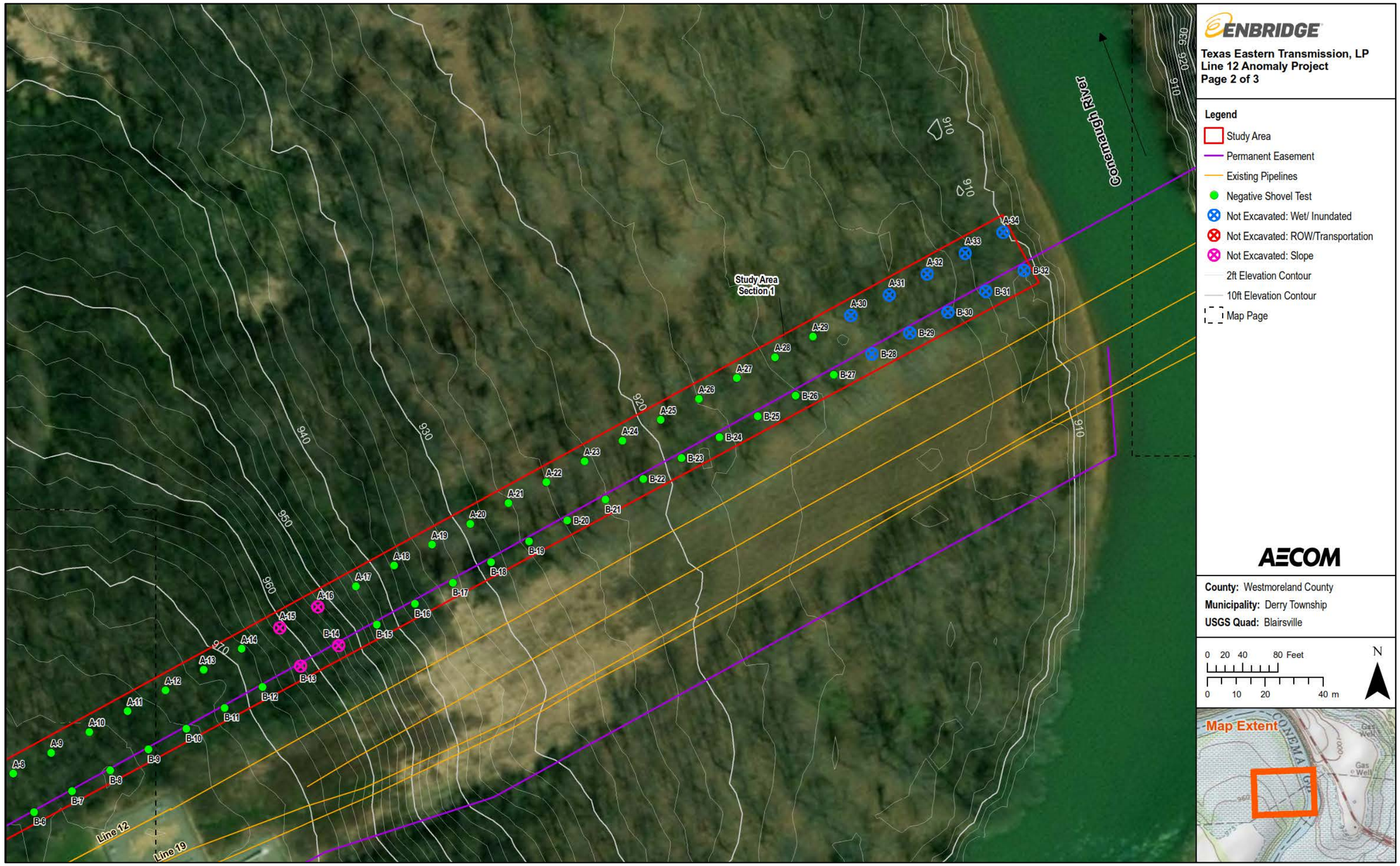


Figure 7b: Survey coverage map, Section 1.

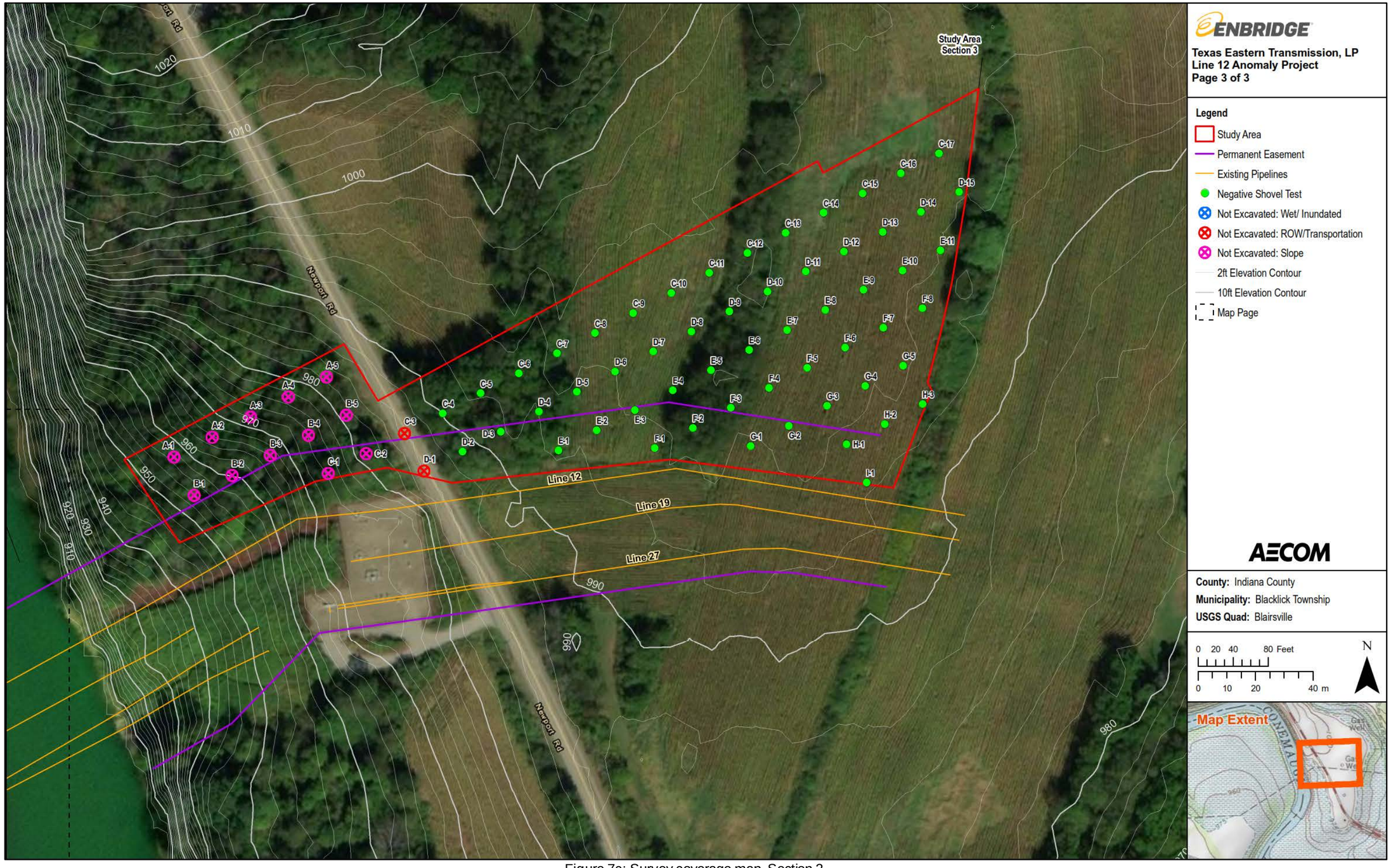


Figure 7c: Survey coverage map, Section 2.

STP A7

0.00 – 0.15m **Stratum I-** Brown (10YR 4/3) weak granular silt loam with less than five percent pebbles (Ap horizon).

0.15– 0.25m **Stratum II-** Brownish yellow (10YR 6/6) strong subangular blocky silty clay loam with less than five percent pebbles (Bt horizon).

STP D3

0.00 – 0.31 m **Stratum I -** Dark brown (10YR 3/3) weak silt loam with iron oxide (Ap horizon).

0.31 – 0.41 m **Stratum II -** Light yellowish brown (10YR 6/4) silty clay loam (B horizon)

ENBRIDGE
Texas Eastern Transmission, LP

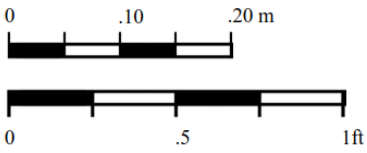
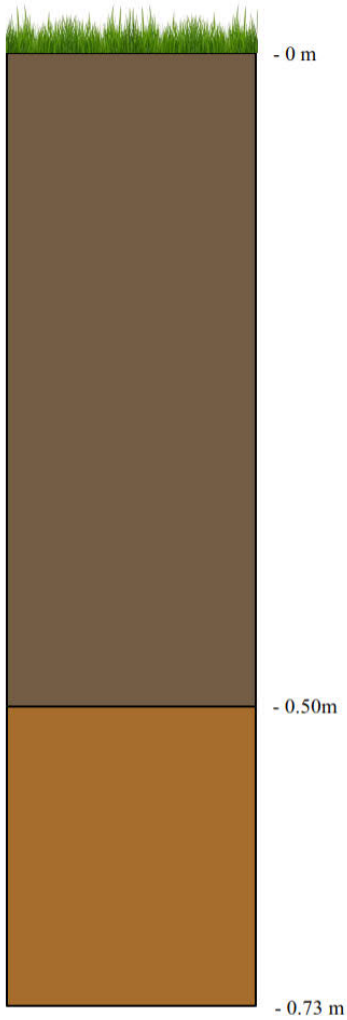
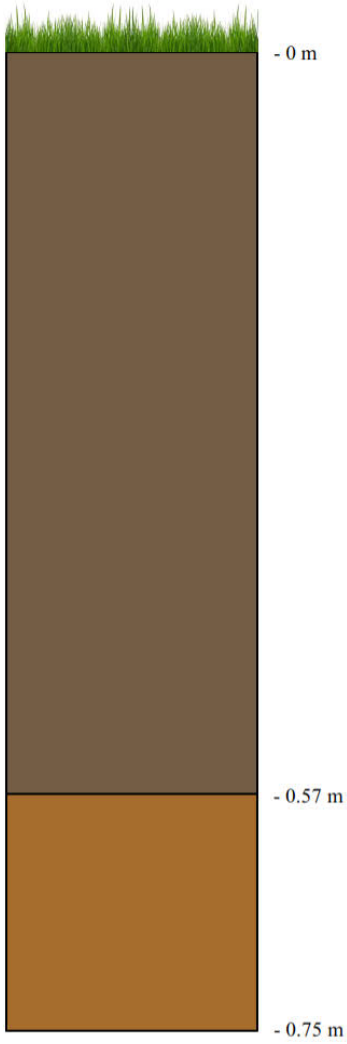


Figure 8a: Representative STP profiles, Section 1, high terrace.





STP B19

0.00 – 0.50m	**Stratum I-** Brown (10YR 4/3) structureless silt loam (AC horizon).
0.50– 0.73m	**Stratum II-** Strong brown (7.5YR 5/8) weak subangular blocky silty clay loam (Bw horizon). Cobbles at 0.73m.

STP B20

0.00 – 0.57m	**Stratum I-** Brown (10YR 4/3) structureless silt loam (AC horizon).
0.57– 0.75m	**Stratum II-** Strong brown (7.5YR 5/8) weak subangular blocky silty clay loam (Bw horizon).

ENBRIDGE
Texas Eastern Transmission, LP

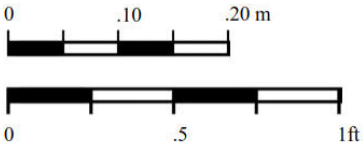
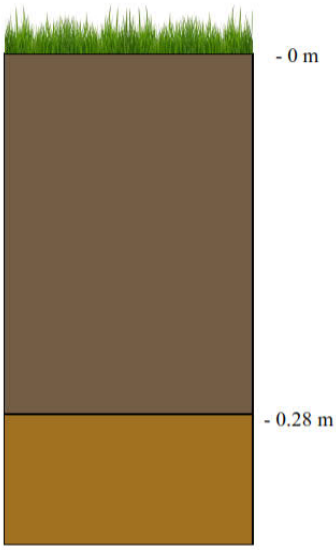
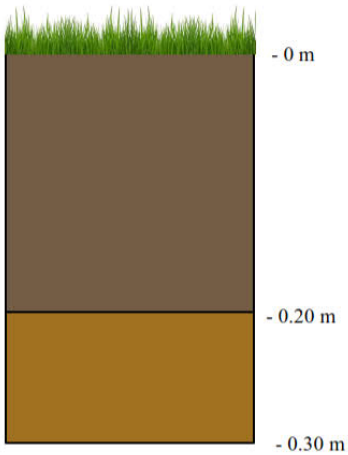


Figure 8b: Representative STP profiles, Section 1, floodplain.





STP F5

0.00 – 0.28m	**Stratum I-** Brown (10YR 4/3) weak granular silt loam with less than five percent pebble (Ap horizon).
0.28 – 0.38m	**Stratum II-** Yellowish brown (10YR 5/8) strong subangular blocky silty clay loam with less than five percent pebbles (Bt horizon).

STP C5

0.00 – 0.20m	**Stratum I-** Brown (10YR 4/3) weak granular silt loam with less than five percent pebbles (Ap horizon).
0.20– 0.30m	**Stratum II-** Yellowish brown (10YR 5/8) strong subangular blocky silty clay loam with less than five percent pebbles (Bt horizon).

ENBRIDGE
Texas Eastern Transmission, LP

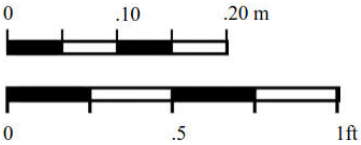


Figure 8c: Representative STP profiles, Section 2, high terrace.

Photograph 1: High terrace in Section 1 facing southwest from STP A14.

Photograph 2: Section 1, floodplain facing southwest from STP A24.

Photograph 3: Section 1, floodplain facing northeast from STP B22. Note flooding from Conemaugh River.

Photograph 4: Section 1, wetland on high terrace facing west from STP D6.

Photograph 5: Section 1, standing water within wetland facing southwest from STP D5.

Photograph 6: Section 2, Edge of high terrace facing southwest from ROW.

Photograph 7. Section 2, agricultural field facing west from STP E8.

Attachment C
Testing Strategy Justification

Negative Survey Form

The PA SHPO's Statewide Pre-Contact Probability Model (Model) ranks the Study Area as a combination of high and medium probability areas. Model-designated high probability areas are depicted on the high terraces on both sides of the Conemaugh River as well as on the floodplain on the west side of the river. River-proximal portions of the floodplain are ranked as possessing a moderate probability for Native American sites. The Model generally conforms to non-statistical models of Native American site locations in western Pennsylvania. Due to close proximity of recorded Native American archaeological sites, as well as the purported location of historic Newport village, the Study area was tested at 15-meter (49.2-foot intervals). STPs were not excavated on slopes exceeding 15 percent or in flooded areas.

Requirement E

PASPGP-5 Cumulative Impacts Project Screening Form

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATERWAYS ENGINEERING AND WETLANDS

PASPGP-5 REVIEW CHECKLIST

NOTE: This checklist and instructions can be used as a tool to assist permit applicants to determine if a proposed project will be either a U.S. Army Corp of Engineer's Reporting or Non-Reporting action. It is not required to be submitted for a Chapter 105 permit review but, if provided, it may provide clarity to DEP during the permit review.

Applicant / Project Name: Texas Eastern Transmission, LP/Conemaugh River Crossing Project	County(ies): Westmoreland and Indiana

YES ☐ NO ☒ 1. Is any of the proposed work located waterward of the ordinary high water mark (OHWM) of any of the ineligible waterbodies identified in the instructions?

YES ☐ NO ☒ 2. Does the proposed work result in the diversion of more than 10,000 gallons per day of surface water or groundwater into or out of the Great Lakes Basin (Lake Erie Watershed)?

*****

YES ☐ NO ☒ 3. Does the application/registration include any Single and Complete Projects that propose the permanent conversion of greater than 0.10 acre of forested and/or shrub-scrub wetlands in association with a regulated activity?

YES ☐ NO ☒ 4. Is the application/registration associated with a Single and Complete Project whereby a previous Department of the Army authorization has been issued through an Individual Permit, a Nationwide Permit, or a PASPGP processed by the Corps as a Category III/Reporting Activity? **If YES, please complete the following table.**

Authorization Type	Authorization Number	Date (mm/dd/yyyy)	Federal Permitted Impacts	
			Wetlands	Waters

YES ☐ NO ☒ 5. Does the proposed project require the preparation of an Environmental Impact Statement?

YES ☐ NO ☒ 6. Does the proposed regulated activity or area of indirect impact (secondary impact) extend across state boundaries (i.e., the work in not wholly located within the Commonwealth of Pennsylvania)?

YES ☐ NO ☒ 7. Does the Single and Complete Project involve the construction or expansion of a residential, commercial or institutional subdivision or development?

YES ☒ NO ☐ 8. Does greater than 0.25 acre of wetland(s) exist within the property boundary that are not proposed to be directly impacted as part of this application/registration? **If YES, provide wetland acreage: 3.53 acres.**

YES ☐ NO ☒ 9. Are you proposing to protect the wetland area(s) through a deed restriction or conservation easement that follows the Corps' Model Protective Covenant?

YES ☐ NO ☒ 10. Does the proposed work temporarily impact waters and/or wetlands that will remain in place for more than 1 year?

YES ☐ NO ☒ 11. Are you proposing to do work in the Delaware River (upstream from the U.S. Route 202 Bridge in New Hope, Pennsylvania.) and/or the Lehigh River (from the mouth to Francis E. Walter Dam, located in Carbon and Luzerne County, Pennsylvania between March 15 and June 30?

YES ☐ NO ☒ 12. Does the proposed work occur in any of the waters listed in the instructions?

YES ☒ NO ☐ 13. Will you comply with all of the identified conservation measures?

YES ☐ NO ☒ 14. Is there any other pending applications/registrations with the DEP or Corps that are necessary for this total proposed project to function and meet its intended purpose? **If YES, provide following information.**

Application / Registration Number / Type	Project Name	Date of Submittal to DEP (mm/dd/yyyy)	DEP / CCD Reviewing Office	Corps Reviewing Office

Requirement F

Bog Turtle Habitat Screening

BOG TURTLE HABITAT SCREENING

The Conemaugh River Crossing Project is located in Westmoreland and Indiana Counties, therefore a Bog Turtle Screening Form is not required. See Requirement G (PNDI Receipt) for results of the PNDI search.

Requirement G

PNDI Search

1. PROJECT INFORMATION

Project Name: **Conemaugh River Crossing**
Date of Review: **2/24/2020 02:30:31 PM**
Project Category: **Energy Storage, Production, and Transfer, Energy Transfer, Pipeline (gas, oil) - service, replace existing line**
Project Area: **34.74 acres**
County(s): **Indiana; Westmoreland**
Township/Municipality(s): **BLACKLICK; DERRY**
ZIP Code: **15717; 15725**
Quadrangle Name(s): **BLAIRSVILLE**
Watersheds HUC 8: **Conemaugh**
Watersheds HUC 12: **Backlick Creek-Conemaugh River; Conemaugh River-Kiskiminetas River**
Decimal Degrees: **40.456304, -79.298776**
Degrees Minutes Seconds: **40° 27' 22.6946" N, 79° 17' 55.5938" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate no known impacts to threatened and endangered species and/or special concern species and resources within the project area. Therefore, based on the information you provided, no further coordination is required with the jurisdictional agencies. This response does not reflect potential agency concerns regarding impacts to other ecological resources, such as wetlands.

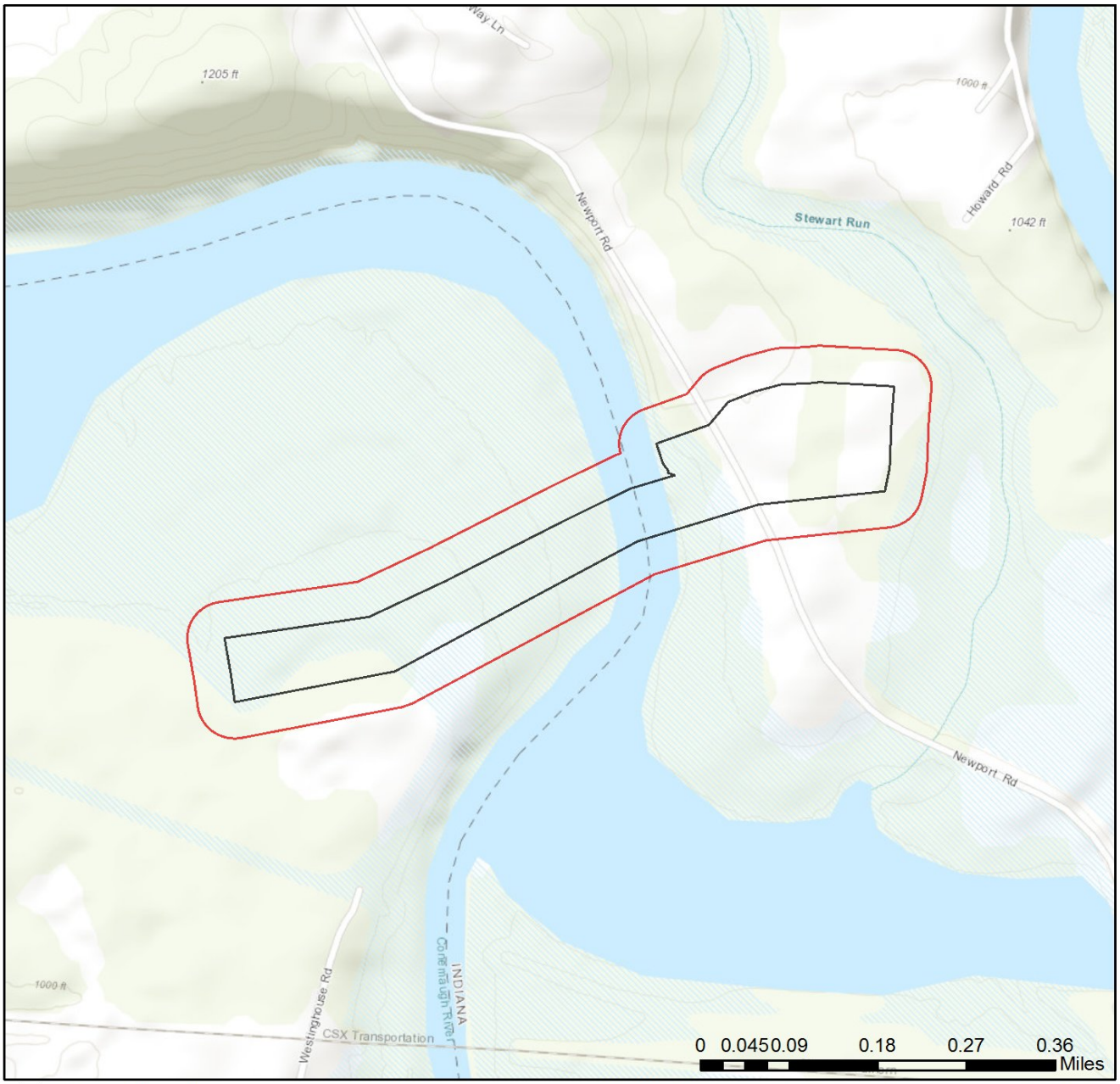
Conemaugh River Crossing

Project Boundary

Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Conemaugh River Crossing



Project Boundary

Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission

RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE:

No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at https://conservationexplorer.dcnr.pa.gov/content/resources.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552
Harrisburg, PA 17105-8552
Email: RA-HeritageReview@pa.gov

U.S. Fish and Wildlife Service
Pennsylvania Field Office
Endangered Species Section
110 Radnor Rd; Suite 101
State College, PA 16801
NO Faxes Please

PA Fish and Boat Commission
Division of Environmental Services
595 E. Rolling Ridge Dr., Bellefonte, PA 16823
Email: RA-FBPACENOTIFY@pa.gov

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Email: RA-PGC_PNDI@pa.gov
NO Faxes Please

7. PROJECT CONTACT INFORMATION

Name: Eileen Banach
Company/Business Name: AECOM
Address: 10 Orms Street
City, State, Zip: Providence, RI 02904
Phone: (401) 854-2802 Fax: ( )
Email: eileen.banach@aecom.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

Eileen Banach 2/24/2020

applicant/project proponent signature date

Requirement H

Plans

RIGHT-OF-WAY	0+00 – 12+61	12+61 – 26+69
TRACT NUMBERS	48	1
OWNERSHIP/AGENCY	UNITED STATES OF AMERICA	UNITED STATES OF AMERICA
	1,261'	1,376'

SURVEY DATA

SURVEY COMPANY:
FIELD BOOK:
PAGES:

STA. 0+00 EQUATION, 815+49 BEGIN CONSTRUCTION CENTERLINE MLV (REF. DWG. DELM-D-1200)
STA. 0+25 FENCE X-ING
STA. 4+12.2 P.I. = 11°12'09" LT.
STA. 4+67 HDD EXIT
STA. 4+67 P.I. = 12°33'24" RT.
STA. 4+95 TD DEG. OVERBEND (3 DIA. RADIUS ELL)
STA. 5+43 ENTER WETLANDS
STA. 8+31 24" LINE 12
STA. 11+79 EXIT WETLANDS
STA. 12+81 ℄ OF CONEMAUGH RIVER
STA. 16+81 FENCE X-ING
STA. 16+86 24" LINE 12
STA. 17+06 FENCE X-ING
STA. 17+06 OVERHEAD WIRE X-ING
STA. 17+84 EDGE OF ROAD
STA. 17+95 ℄ OF NEWPORT ROAD
STA. 18+05 EDGE OF ROAD
STA. 18+09 OVERHEAD WIRE X-ING
STA. 23+03 12 DEG. OVERBEND (3 DIA. RADIUS ELL)
STA. 23+26 HDD ENTRY
STA. 23+28 P.I. = 38°03'37" RT.
STA. 24+21 P.I. = 02°35'46" LT.
STA. 25+80 BEGIN FABRICATION (REF. DWG. DELM-D-1220)
STA. 25+99 VALVE
STA. 26+20 24" TEE
STA. 26+49 P.I. = 90°00'00" RT. (SR ELL)
STA. 26+69 END FABRICATION/MAINLINE
STA. BACK / 26+69/AHEAD 838+36 TIE IN (REF. DWG. DELM-G-1211)

CLASS LOCATION

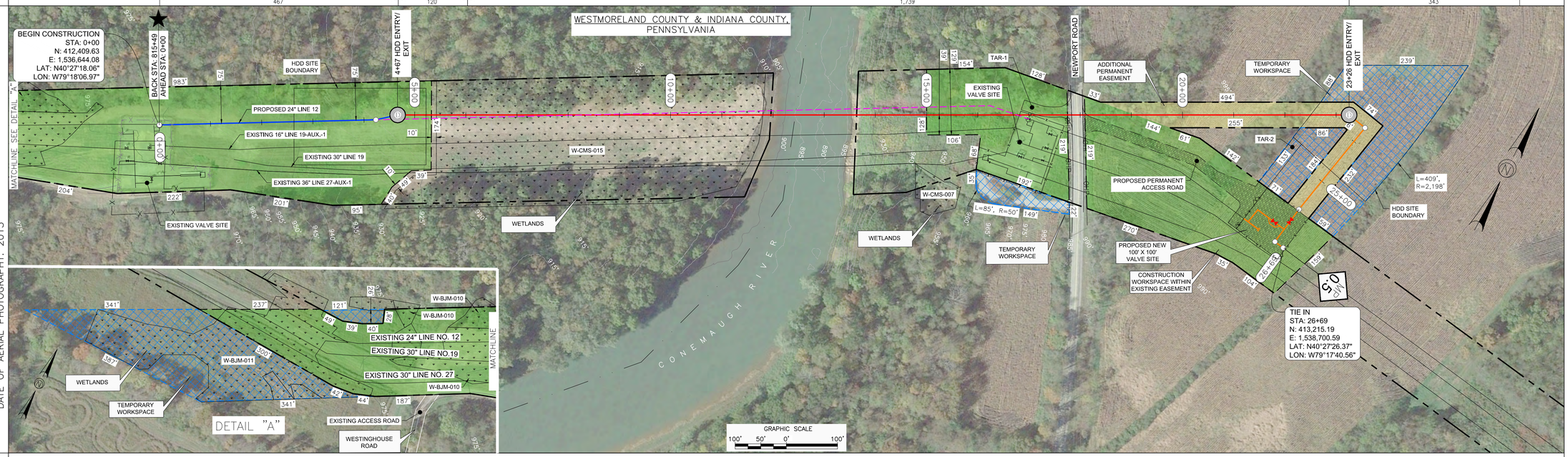
CLASS 1

PIPE MATERIAL

815+49 BACK / 0+00 AHEAD
1-A 467' | 4+67 | 2 4+95 1-C 120' | 5+87 | 1-B 1,739' | 23+03 | 3 | 23+26 | 4 | 23+68 | 5 | 1-A 343' | 26+69

ALIGNMENT LEGEND

- PROPOSED IN-SITU REPLACEMENT
- HDD DRILL
- CONVENTIONAL LAY
- CAPPED & GROUTED PIPELINE
- TEXAS EASTERN PIPELINE
- PIPELINE MILEPOST
- EXISTING EASEMENT
- CONTOURS
- PROPERTY LINE
- COUNTY LINE CENTERLINE
- FENCE
- FOREIGN PIPELINE
- OVERHEAD WIRES
- ADDITIONAL PERMANENT EASEMENT
- CONSTRUCTION WORKSPACE WITHIN EXISTING EASEMENT
- TEMPORARY WORKSPACE
- DELINEATED WETLAND BOUNDARY
- PROPOSED PERMANENT ACCESS ROAD
- EXISTING ACCESS ROAD
- DRILL TARGET
- VALVE



ENVIRONMENTAL DATA

FOR ENVIRONMENTALLY SENSITIVE AREAS (ESA), CONSULT WITH ENVIRONMENTAL INSPECTOR PRIOR TO CONSTRUCTION ACTIVITIES. FOR REFERENCE ENVIRONMENTAL SENSITIVE AREA DEFINITION.

STA. 5+43 BEGIN W 001
STA. 11+79 END W 001

E & S TYPICALS

E&S TYPICALS WILL BE USED AS A PLAN AND WILL FURTHER INPUT FROM ENVIRONMENTAL INSPECTORS, FOR REFERENCED E&S TYPICAL.

ES-0022 | ES-0022 | ES-0026 | ES-0011 | ES-0011

PROFILE

THE LOCATION OF TRENCH BREAKERS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

SLOPE BREAKER ○
TRENCH BREAKER ▲

REGISTERED PROFESSIONAL ENGINEER
BRANDON MICHAEL WALKER
PE077056
COMMONWEALTH OF PENNSYLVANIA
05/28/2020

PROJECT DATA	
NOM. DIA.	24"
MOP	1050 PSIG
DESIGN SPEC.	DOT 192 / ASME B31.8
PIPE SPEC.	API-5L
MIN. TEST PRESSURE	1.5X MOP

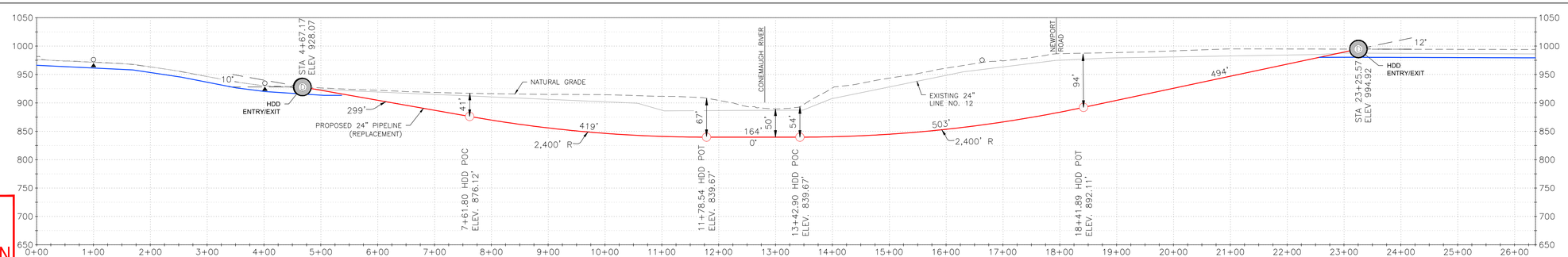
LAND USE CLASSIFICATION

AG	AGRICULTURE	PA	PASTURE	ROW	EXISTING RIGHT-OF-WAY
F/W	FOREST/WOODLAND	R	RESIDENTIAL	OW	OPEN WATER

PERMANENT SLOPE BREAKER & TRENCH BREAKER SPACING

% SLOPE	SLOPE BREAKER SPACING (FT)	% SLOPE	TRENCH BREAKER SPACING (FT)
5–15%	300 FT	5–15%	300 FT
15–30%	200 FT	15–30%	200 FT
>30%	100 FT	>30%	100 FT

ISSUED FOR 05/28/20 CONSTRUCTION



LAND USE:	PA			OW	PA	ROW	PA	PA
% SLOPE:	< 5%	5–15%	> 30%	0%	> 30%	< 5%	5–15%	< 5%

DWG. NO.	DESCRIPTION
DELM-D-1200	PIPING PLAN WEST SIDE
DELM-D-1211	PIPING SECTIONS
DELM-D-1220	PIPING PLAN MAINLINE VALVE
DELM-G-1211	PROPOSED SITE PLAN EAST SIDE

REFERENCE DRAWINGS

REV	DSN	CK	DESCRIPTION
0	LGF	RG	ISSUED FOR CONSTRUCTION (05/28/2020)

REVISIONS

ITEM NO.	MATERIALS	QTY
1	PIPE, 24" X 0.500, X-60,	2669'
2	3R ELL, 10 DEG. SEGMENTABLE	1
3	3R ELL, 12 DEG. SEGMENTABLE	1
4	3R ELL, 39 DEG. SEGMENTABLE	1
5	3R ELL, 90 DEG.	1
A	FBE COATING	810'
B	FBE W/ ARO COATING	1739'
C	FBE W/ ARO + SP-2888	120'

audubon Field Solutions
10205 WESTHEIMER ROAD
SUITE 100
HOUSTON, TX 77042
PHONE: (281) 669-0590

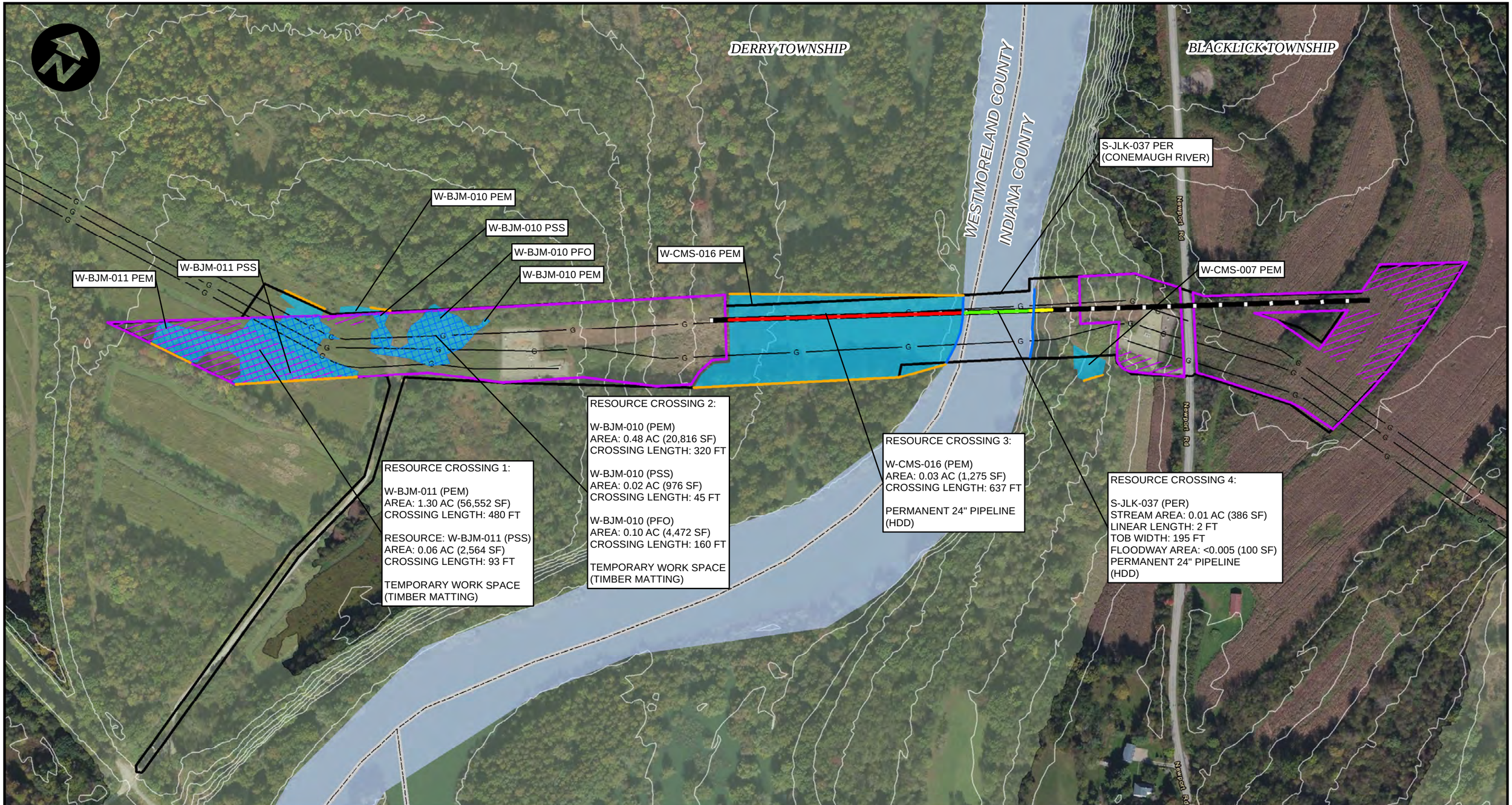
DRAWN BY	ENGINEERING APPROVALS			
	BID		CONSTRUCTION	
JBS		4/14/20		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

CONEMAUGH RIVER CROSSING PROJECT
DELMONT TO ARMAGH
PROPOSED 24-INCH LINE 12 HDD INSTALLATION
CONSTRUCTION ALIGNMENT
LOC. WESTMORELAND & INDIANA COUNTY, PA

ENBRIDGE
Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston , Tx 77056-5310 713 / 627-5400

YEAR: 2020	W.B.S.	SCALE: 1 = 100'	DWG.DELM-DW-P1100	REV. 0

S:\AFS\Projects\Enbridge\Conemaugh_River_Xing\190913 – Conemaugh River Xing\801_Mapping\001_Alignment\DELM-DW-P1100_ALIGNMENT SHEET.dwg – PLOT TIME: 5/28/2020 8:29 AM



BASE MAP SOURCES:
AERIAL IMAGERY: ESRI, HERE, GARMIN, (C) OPENSTREETMAP CONTRIBUTORS
SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

NWI WETLAND: USFWS, NATIONAL WETLANDS INVENTORY FOR PA, POLYGON, 10/15/2018

SOIL MAP UNIT: USDA-NRCS, SOIL SURVEY GEOGRAPHIC DATABASE FOR WESTMORELAND AND INDIANA COUNTIES, PA, 9/2018

LEGEND

- PROPOSED LOD
- PROPOSED TEMP. WORK SPACE
- PROPOSED HDD
- EXISTING TETLP PIPELINE
- STUDY AREA
- WETLAND
- WATERCOURSE
- OPEN-ENDED WETLAND
- WETLAND IMPACT (ROW)
- WETLAND IMPACT (HDD)
- STREAM IMPACT (HDD)
- FLOODWAY IMPACT (HDD)
- COUNTY BOUNDARY
- FEMA 100-YR FLOODPLAIN

0 125 250 500 750 1,000 Feet

ENBRIDGE

FIGURE 2
SITE PLAN

AECOM

CONEMAUGH RIVER PROJECT

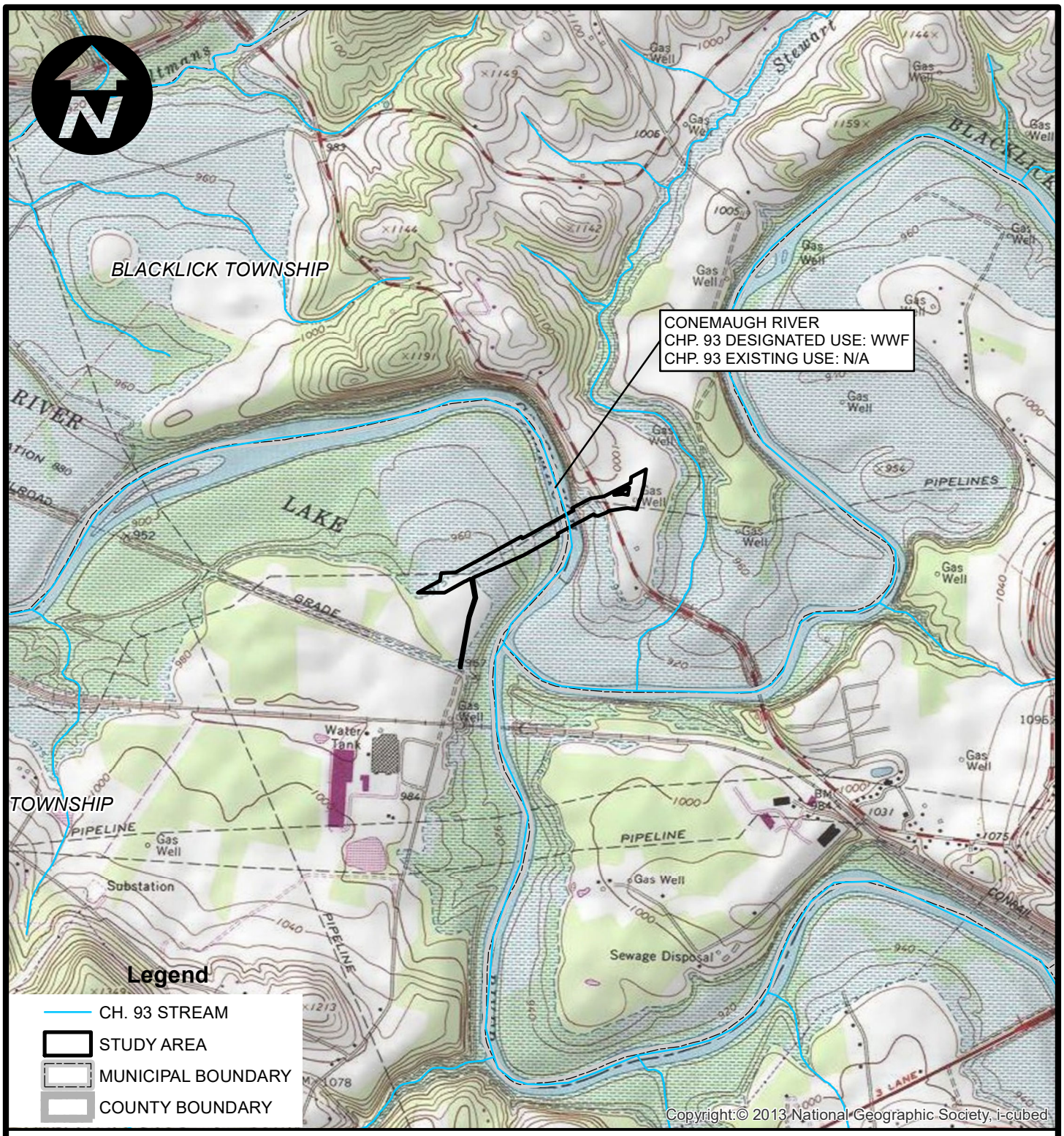
40° 27' 21.15" N AND 79° 17' 57.81" W

BLACKLICK TOWNSHIP, INDIANA COUNTY
AND DERRY TOWNSHIP, WESTMORELAND COUNTY, PA

Prepared by: MLN	CHECKED BY: SLH	DATE: 5/19/2020	PAGE 1 OF 1

Requirement I

Location Map



USGS QUAD NAME: BLAIRSVILLE, PA
BLACKLICK TOWNSHIP, INDIANA COUNTY AND DERRY TOWNSHIP, WESTMORELAND COUNTY, PA
SITE CENTER: 40° 27' 21.15" N AND 79° 17' 57.81" W

TOPO SOURCE: SEAMLESS DIGITAL RASTER GRAPHIC-N.P.S. NATURAL PHYSICAL MAP & U.S.G.S. TOPOGRAPHIC MAP 2013, NATIONAL GEOGRAPHIC SOCIETY, ICUBED

AECOM

FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE 120
PITTSBURGH, PA 15220

ENBRIDGE

TEXAS EASTERN TRANSMISSION, LP

PREPARED BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	DRAWING NO.
JAS	MAB	SLH	4/23/2020	1 " = 2,000 '	**FIGURE 1**
			Page 1 of 1	PROJECT NO. 60594173	LOCATION MAP 2020 INTEGRITY PROGRAM CONEMAUGH RIVER CROSSING PROJECT INDIANA AND WESTMORELAND COUNTIES, PENNSYLVANIA

Requirement J

Project Narrative and Aquatic Resource Impact Table

PROJECT NARRATIVE

Introduction

Texas Eastern Transmission, LP (Texas Eastern) proposes to replace a section of their existing Line 12 natural gas pipeline beneath the Conemaugh River in Derry Township, Westmoreland County and Blacklick Township, Indiana County, Pennsylvania. Activities associated with the installation of this pipeline are referred to herein as the Conemaugh River Crossing Project (Project). Portions of this proposed repair work are regulated by the Pennsylvania Department of Environmental Protection (PADEP) and the United States Army Corps of Engineers (USACE) under the Dam Safety and Waterway Management Rules and Regulations, Title 25 Pennsylvania Code, Chapter 105 and Section 401/404 of the Clean Water Act. Accordingly, Texas Eastern is submitting this application for temporary and permanent impacts to wetlands, a river, and floodway that will occur as a result of Project activities. The following sections detail the existing site conditions, construction methodologies, and minimization and avoidance measures that will be implemented as part of the project.

Project Purpose and Need

Per the United States Department of Transportation (USDOT) regulations regarding pipeline safety (49 CFR Part 192 Subparts I and O), gas transmission pipeline operators are required to develop and implement a comprehensive corrosion control and integrity management program for pipeline segments where a failure would have the greatest impact on the public or property. The rule further requires that operators identify and characterize applicable threats to pipeline segments, conduct a baseline assessment and periodic reassessments of these segments, mitigate significant defects discovered from the assessments, and continually monitor the effectiveness of its integrity management program.

The USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA), acting through the Office of Pipeline Safety, administers the national regulatory program to ensure the continued protection of the environment and public from the risks of hazardous materials transportation by establishing policy and enforcing rigorous operation and maintenance standards. Texas Eastern conducts regularly scheduled internal in line inspections (aka “tool runs”) of their natural gas pipeline transmission systems using advanced internal inspection tools commonly known as “pigs” or “smart pigs”. These internal pipeline tools are equipped with GPS tracking and sensors to measure and record pipe wall thickness as they pass through the pipe. Upon completion of a pipeline tool run, the data is analyzed by Texas Eastern’s integrity experts and given a repair classification based on the severity of the defect. Examples of these pipeline “anomalies” include pipe dents or evidence of metal loss from corrosion.

A tool run was completed in 2018 on Texas Eastern’s 24-inch Line 12 pipeline system in Westmoreland County. As a result of these inspections, an anomaly was identified approximately 25 feet from the west

bank of the Conemaugh River, within wetland W-CMS-016, that required investigation and repair to comply with PHMSA regulations. Under PHMSA regulations the existing Line 12 cannot operate unless the anomaly is repaired. Texas Eastern obtained a General Permit 11 (GP116518226) from PADEP to cross and excavate wetland W-CMS-016 and attempted to repair the anomaly during the construction season in 2018 and 2019. However, the Conemaugh River in this location is part of a USACE flood control area and frequently overflows its west bank into the existing pipeline right-of-way (ROW) and wetland W-CMS-016. Additionally, Line 12 is currently located approximately 30 feet below grade, likely due to silt deposits from frequent river flooding. These combined conditions made it impossible to keep the trench box dewatered sufficiently for safe anomaly repair. Texas Eastern explored several options to repair the anomaly and ultimately concluded that it would not be possible under current conditions.

With anomaly repair deemed infeasible and Line 12 inoperable Texas Eastern has been temporarily using their Line 19 Auxiliary (AUX) line to continue to meet gas service demands, however this pipeline is too small to continue use indefinitely. Based on studies conducted Texas Eastern has determined that the existing segment of Line 12 under the Conemaugh River should be abandoned in place and a new segment installed. Texas Eastern has chosen horizontal direction drilling (HDD) over an open-cut or conventional crossing of the Conemaugh River. HDD will require less wetland impacts by avoiding open cutting the large wetland on the west side of the river (W-CMS-016), as well as avoiding direct impacts to the Conemaugh River itself. The existing Line 12 will be replaced in-situ from the existing mainline valve (MLV) site on the west side of the Conemaugh River to the HDD entry point; it will then be capped and grouted from the HDD entry point to the existing MLV site on the east side of the Conemaugh River (see Alignment Sheet in Requirement H) . The trajectory of the HDD would be too steep to meet the existing MLV on the east side of the Conemaugh River, so the HDD must exit at a point past that MLV outside of the existing ROW easement; Texas Eastern is in the process of obtaining additional ROW easement from the USACE to accommodate the new pipeline. Texas Eastern must also install a new MLV and permanent access road 20 feet wide and approximately 375 feet long off Newport Road in order to access the new MLV site and conduct required internal inspections. The Line 12 MLV located in the existing MLV site on the west side of the Conemaugh River will be replaced with a new MLV to support pipeline operations. The Line 12 MLV located in the existing MLV site on the east side of the Conemaugh River will be removed and replaced with a flange connection. The existing Line 12 pipe under Newport Road will remain in service to connect the new MLV site east of Newport road to the existing pipeline crossover located at the MLV site east of the Conemaugh River.

Project Location

A United States Geological Survey (USGS) topographic quadrangle-based map (Blairsville Quadrangle) depicting the location of the Project is provided in Requirement I. The Project area has, with the exception

of an agricultural area, been utilized as a utility corridor. The USACE is the primary landowner of the entire project area including an area of East side of the River that is leased to the PA Game Commission (PGC).

The Project is located mostly within existing maintained ROW on either side of the Conemaugh River, but will require some temporary workspace outside of the existing ROW as well as a small area of new permanent easement. There are currently four (4) high-pressure natural gas transmission pipelines in operation within the project ROW, the 24-inch Line 12, the 30-inch Line 19, the 16-inch Line 19-AUX and the 36-inch Line 27-AUX. Through periodic vegetation management, the ROW is maintained in a mixed herbaceous and shrub state. Immediately surrounding the ROW within the Project area are agricultural fields and forestland. Terrain along the ROW consists of flat to gradually sloping land on the west side of the river and steep sloping to flat land on the east side of the river. Two wetlands will be crossed via temporary structures for workspace to construct this Project.

Proposed Construction Activities

Construction activities will disturb both soil and ground cover to replace a portion of Line 12, install a new section of Line 12 in new permanent easement, and set up workspace for the HDD operation. The proposed Project will utilize the extent of Texas Eastern's existing ROW on the western and eastern sides, as well as additional workspace outside of the existing easement in order to provide adequate room for the HDD operation. The Project will also require new permanent easement to accommodate the new Line 12 segment on the eastern end. The total disturbed area for this project, including temporary workspace outside the existing easement and new permanent easement, will be approximately 12.23 acres. These disturbances will be temporary with the exception of a new 20-foot wide and 375-foot long permanent access road and MLV. Disturbed areas will be immediately stabilized, seeded and mulched following completion of construction activities. The following construction activities will occur as a result of the proposed project. Additional information on the construction process is provided in the Erosion and Sediment Control Plan (E&SCP) drawings provided in Requirement M.

ROW Workspace Preparation

Before the start of construction, utilities will be identified, land surveys will be finalized, and the pipeline centerline and construction workspace will be surveyed and marked. Texas Eastern's contractors will contact the "PA One Call System" to verify and mark all utilities along the construction workspace to minimize the potential for damage to other buried facilities in the area. Where there is a question as to the location of utilities, they will be located by field instrumentation and test pits. The USACE will be notified at least 3 to 5 days before the start of construction.

The construction workspace will be located mostly within the cleared and maintained ROW, though temporary workspace outside of the ROW are mostly maintained as field. Texas Eastern has not maintained the full extent of their existing easement on the northern side of the ROW and to provide

adequate room for the HDD operations, limited tree trimming, and clearing will be conducted. Within wetland areas a total of 26 trees that meet the regulatory classification of trees will need to be removed, these trees will be cut with the stumps left intact. Twelve of the trees that need to be removed are located in a Palustrine Forested (PFO) wetland within the limits of Texas Eastern's existing easement, which will be maintained following construction resulting in approximately 0.10 acres of permanent wetland conversion. To mitigate for the wetland conversion, Texas Eastern intends to purchase off-site mitigation credits. Further information concerning mitigation is provided in Requirement T. The remainder of trees to be removed are in the HDD pullback area outside of the existing easement, this workspace is required to complete construction operations and will be restored following construction and allowed to regenerate. The trees that will be cut in the HDD pullback area are located within wetland W-BJM-011, classified as Palustrine Emergent (PEM) and Palustrine Scrub-shrub (PSS), will not constitute a conversion of forested wetland.

Prior to construction, limited clearing within the ROW will be required for construction of the Project. Initial clearing operations will include the removal of vegetation within the construction workspace either by hand cutting or mowing. The limits of clearing will be identified and flagged in the field prior to any vegetation cutting operations. In the wetlands, brush will be hand-cut and removed from the site. Unless grading is required for safety reasons, vegetation will be cut off at ground level, leaving existing root systems intact to revegetate.

Closely following clearing, but prior to grading, erosion controls will be installed at the required locations as outlined in the E&SCP. The Project E&SCP will be reviewed concurrently by the Westmoreland County Conservation District (WCCD) and Indiana County Conservation District (ICCD). WCCD will be the lead Conservation District and coordinate review with ICCD, and will provide comments and approval directly to PADEP.

The construction workspace will be rough graded as necessary to allow for safe passage of equipment and to prepare a work surface for construction activities. However, as stated above, the rootstock of shrubby vegetation in upland areas will be left in the construction workspace wherever possible to encourage natural revegetation and, unless grading is required for safety reasons, wetland vegetation will be cut off at ground level, leaving existing root systems intact. Typically, the grading of the construction workspace will be completed with bulldozers. Backhoes will be used in conjunction with bulldozers in areas where boulders require removal. Timber mats will be placed over wetlands within the LOD.

In-Situ Replacement of Existing Line 12 Segment and Installation of New Line 12 Segment

A trench will be excavated to expose the existing pipeline between the MLV and HDD entry/exit point on the west side of the Conemaugh River, and between the HDD entry/exit and new MLV on the east side of the River. In general, the trenches will be approximately 15 feet wide and 9 feet deep. This is necessary to provide adequate room for safe removal of the existing Line 12 segment and installation of the new

pipeline. Excavated material will be placed next to the trench so as to avoid unnecessary movement of machinery across the terrain. These construction activities will not impact any wetlands or watercourses.

Should trench dewatering be necessary, it will be pumped to a stable, vegetated upland area (where practical), and filtered through a filter bag. The trench will be dug by an excavator or backhoe.

All suitable material excavated during trenching will be replaced in the trench once the pipeline has been replaced. In areas where excavated material is unsuitable for backfilling, additional clean fill will be brought from a commercial borrow area in the region. To protect the new coating, the pipe is padded with relatively rock-free material placed immediately around the pipe. Suitable padding material is typically made by mechanically screening the subsoil directly over the pipe trench using an excavator outfitted with a 'padding bucket'. If suitable padding material is unavailable, material will be brought from a commercial borrow area in the region. In no case will topsoil be used as padding material. Once the pipe is padded, the trench is then backfilled with the remainder of the excavated subsoil material. The top of the trench may be slightly crowned to compensate for settling. Topsoil is then spread across the construction workspace as needed. Upon completion of finish grading the soil is inspected for compaction and scarified as necessary.

Once backfilling is complete, restoration and revegetation of the construction workspace will immediately occur. In general, every effort will be made, weather and soil conditions permitting, to complete final cleanup (including final grading) and installation of any permanent erosion control measures within 20 days after the trench is backfilled. In conjunction with backfilling operations, any woody material and construction debris will be removed from the construction workspace. The construction workspace will be fine-graded to prepare for restoration. Permanent water bars will be reinstalled in accordance with FERC requirements for slope and spacing using compacted soil and maintained in accordance with the E&SCP at the existing locations. Permanent water bars will be installed to match existing water bars on adjacent undisturbed pipeline ROW.

Revegetation will be completed in accordance with permit requirements and in accordance with the E&SCP. The construction workspace will be seeded within six (6) working days following final grading, weather and soil conditions permitting. Alternative seed mixes specifically requested by the landowner or agencies may be used. Any soil disturbance that occurs outside the permanent seeding season or any bare soil left unstabilized by vegetation will be mulched in accordance with the E&SCP.

HDD Operation

HDD is a trenchless method of installing pipelines in areas where traditional open cut excavations are not feasible due to sensitive resource areas or logistical reasons. The greatest advantage of the HDD crossing technique is that open cut trenching and equipment disturbance within sensitive resource areas are not necessary, and, as a result, environmental impacts on sensitive resource areas are minimized. However, a greater amount of equipment staging is required for HDD than for the open cut crossing method.

The HDD operation will be accomplished in three stages. The first stage consists of directionally drilling a small diameter pilot hole along the pre-designed directional path. The second stage, commonly referred to as reaming, involves enlarging this pilot hole to a diameter suitable for installation of the pipeline. This is accomplished using reaming tools that consist of a circular array of cutting heads. The pilot hole is enlarged by making multiple passes with successively larger reaming tools. The third stage, pull back, consists of pulling the pipeline back into the enlarged hole. The pipeline string or pull section must be pre-fabricated prior to pull-back operations in a stringing area workspace extending behind the HDD exit workspace. The stringing area workspace in this area is limited, so the pull section will be fabricated in two pieces and welded together.

The entry-side equipment and operations typically will include the drilling rig and entry hole, control cab, drill string pipe storage, tool storage trailers, power generators, bentonite storage, bentonite slurry mixing equipment, slurry pump, cuttings separation equipment, cuttings return/settlement pit, water trucks and water storage, and the heavy construction equipment necessary to support the operation. Exit-side equipment and operations typically will include the exit point and slurry containment pit, cuttings return/settlement pit, cuttings separation and slurry reclamation equipment, drilling string pipe storage, and the heavy construction equipment necessary to support the operation.

In addition to the drilling operations to be conducted within this workspace footprint, temporary workspace will be required outside of the existing ROW to provide a straight corridor for handling pipe on the west side of the Conemaugh River where the ROW changes direction, in which to prefabricate the pipeline into one continuous section in preparation for the pull-back. Once assembled, the pipeline will be placed on pipe rollers so that it may be conveyed into the drill hole during the pull-back operation.

Wetland and Watercourse Crossings

One PEM/PSS and one PEM/PFO wetland will be crossed via temporary structures and used as workspace during construction operations resulting in 1.96 acres of temporary impact (1.36 acres in wetland W-BJM-011 and 0.60 acres of impact in wetland W-BJM-010). The HDD operation will install a new segment of Line 12 beneath one PEM wetland resulting in 0.03 acres of permanent impact, and beneath one perennial watercourse and its assumed floodway resulting 0.02 acres of permanent impact. For additional information on these resources and the associated impacts, please refer to Table A-1 within Requirement A.

Access Roads

The ROW will be accessed via Westinghouse Road on the west side of the Conemaugh River and via Newport Road on the east side. A new permanent access road 20 feet wide and 375 feet long will be installed on the east side of the river from Newport Road to access the new permanent MLV. No wetlands or watercourses will be impacted as a result of accessing the ROW or new MLV.

Erosion and Sediment Control/Stormwater Management

Erosion and Sediment Control Plan is included in Requirement M of this permit application.

PNDI Avoidance Measures

A signed copy of the Pennsylvania Natural Diversity Inventory (PNDI) Project Environmental Review Receipt is provided within Requirement G of this permit application. The PNDI review resulted in "No Known Impacts" for threatened and/or endangered species under the jurisdiction of the PA Department of Conservation and Natural Resources (PADCNR), PGC, PA Fish and Boat Commission (PFBC), and United States Fish and Wildlife (USFWS).

Statement on Water Dependency

Due to the linear nature of this project, avoidance of all wetland resources was not feasible. The proposed project is considered water dependent because it requires access to, proximity to, or siting within water to fulfill the basic purposes of this project.

AQUATIC RESOURCE IMPACT TABLE

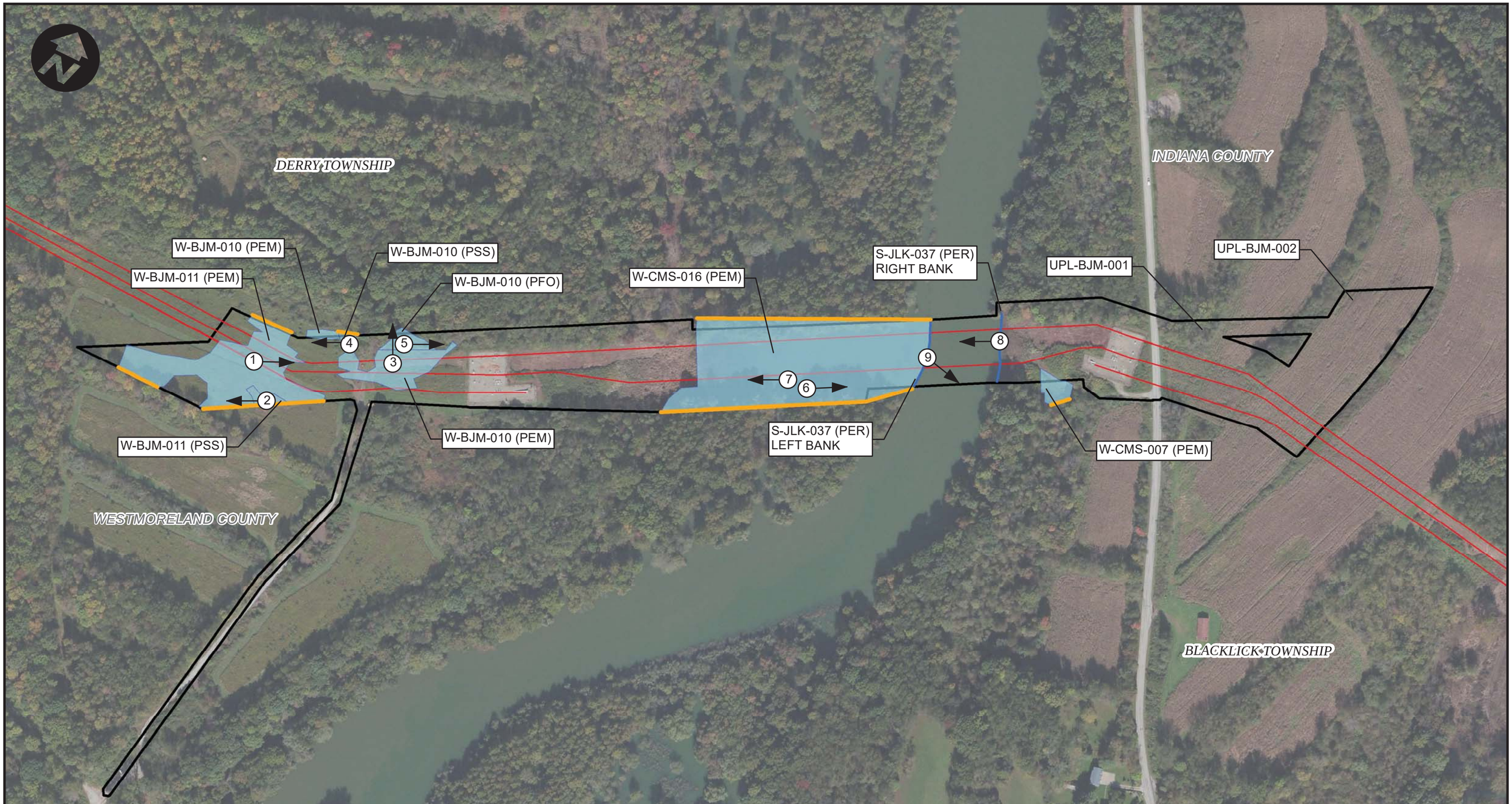
PROJECT / SITE NAME:			Conemagh River Crossing					APPLICANT'S NAME / CLIENT:			Texas Eastern Transmission, LP								Date:	4/22/2020		
DEP USE ONLY			Project Information								PADEP / 105											
PADEP Permit Number	Single and Complete Project Number	Crossing Number	Fees	Structure / Activity	Aquatic Resource Type	Latitude	Longitude	Waters Name	PA Code Chapter 93 Designation	Work Proposed / Impact Type	DEP Impact Type	Watercourse Impact Width	Watercourse Impact Length	Actual Stream Impact Area	DEP Stream Impact Area (leave blank)	Floodway Impact Width	Floodway Impact Length	Actual Floodway Impact Area	DEP Floodway Impact Area (leave blank)	Wetland Impact Width	Wetland Impact Length	Actual Wetland Impact Area	DEP Wetland Impact Area (leave blank)
leave blank	*leave blank*	*leave blank*		unique identifier		*dd nad83*	*dd nad83*				*temp / perm*	*linear feet*	*linear feet*	*square feet*	*square feet*	*linear feet*	*linear feet*	*square feet*	*square feet*	*linear feet*	*linear feet*	*square feet*	*square feet*
				W-BJM-011	Palustrine Emergent (PEM)	40.454157	-79.304047	WETLAND	N/A	Temporary Workspace	Temp	–	–	–		-	-	-		118	480	56,552	
				W-BJM-011	Palustrine Scrub-shrub (PSS)	40.453907	-79.30384	WETLAND	N/A	Temporary Workspace	Temp	–	–	–		-	-	-		28	93	2,564	
				W-BJM-010	Palustrine Emergent (PEM)	40.454614	-79.302808	WETLAND	N/A	Temporary Workspace	Temp	–	–	–		-	-	-		65	320	20,816	
			$10,550	W-BJM-010	Palustrine Scrub-shrub (PSS)	40.454602	-79.303316	WETLAND	N/A	Temporary Workspace	Temp	–	–	–		-	-	-		22	45	976	
				W-BJM-010	Palustrine Forested (PFO)	40.454802	-79.302755	WETLAND	N/A	Temporary Workspace	Temp	–	–	–		-	-	-		28	160	4,472	
				W-CMS-016	Palustrine Emergent (PEM)	40.455699	-79.300104	WETLAND	N/A	Bore	Perm	–	–	–		-	-	-		2	637	1,275	
				S-JLK-037	Perennial (PER)	40.456669	-79.297892	Conemaugh River	WWF	Bore	Perm	2	195	386		2	50	100		-	-	-	

Requirement K

Color Photographs of Proposed Impacts

COLOR PHOTOGRAPHS

Enclosed are color photographs of the impacted wetlands and a Photo Location Map depicting the locations of each photograph.



BASE MAP SOURCES:
AERIAL IMAGERY: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

NWI WETLAND: USFWS, NATIONAL WETLANDS INVENTORY FOR PA, POLYGON, 10/15/2018

SOIL MAP UNIT: USDA-NRCS, SOIL SURVEY GEOGRAPHIC DATABASE FOR WESTMORELAND AND INDIANA COUNTIES, PA, 9/2018

Legend

STUDY AREA
WETLAND
PIPELINE
OPEN-ENDED WETLAND
PHOTO LOCATION AND DIRECTION
WATERCOURSE

0 125 250 500 750 1,000 Feet

ENBRIDGE

FIGURE 3
PHOTO LOCATION MAP

AECOM

CONEMAUGH RIVER PROJECT

40° 27' 21.15" N AND 79° 17' 57.81" W
BLACKLICK TOWNSHIP, INDIANA COUNTY
AND DERRY TOWNSHIP, WESTMORELAND COUNTY, PA

Prepared by: JAS	CHECKED BY: MLN	DATE: 4/28/2020	PAGE 1 OF 1

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Texas Eastern Transmission, LP	Conemaugh River Crossing Project	60624893

Photo No.	Date:
1	03/05/2020

Direction Photo Taken:

East

Description:

Crossing Number #1
Wetland
W-BJM-011
PEM

Photo No.	Date:
2	03/05/2020

Direction Photo Taken:

West

Description:

Crossing Number #1
Wetland
W-BJM-011
PSS

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Texas Eastern Transmission, LP	Conemaugh River Crossing Project	60624893

Photo No.	Date:
3	03/05/2020

Direction Photo Taken:

North

Description:

Crossing Number #2
Wetland
W-BJM-010
PEM

Photo No.	Date:
4	03/05/2020

Direction Photo Taken:

West

Description:

Crossing Number #2
Wetland
W-BJM-010
PSS

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Texas Eastern Transmission, LP	Conemaugh River Crossing Project	60624893

Photo No.	Date:
5	03/05/2020

Direction Photo Taken:

East

Description:

Crossing Number #2
Wetland
W-BJM-010
PFO

Photo No.	Date:
6	06/24/2016

Direction Photo Taken:

East

Description:

Crossing Number #3
Wetland
W-CMS-016
PEM

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Texas Eastern Transmission, LP	Conemaugh River Crossing Project	60624893

Photo No.	Date:
7	06/24/2016

Direction Photo Taken:

West

Description:

Crossing Number #3
Wetland
W-CMS-016
PEM

Photo No.	Date:
8	03/05/2020

Direction Photo Taken:

West

Description:

Crossing Number #4
Watercourse
S-JLK-037
PER

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Texas Eastern Transmission, LP	Conemaugh River Crossing Project	60624893

Photo No.	Date:
9	03/05/2020

Direction Photo Taken:

Southeast

Description:

Crossing Number #4
Watercourse
S-JLK-037
PER

Requirement L

Environmental Assessment Form and Wetland Report

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Environmental Assessment Form

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATERWAYS ENGINEERING AND WETLANDS

CHAPTER 105 ENVIRONMENTAL ASSESSMENT FORM

			Included	Item Location
Note: The Department may waive a specific information requirement in writing, at the request of the Applicant, during the pre-application review process if the Department determines the information is not necessary to complete the review.				
Module S1: Project Summary				
This module is intended to organize information in order to present an overall summary of the project scope, certain key information requirements and when applicable, a comprehensive view of the overall project and related projects.				
A. Provide an overall project description and If the answer to the question below is **YES**, address CEA requirements; otherwise proceed to **S1.B** Comprehensive Environmental Assessment (CEA) when applicable. Answer the following question:			☒	S1.A
Does the "overall" project require more than one Ch. 105 permit in more than one county or will the project be completed in more than one phase?	☐ Yes	☒ No		
B. Provide information related to the project purpose, need, water dependency and summarize the amount and type of resources present and the temporary and permanent impacts proposed to those resources.			☒	S1.B
Module S2: Resource Identification and Characterization				
This module is intended to organize information related to the identification of the resources present on the project site and to characterize those resources that may be affected by the proposed project.				
A. Provide the standard resource identification information, location map, wetland determination or delineation reports; watercourse reports; identification and qualifications of preparers; location map, and answer the related questions.			☒	S2.A
Is the site located within or adjacent to any of the following; or within 100 feet of items vii or viii?				
i. National, state or local park, forest or recreation area	☐ Yes	☒ No		S2.A
ii. National natural landmark	☐ Yes	☒ No		S2.A
iii. National wildlife refuge, or Federal, state, local or private wildlife or plant sanctuaries	☐ Yes	☒ No		S2.A
iv. State Game Lands	☒ Yes	☐ No		S2.A
v. Areas identified as prime farmland	☒ Yes	☐ No		Tbl S2-2
vi. Source for a public water supply	☐ Yes	☒ No		S2.A
vii. A National Wild or Scenic River or the Commonwealth's Scenic Rivers System	☐ Yes	☒ No		S2.A
viii. Designated Federal wilderness area	☐ Yes	☒ No		S2.A
B. Identify all aquatic resources present on the project site and provide an identifier, the resource type; size of the resource(s); fishery designations, Ch. 93 uses and special protection status; and Exceptional Value (EV) wetland analysis.			☒	S2.A/B
C. Provide the following information related to habitat for Federal threatened and endangered (T&E) plant and animal species or State T&E species or species of special concern - copies of search forms or search receipts; identification of avoidance and minimization efforts taken to resolve identified conflicts.			☒	S2.C
Did the PNDI search or agency coordination identify any potential conflicts?	☐ Yes	☒ No		S2.C
If the above is answered **YES**; answer the following two questions related to PNDI Coordination:				
a. *Is the applicant utilizing a sequential review of the PNDI coordination?*	☐ Yes	☐ No		
b. *Is the applicant utilizing a concurrent review of the PNDI coordination?*	☐ Yes	☐ No		
D. Characterize the aquatic resources: riverine, wetland and lacustrine present on the project site that are proposed to be directly or indirectly affected by the project. Including but not limited to the following, resource classification information, Level 2 rapid condition assessment results, discussion of resource functions, characterization of riparian properties and any other relevant information or studies conducted.			☒	S2.D/ S3.C
Module S3: Identification and Description of Potential Project Impacts				
*This module is intended to organize and present information concerning the potential impacts or effects of the proposed project **in this** application. Impacts related to the "over all" project that are proposed under related but separate application(s) should be addressed as part of the CEA Policy response under **S1.A**.*				
A. Provide a summary table of the proposed temporary and permanent direct and indirect impacts for each effected resource category (e.g. riverine, wetlands and lacustrine resources).			☒	S3.A
B. If any questions from **S2.A** Standard Information Response questions were answered YES, discuss in detail any potential impacts to those resource(s).			☒	S3.B
IMPORTANT NOTE: If either item vii or viii from S2.A is answered YES, the project is not eligible as a "Small Project Application" type. Complete all applicable sections of the EA form for the standard application type unless an item was otherwise waived by the Department in writing (see previous Note on waiving of information requirements).				

	Included	Item Location
C. Provide a table(s) of all proposed water obstruction(s), encroachment activities and dams (e.g. subfacility codes) and provide an identifier, the subfacility code and description, resource identifier from **S2.B**, latitude and longitude, the proposed temporary and permanent direct and indirect impacts and subfacility details.	☒	S3.C
D. Provide a discussion of how the proposed subfacility(ies) individually and in combination directly and/or indirectly impact the identified resource(s) and the effects on the applicable resource functions: hydrologic, biogeochemical, habitat, recreation, any other environmental impacts and the effects on the property or riparian rights of owners upstream, downstream or adjacent to the project.	☒	S3.D
E. **Antidegradation Analysis** - The applicant should demonstrate consistency with State antidegradation requirements as described in the Water Quality Antidegradation Implementation Guidance Policy Document Number 391-0300-002. Project application information provided below in **S3.F, G and H** may be cross-referenced.	☒	S3.E
F. **Alternatives Analysis** - The scope and extent of this analysis should be commensurate with the size and scope of the proposed project impacts *in this* application, information provided in **S4.A** below, related to avoidance and minimization efforts, may be cross-referenced.	☒	S3.F
G. **Potential Secondary Impact Evaluation** - Identify and describe environmental impacts on adjacent land and water resources associated with but not that direct result of the project.	☒	S3.G
H. Identify and evaluate the potential cumulative environmental impacts of this project and other potential or existing projects like it, and the impacts that may result through numerous piecemeal changes to the wetland resource.	☒	S3.H
Module S4: Mitigation Plan		
*This module is intended to organize and present information concerning actions undertaken in accordance with the definition of **Mitigation** in Title 25 Pa. Code Chapter 105 - §105.1, 105.16, 105.18a(a)(3), 105.18a(b)(7), 105.20a, and 105.21 as related to the potential impacts or effects of the proposed project **in this** application.*		
A. Identify and discuss any measures taken that resulted in avoiding or minimizing unavoidable resource impacts, provide detailed responses for individual proposed impact area(s) **and** the project as a whole.	☒	S4.A
B. Identify and discuss any repair, rehabilitation or restorative actions taken to rectify an impacted resource, provide detailed responses for individual proposed impact area(s) and the project as a whole. Identify and discuss any proposed preservation and maintenance operations that will be taken to reduce or eliminate an impact during the life of the project.	☒	S4.B
C. Identify and discuss any actions undertaken to provide compensatory mitigation including the purchase of credits from an approved provider, a detailed discussion of proposed compensation actions and how they will offset the lost resource functions. Provide detailed plans including performance standards and success criteria.	☒	S4.C
Answer the following question. If the answer to the question is **YES**, provide the information regarding the mitigation credit provider; otherwise provide a detailed mitigation plan. If the application proposes to utilize both mitigation bank credits and conduct permittee responsible mitigation; both the credit provider and mitigation plan information shall be submitted.	☒	
Does the applicant propose to utilize an approved mitigation bank to provide all or a portion of the compensation? ☒ Yes ☒ No		S4.C
D. When applicable, provide a plan to monitor the identified actions proposed in **S4.B** and/or **S4.C** compensatory mitigation area. Applicants should utilize the Department's Design Criteria and the USACE's RGL 08-03 -(http://www.usace.army.mil/Portals/2/docs/civilworks/RGLS/rgl08_03.pdf) to develop monitoring plans for compensatory mitigation proposals. The plan should include performance standards/success criteria, duration and timeframes of monitoring, monitoring report template, and template remedial action or adaptive management plan.	☒	S4.D
Note: All or portions of this Module may apply to "Small Project" type applications under case specific circumstances and should be discussed during any pre-application meetings or prior to application submittal.		
CERTIFICATION		
I certify that the above statements, attachments including those labeled and identified as Enclosures, and all conclusions are true, correct, and based upon current environmental principles and science, to the best of my knowledge and belief.		
Signature: Eric Berk — Date: 5/26/2020		

Module S1

Project Summary

MODULE S1
PROJECT SUMMARY

S1.A Project Description

Texas Eastern is seeking authorization from the Pennsylvania Department of Environmental Protection (PADEP) to mitigate for the aquatic resource impacts associated with replacement of a segment of existing natural gas pipeline located in Blacklick Township, Indiana County and Derry Township, Westmoreland County, Pennsylvania (PA). The location of the Project is depicted on the Location Map (Requirement I).

The Project is located entirely within an existing pipeline right-of-way (ROW) with limited area adjacent to the ROW needed for temporary workspace and new easement and is surrounded by agricultural and forest land. The Project area drains to Conemaugh River. Conemaugh River watershed is located within the Allegheny River basin.

The Conemaugh River has PA Code, Title 25, Chapter 93 designated protected aquatic life uses of *Warm Water Fishes* (*WWF*) (Commonwealth of PA, 2020a). PADEP does not list the Conemaugh River as having an Existing Use Classification (PADEP, 2020b). The Conemaugh River is not listed by the Pennsylvania Fish and Boat Commission (PFBC) as Stocked Trout Waters nor is it listed by the PFBC as Wild Trout Waters (PFBC, 2020c).

According to the *2018 Final Pennsylvania Integrated Water Quality Monitoring and Assessment Report*, none of the receiving waters are listed as a siltation impaired waterbody (PADEP, 2018).

Construction of the Project will result in a total of approximately 21,792 square feet (0.60 acres) of temporary impact and 4,472 square feet (0.10) of permanent/conversion impact to wetland W-BJM-010, and 59,116 square feet (1.36 acres) of temporary impact to wetland W-BJM-011. The horizontal directional drill (HDD) avoids surface disturbance to wetland W-CMS-016 and watercourse S-JLK-037. Additional information regarding mitigation and restoration of the impacted wetlands is detailed in Requirement T.

The construction of this Project will not cause or contribute to pollution of groundwater, surface waters, or diminution of resources sufficient to interfere with their uses. A summary of specific measures undertaken or that will be taken to mitigate the overall Project impacts are summarized in Requirement T and in Module S4. Module S3.E of this Environmental Assessment contains detailed information pertaining to the Project's overall consistency with the PADEP antidegradation requirements. More detailed information pertaining to antidegradation requirements pertaining to

this Project can be found in the Erosion and Sediment Control Plan (E&SCP) contained within Requirement M.

The overall Project will be completed in a single phase and but is located in more than one county. Consequently, a Comprehensive Environmental Assessment (CEA) that complies with the requirements described in the *Comprehensive Environmental Assessment of Proposed Project Impacts for Chapter 105 Water Obstruction and Encroachment Permit Application* is required in this Environmental Assessment (PADEP, 2017).

For additional Project information, please refer to Requirement J (Project Narrative) of the Joint Permit Application.

S1.B Additional Information

S1.B.1 Project Purpose and Need

The purpose of the Project is for Texas Eastern to replacement of a segment of their existing Line 12 pipeline adjacent to and beneath the Conemaugh River. Additional information pertaining to the Project can be found in the Project Narrative located in Requirement J.

S1.B.2 Statement of Water Dependency

Due to the nature of this project, avoidance of all aquatic resources was not feasible. The Project is considered water dependent because it requires access or proximity to or siting within water to fulfill the basic purposes of this project.

S1.B.3 Resource Summary

Table S1-1 below provides a quantitative summary of amount and types of delineated resources identified within the Project Study Area, which are depicted in Attachment S-1 and listed in Module S2.B. For additional information on delineated resources associated with this Project, please refer to Attachment S-1 for the *Wetland and Watercourse Delineation Report*.

Table S1-1. Summary of Resource Systems Present Within and Adjacent to Project Area

Resource Type	Classification[1]	Quantity	Delineated Size (acres)[3]	Delineated Size (linear feet)
Wetland	PEM	1	3.40	-
	PEM/PSS	1	1.47	-
	PEM/PSS/PFO	1	0.63	-
	Total	**3**	**5.50**	**-**
Watercourse	PER	1	-	195
	Total	**1**	**-**	**195**

[1] PEM= Palustrine Emergent, PSS= Palustrine Scrub-shrub, PFO= Palustrine Forested, PER= Perennial

S1.B.4 Impact Summary

Table S1-2 at the end of this section provides a summary of the permanent and temporary direct and indirect impacts within the proposed limit-of-disturbance (LOD) and described in Module S3.A. At the time of this permit application, there are no additional impacts anticipated to occur in the future beyond those contained within this permit application.

Aboveground Facilities

A new 100-foot by 100-foot valve site along with a permanent access road will be constructed at the eastern end of the Project.

Access Roads

One permanent access road is proposed for this Project. The proposed access road consists of approximately 375 linear feet, with an average width of approximately 20 feet.

Permanent Impacts

For the purposes of the Project, permanent impacts listed in Table S1-2 are the impacts that will occur from the placement or construction of a water obstruction or encroachment, and the area necessary for operation and maintenance. Permanent impacts associated with this Project are those locations where a Utility Line Crossing is required for the installation of the pipeline. These impacts are located within the permanent ROW of the proposed Project and are all considered to be **permanent indirect** impacts as there is no net loss of resource acreage. There are no **permanent direct** impacts because there are no impacts that will remain following construction, such as the filling, draining or conversion of a resource to another aquatic resource type such as changing a palustrine wetland to a lacustrine wetland.

Temporary Impacts

Temporary direct impacts listed in Table S1-2 are associated with impacts to resources during construction that constitute a temporary loss of a resource that is restored upon completion of construction. These temporary impacts will not be maintained as a result of the operation and maintenance of the Project. Temporary impacts associated with this Project are those locations where a Temporary Road Crossing is required to access the ROW and construct through the Utility Line Crossings, or where timber mats are used to cross a stream, wetland or floodway. These impacts are all considered to be temporary direct impacts because the temporary loss of the resource is restored following construction, thus there is no net loss of resource acreage. There are no proposed **temporary indirect** impacts associated with this Project.

These impacts correspond to the *Aquatic Resource Impact Table* located within Requirement J. Please note that for proposed Project, the permanent and temporary impact areas contained within the *Aquatic Resource Impact Table* and this Environmental Assessment may be greater than the actual impact due to overlap between the permanent and temporary impact areas. Specifically, at resource crossings where both open-cut pipeline installation (Utility Line Crossing) and timber matting (Temporary Road Crossing) activities are proposed, the permanent impact area for the pipeline installation is calculated based off of the width of the entire permanent ROW, which includes the area within which the timber matting will be placed. The impact area for the timber matting is then calculated independently and based off of a typical maximum timber mat width of 16 feet. As a result, such crossings will include proposed permanent and temporary impacts that, when combined, could result in a total impact area greater than the delineated size of the resource.

For more detailed information pertaining to the proposed Project permanent and temporary direct and indirect impacts of these resources please refer to Module S3.A.

Table S1-2. Summary of Proposed Impacts

Resource Type	Classification	Permanent[2]				Temporary[2]			
		Direct		Indirect		Direct		Indirect	
		Impact Area (square feet)	Impact Area (acres)	Impact Area (square feet)	Impact Area (acres)	Impact Area (square feet)	Impact Area (acres)	Impact Area (square feet)	Impact Area (acres)
Wetland[1]	PEM/PSS/PFO	-	-	1,275	0.03	85,380	1.96	-	-
Watercourse/Floodway	WWF	-	-	486	0.02	**-**	**-**	**-**	**-**
Total		**-**	**-**	**1,761**	**0.05**	**85,380**	**1.96**	**-**	**-**

[1] PEM= Palustrine Emergent, PSS=Palustrine Scrub/shrub, PFO-Palustrine Forested
[2] These impacts correspond to the *Aquatic Resource Impact Table* located within Requirement J.

Module S2

Resource Identification and Characterization

MODULE S2
RESOURCE IDENTIFICATION AND CHARACTERIZATION

S2.A Standard Resource Identification Information

On June 23 and 24, 2016; August 19, 2016; and March 5, 2020, AECOM environmental scientists performed site investigations to identify and delineate wetlands and watercourses that may be regulated under the Pennsylvania Clean Streams Law and Dam Safety and Encroachments Act and the federal Clean Water Act (Commonwealth of Pennsylvania (PA), 2020a and 2020b; Clean Water Act of 1972). The limit of the site investigation was defined by the easement limits of Texas Eastern's existing pipeline ROW and temporary workspace outside the existing ROW. During the site investigations, four (4) wetlands and one (1) watercourse were delineated within the Project area.

The *Wetland and Watercourse Delineation Report* located within Attachment S-1 contains information pertaining to the delineation process utilized to identify and delineate the wetlands found within the Study Area. This report also contains wetland and watercourse data forms and photos of the identified resources.

The AECOM scientists listed within Table S2-1 performed the aquatic resource delineations, and prepared permit application materials. Copies of the AECOM scientist resumes containing their qualifications are provided in Attachment S-2.

TABLE S2.1
SCIENTIST INFORMATION

Scientist Name	AECOM Mailing Address	E-mail Address	Portions of Work Completed
Jesse Killosky	No longer at AECOM	--	Resource Delineation
Brian Miller	681 Andersen Drive Pittsburgh, PA 15220	brian.miller1@aecom.com	Resource Delineation
Charlotte Stallone	No longer at AECOM	--	Resource Delineation
Eileen Banach	10 Orms Street Providence RI 02904	eileen.banach@aecom.com	Permit Application
Mark Benfer	715 Washington Boulevard Williamsport, PA 17701	mark.benfer@aecom.com	Permit Application

Scientist Name	AECOM Mailing Address	E-mail Address	Portions of Work Completed
Josh Singleton	715 Washington Boulevard Williamsport, PA 17701	josh.singleton@aecom.com	Delineation Report
Angela Chmiel	10 Orms Street Providence RI 02904	angela.chmiel@aecom.com	Permit Application

The Plan located within Requirement H and Figure 2 – Plan View located within the *Wetland and Watercourse Delineation Report* (Attachment S-1), both at a scale of 1:2,400 depict all of the wetlands and watercourses delineated within the Study Area as well as within the LOD for the Project. These features are all labeled with unique identifiers and their classifications.

The Location Map contained within Requirement I shows the overall Project area with all receiving waters and political boundaries labeled on the United States Geological Survey 7.5-minute series Blairsville, PA topographical quadrangles (National Geographic Society, 2013) at a scale of 1:24,000, as required in the permit application. Based on available data, no natural areas, wildlife sanctuaries, natural landmarks and other geographical or physical features including cultural, archaeological and historical landmarks were identified within 1 mile of the Project area. Therefore, these features are not shown on the enclosed Location Map.

The Project is not located in or within 100 feet of a national or local park, forest, or recreation area. The Project is located within United States Army Corps of Engineers (USACE) flood control zone and USACE-owned land on the east side of the Conemaugh River is leased to the PA Game Commission (PGC). The Project is not located in or within 100 feet of a national natural landmark, national wildlife refuge, or federal or local or private wildlife or plant sanctuaries. It is also not located in or within 100 feet of a national wild or scenic river, the Commonwealth's Scenic Rivers System, or any areas designated as a Federal Wilderness Area. According to the PADEP's eMapPA Internet application, the Project is not located along any private or public water supply (PADEP, 2019a).

Two prime farmland soil map units listed by the Natural Resource Conservation Service (NRCS) were identified within the Project area.

Table S2-2: Prime Farmland Soils

Map Unit Symbol	Description	Acreage within Limit-of-Disturbance
MoA	Monongahela silt loam, 0 to 3 percent slopes	3.2
MoB	Monongahela silt loam, 3 to 8 percent slopes	6.0
Total Acres:		**9.2**

The Project area is occupied by an existing natural gas ROW and is surrounded by agricultural and forest land. The Project area drains to the Conemaugh River, which is located in the Allegheny River basin.

The Conemaugh River has PA Code, Title 25, Chapter 93 designated protected aquatic life uses of *Warm water Fishes* (*WWF*) (Commonwealth of PA, 2020a). The Conemaugh River is not listed by the PFBC as Stocked Trout Waters, nor is it listed as Stocked Trout Waters (PFBC, 2020a and 2020b).

According to the 2018 *Final Pennsylvania Integrated Water Quality Monitoring and Assessment Report*, none of the receiving waters are listed as a siltation impaired waterbody (PADEP, 2018).

S2.B Aquatic Resources That May Be Affected

Tables S2-3 list the wetlands located within the Project Study Area that have the potential to be affected by the Project. The identified wetlands contain a project-specific resource identifier ("W").

The sizes of the existing resources listed in Tables S2-3 contains information pertaining to whether any of the wetlands delineated within the Study Area are EV according to PA Code, Title 25, Chapter 105 [105.17 (iii)].

Table S2-3. Wetland Summary

Wetland ID[1]	Classification[2]	Delineated Size (acres)	Chapter 105 Wetland Classification	Hydrogeomorphic Classification (HGM)[4]	Palustrine Community Classification[5]
W-BJM-010	PEM/PSS/PFO	0.63[3]	-	Flat mineral soil	Mixed Forb – Graminoid Wet Meadow
W-BJM-011	PEM/PSS	1.47[3]	-	Flat mineral soil	Mixed Forb – Graminoid Wet Meadow
W-CMS-007	PEM	0.13	-	Flat mineral soil	Mixed Forb – Graminoid Wet Meadow
W-CMS-016	PEM	3.40[3]	-	Flat mineral soil	Mixed Forb – Graminoid Wet Meadow

Notes:
[1] Wetland ID is an AECOM designation for a wetland.
[2] PEM= Palustrine Emergent, PSS= Palustrine Scrub-Shrub, PFO= Palustrine Forested
[3] The wetland area is open-ended and continues outside of the Study Area. Acreage included within table represents the delineated acreage within the Project Study Area.
[4] HGM classifications were assigned from *Hydrogeomorphic Classification. HGM classification for wetlands of the Mid-Atlantic Region, USA* (Brooks).
[5] PCC classifications were assigned from *Terrestrial and Palustrine Plant Communities of Pennsylvania, 2nd Edition* (Zimmerman et al., 2012).
.

S2.C Threatened and Endangered Species and Species of Special Concern

A signed copy of the Pennsylvania Natural Diversity Inventory (PNDI) Project Environmental Review Receipt is provided within Requirement G of this permit application. The PNDI review resulted in "No Known Impacts" for threatened and/or endangered species under the jurisdiction of the PA Department of Conservation and Natural Resources (PADCNR), PGC, US Fish and Wildlife Service (USFWS) and PA Fish and Boat Commission (PFBC).

S2.D Aquatic Resource Characterization

Table S2-3 above contains all the resources potentially affected by the Project. The *Wetland and Watercourse Delineation Report* contained within Attachment S-1 contains data sheets, resource mapping and photos of all delineated resources. In some instances, these resources extended outside of the Project Study Area and are depicted in the report as being open-ended.

The impacted wetlands and Conemaugh River were evaluated using the PA Wetland Condition Level 2 Rapid Assessment Protocol (L2RAP) (PADEP, 2019b). The overall score for the Conemaugh River is 0.76; the overall score for wetland W-BJM-010 is 0.90; the overall score for wetland W-BJM-011 is 0.89; and the overall score for wetland W-CMS-016 is 0.96. Mapping and data sheets related to the L2RAP are provided in Attachment S-3.

S2.D.1 Riverine Resources

The Conemaugh River was the only riverine resource delineated within the Project area. This resource will be crossed using a horizontal directional drill (HDD) bore and there will be no impact to riverbanks or bed.

S2.D.2 Wetland Resources

Table S2-3 above provides the following information for each delineated wetland: Hydrogeomorphic (HGM) classification, Cowardin vegetation class, and Palustrine Community Classification (PCC) (Brooks; Zimmerman et al., 2012).

The following section contains information pertaining to the wetland HGM types and conditions as they relate to their inherent functions including, but not limited to, those associated with hydrologic, biogeochemical and habitat attributes as well as any applicable recreational uses.

Habitat Attributes

As shown in Table S2-4, the wetlands within the Study Area were identified as wetland HGM code flat mineral soil. Additionally, wetlands were classified as PEM, PEM/PSS/PFO, and PEM/PSS wetland type. Wetland PCC classification identified was: Mixed Forb – Graminoid Wet Meadow. The most common dominant herbaceous plant species observed were *Juncus effusus, Microstegium vimineum, Chamaedaphne calyculata, Fallopia japonica, Juncus tenuis*, and *Carex crinita*. The most common Sapling-Sapling/Shrub species were *Frangula alnus*, *Ulmus Americana*, *Fraxinus pennsylvanica*, *Acer rubrum*, *Cornus racemosa, Platanus occidentalis*. The most common tree species were *Platanus occidentalis*, *Fraxinus pennsylvanica*, and *Acer rubrum*,

The primary indicators of hydrology were Surface Water (A1), High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), Aquatic Fauna (B13), and Oxidized Rhizospheres on Living Roots (C3). Wetland soils matrix hues were 10YR, 2.5YR, and 5GY with low chroma (≤2). Soils met the criteria for hydric soil indicators Depleted Matrix (F3). The soil texture was silty loam or clay loam.

Hydrologic Patterns

The landform/geomorphic setting of identified wetlands was identified as hillsides, and groundwater primarily provides hydrology to the hillside wetlands.

Biogeochemical

No obvious sources of pollution were observed within the Project area.

Recreational Uses

Hunting is a major recreational activity in the region; however, the Project area is located within privately-owned land that is bisected by two roads, which does not offer opportunities for public hunting, hiking or observation of wildlife. Game species present in the general vicinity may include wild turkey (*Meleagris gallopavo*), white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), eastern cottontail rabbit (*Sylvilagus floridanus*), black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canus latrans*), and ruffed grouse (*Bonasa umbellus*), amongst others. Non-game species present in the general vicinity may include red-tailed hawk (*Buteo jamaicensis*), eastern screech owl (*Otus asio*), American kestrel (*Falco sparverius*), turkey vulture (*Cathartes aura*), eastern chipmunk (*Tamias striatus*), striped skunk (*Mephitis mephitis*), and resident and neo-tropical songbirds.

S2.D.3 Lacustrine Resources

There are no lacustrine resources delineated within the Project area.

S2.D.4 Other Environmental Factors

Other environmental factors, special studies, macroinvertebrate studies, or substitute methods were not conducted for the proposed Project; therefore, discussion of such methods is not provided.

Module S3

Identification and Description of Potential Project Impacts

MODULE S3
IDENTIFICATION AND DESCRIPTION OF POTENTIAL PROJECT IMPACTS

S3.A Impact Summary

Construction of the Project will result in a total of approximately 1,761 square feet (0.05 acres) of permanent impact to wetland W-CMS-016 and stream/floodway S-JLK-037, and 85,380 square feet (1.96 acres) of temporary impact to wetlands W-BJM-010 and W-BJM-011. Impacts will result from temporary workspaces and HDD operations. No lacustrine resources were identified within the Project area; therefore discussion of impacts to these resources is not applicable to this Module. Table S1-2 in Module S1 contains a summary of the proposed permanent and temporary direct and indirect impacts.

S3.B Standard Information Responses

The Project is not located in or within 100 feet of a national or local park, forest, or recreation area; nor is it located in or within 100 feet of a national natural landmark, national wildlife refuge, or federal or local or private wildlife or plant sanctuaries. It is also not located in or within 100 feet of a national wild or scenic river, the Commonwealth's Scenic Rivers System, or any areas designated as a Federal Wilderness Area. The Project is not located along any private or public water supply (PADEP, 2020a and PaGWIS, 2020).

Approximately 9.2 acres within the LOD are mapped as prime farmland soils by the NRCS (NRCS, 2017). These prime farmland soils are located in active farmland which will continue to be farmed following construction of the pipeline. Thus, there is no loss of prime farmland soils proposed as part of this Project.

S3.C Subfacility Details

Please refer to the Aquatic Resource Impact Table within Requirement J of this Joint Permit Application for all subfacility details including: the affected resources, coordinates, location, subfacility code, permanent direct and indirect impacts, and temporary direct and indirect impacts.

S3.D Resource Function Effects

The wetland impacts proposed for the Project are summarized and tabulated on the Aquatic Resource Impact Table which is attached in Requirement J. Watercourse S-JLK-037 and its associated floodway will be impacted by this Project through having a pipeline HDD bored under the watercourse and floodway. Four (4) wetlands were delineated during the watercourse and wetland investigation. Three wetlands will be impacted by the Project. W-BJM-011 and W-BJM-010 will be temporary impacted by the temporary workspace, and W-CMS-016 will be permanently impacted by the pipeline that will be bored under the wetland.

Hydrologic Impacts

The Project is not anticipated to adversely affect the natural drainage patterns, groundwater discharge, natural recharge areas, or storm and floodwater storage and control or have a significant impact to the water quality characteristics provided by the wetlands within the Project area. Impacts to the watercourse flushing characteristics, stream gradient, or sensitive waterbodies will be minimal due to HDD methodology being used to install a new section of pipeline. The Erosion and Sediment Control Plan (E&SCP) (see Requirement M) is consistent with the standard design criteria from the Pennsylvania Stormwater Best Management Practices Manual (BMP Manual) to protect water quality.

An approved E&SCP and appropriate BMPs will be implemented and utilized as necessary to reduce any temporary effect on water quality and resources during restoration efforts.

Habitat Impacts

Texas Eastern plans to restore all impacted areas to pre-construction conditions following the completion of construction activities.

Biogeochemical Impacts

Minimal temporary impacts to food chain production may occur during construction. No processes or communities that are important ecologically to food chain production would be impacted for longer than the duration of construction. Additionally, wetland and upland disturbed areas will be restored to original condition once construction activities are complete.

Recreation

As mentioned previously, public recreational activities such as hunting, or fishing are unlikely to occur in the Project area which is located within privately-owned land surrounded by forested land. As such, impact on recreational activates is not likely to occur.

Properties upstream and downstream of the Project area include existing roadway, forest land, and pipeline ROW. These land uses should not have any further impact on the aquatic habitat within the Project area. The areas that are to be impacted during construction will be restored as depicted on the E&SC Plans within Requirement M. The proposed construction activities will not permanently restrict the property rights of landowners upstream or downstream of the proposed Project as the area will be returned to pre-construction conditions.

Environmental impacts on other adjacent land are expected to be minimal. These impacts are anticipated to consist of increased noise levels from machinery and dusty conditions. To minimize these impacts, an approved E&SCP will be implemented and utilized during construction activities.

S3.E Antidegradation Analysis

The proposed construction activities have been evaluated for non-discharge alternatives for compliance with the PADEP's antidegradation requirements in PA Code, §102.4(b)(6). Non-discharge alternatives are defined as environmentally sound and cost effective BMPs that individually or collectively eliminate the net change in stormwater volume, rate and quality for storm events up to and including the 2-year design storm when compared to the stormwater rate, volume and quality prior to the earth disturbance activities.

Various BMPs identified as non-discharge alternatives in the *Erosion and Sediment Pollution Control Program Manual* (PADEP, 2012) were considered and evaluated for implementation as part of the proposed activities. These alternatives were evaluated individually, and in various combinations, for their ability to minimize accelerated erosion and sedimentation during the earth disturbance activity in order to achieve no net change from pre-development to post-development volume, rate and concentration of pollutants in stormwater runoff. The primary non-discharge alternatives/BMPs considered for construction activities are limiting the disturbed area and limiting extent and duration of the disturbance.

The LOD to be utilized for construction has been established to restrict construction activities to occur within the existing pipeline ROW. Since the Project area will be restored to pre-construction conditions, there is no negative affect on land use anticipated. The Project area will only incur temporary land disturbance until vegetation is established.

Texas Eastern will limit the extent and duration of the earth disturbance during construction. The duration and extent of earth disturbances will be limited to the minimal timeframe necessary to complete activities. Temporary or permanent stabilization is to occur as soon as possible upon completion. This BMP is very effective at reducing the concentration of pollutants in stormwater runoff and reducing the impact of sediment runoff volume and rate.

As demonstrated in the previous paragraphs, due to the nature of the Project, the proposed activities are not expected to have an impact on the volume, rate and concentration of pollutants in stormwater runoff up to, and including, the 2-year/24-hour storm. Antidegradation Best Available Combination of Technologies (ABACT) BMPs are not required as the Project is not located in a high-quality or exceptional value watershed. The E&SCP contained within Requirement M of this permit application depicts the locations of all planned BMPs and details for construction.

The proposed Project will create a small amount of new impervious cover, which is of concern for stormwater management. Minimizing the LOD to the minimum area necessary to install the replacement segment and minimizing tree clearing will maintain existing vegetative cover, where feasible and maintain the infiltration capacity of undisturbed areas to the maximum extent practicable.

It is not anticipated that the cumulative effect of this construction will have a major impairment on the Commonwealth's wetland resources because reclamation involves restoring the temporarily impacted wetland area. Furthermore, the wetlands impacted and surrounding upland areas will be restored to original contours and conditions following the completion of all construction activities.

S3.F Alternatives Analysis

An alternative analysis has been provided within Requirement S.

S3.G Potential Secondary Impact Evaluation

In addition to the resources impacted during original pipeline construction, there are adjacent

wetlands that will be avoided during construction. The resource located in Table S.3-2 (W-CMS-007) is proposed to be avoided but has the most likelihood to have a potential secondary impact. Additional information pertaining to this resource is located within the *Wetland and Watercourse Delineation Report* within Attachment S-1.

Table S3-2. Potential Secondary Impacted Resources

Resource Type	Resource ID[1]	Classification[2]	Chapter 93 Designation[3]	Stocked Trout Waters	Wild Trout Waters	Special Protection Status
Wetland	W-BJM-011	PEM/PSS	-	-	-	-
Wetland	W-BJM-010	PEM/PSS/PFO	-	-	-	-
Wetland	W-CMS-016	PEM	-	-	-	-
River	S-JLK-037	PER	WWF	-	-	-
Wetland	W-CMS-007	PEM	-	-	-	-

Notes:

[1] Resource ID is an AECOM designation

[2] PEM= Palustrine Emergent, PSS=Palustrine Scrub/shrub, PFO=Palustrine Forested, PER=Perennial

[3] PA Code, Title 25, Chapter 93 Designated Use or Existing Use Designation, whichever is more protective

The nature of this Project is not anticipated to cause any direct or indirect secondary impacts on adjacent land or resources. The Project will not permanently restrict the property rights of landowners upstream or downstream. There are no dams, water obstructions, or encroachments necessary to fulfill this Project purpose.

S3.H Cumulative Impacts

The CEA Policy states that when a temporary wetland impact is proposed to be properly restored, the applicant does not need to identify the temporary impact as an adverse cumulative impact. Texas Eastern intends to restore the temporarily impacted wetlands immediately following construction to its pre-construction conditions. It is anticipated that this Project will have 0.05 acres of permanent wetland and stream impact due to the pipeline bored under wetland W-CMS-016 and watercourse S-JLK-037 along with its associated floodway. The pipeline will be installed via HDD bore and is unlikely will have any adverse effects on the local watershed. The wetland surface and watercourse riverbanks and bed will not be disturbed during construction activities, so all vegetation will remain intact and minimal impact to underground hydrology will occur.

Texas Eastern will continue to evaluate the integrity of its pipelines using in-line inspection tools

in accordance with the mandates and guidance of United States Department of Transportation (USDOT) Pipeline and Hazardous Materials Safety Administration's (PHMSA) 49 CFR 192 Subpart O, and future inspections may indicate the need for additional anomaly repairs to the pipelines in the Project area. However, if future anomaly repair is required, and impacts to wetlands within the Project area are required to address the anomaly, those impacts would similarly be temporary and restored to pre-construction conditions immediately following construction activities.

To address the Chapter 105 cumulative impacts requirements, PADEP recommends that the applicant identify and consider other existing and potential project permanent impacts for each wetland resource. The Project area was reviewed using the PADEP eMapPa interactive mapper, eFacts websites, and existing utilities surveyed during AECOM investigations to identify additional and/or cumulative wetland impacts that would occur as a result of existing or new potential projects. No current or future projects other than the anomaly investigations were identified within or adjacent to the Project area; however, an anomaly identified and repaired in 2020 was identified in eFacts.

Module S4

Mitigation Plan

MODULE S4
MITIGATION PLAN

S4.A Avoidance and Minimization Measures

As described in the Alternatives Analysis (see Requirement S), the Project purpose and need cannot be accomplished without temporary impacts to wetlands and floodway and permanent impacts to wetlands, a river, and floodway; Texas Eastern will implement appropriate construction measures to minimize these unavoidable impacts. Construction workspace requirements are a function of pipe diameter, equipment size, topography, and geological rock formations. All construction activities are restricted to the limit of disturbance (LOD) on the Erosion and Sediment Control Plan (E&SCP) drawings. The construction workspace includes the bore entry and exit pit, temporary workspace to stage and weld the replacement pipeline, areas for soil stockpiling, and areas that construction equipment will utilize to complete the required repairs. Texas Eastern must provide sufficient workspace to permit the safe operation of construction equipment at the Project site.

The E&SCP best management practices (BMPs) for this earth disturbance activity have been planned to minimize the extent and duration of the proposed earth disturbance, maximize protection of existing drainage features and vegetation, reduce soil compaction, and employ measures and controls that reduce the generation of increased runoff. Specific BMPs have been selected for this site in order to achieve these broad goals. The location of proposed BMPs are shown on the E&SCP drawings.

Timber mats and equipment will not contain free-standing soil and vegetative materials prior to arrival on-site. This minimizes potential impacts from invasive plants, contaminants, biological diseases, etc.

S4.B Impact Repair, Rehabilitation, Restoration, Preservation and Maintenance

Restoration and revegetation of the construction workspace will immediately occur upon completion of construction activities. In conjunction with restoration operations, any woody material and construction debris will be removed from the construction workspace. Permanent water bars will be reinstalled using compacted soil and maintained in accordance with the E&SCP at the existing locations. Permanent water bars will be installed to match pre-existing water bars on pipeline ROW.

Revegetation will be completed in accordance with permit requirements and written recommendations on seeding mixes, rates, and dates obtained from the local soil conservation

authority or other duly authorized agency and in accordance with the E&SCP. Alternative seed mixes specifically requested by the landowner or agencies may be used. Any soil disturbance that occurs outside the permanent seeding season or any bare soil left unstabilized by vegetation will be mulched in accordance with the E&SCP.

Regarding preservation and maintenance, no vehicular traffic will be permitted across wetlands without the aid of temporary timber matting, or approved equal, at any time during construction in an effort to reduce the impact across resources.

S4.C Compensatory Mitigation

As described in the Alternatives Analysis (see Requirement S), Texas Eastern has incorporated all practicable measures to avoid and minimize environmental impacts associated with the Project. Texas Eastern's construction procedures have also been developed to minimize unavoidable impacts to wetlands. During Project construction, a Palustrine Emergent (PEM) wetland and the Conemaugh River will be crossed via horizontal directional drill (HDD). Two additional wetlands, one PEM/Palustrine Shrub/shrub (PSS) and one PEM/PSS/Palustrine Forested (PFO), and the floodway of the Conemaugh River will be crossed via temporary matting. Construction of the Project will result in a total of approximately 4,472 square feet (0.10) of permanent/conversion impact to the PFO portion of one wetland. To mitigate for the wetland conversion, Texas Eastern intends to purchase off-site mitigation credits. Further information concerning mitigation is provided in Requirement T. Construction will be in accordance with the Project Description (see Requirement J) and Texas Eastern's E&SCP to minimize the potential for adverse effects to wetlands and floodway.

The construction procedures used to cross unsaturated wetlands are similar to those used on dry land. Stable temporary work surfaces may be required in wetlands where soils are saturated and unstable. Installing construction mats in the equipment travel lane is a typical method of site stabilization that Texas Eastern will employ, as necessary. During site preparation activities, vegetation will be cut to ground level within the wetland. Original topographic conditions and contours will be restored as close to pre-construction as possible after completion of the repair work.

S4.D Monitoring Plans

Texas Eastern will complete vegetation and site monitoring through final stabilization of the impacted areas as defined in the E&SCP and as required by state or federal agencies.

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Attachment S-1

Wetland and Watercourse Delineation Report

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May 5, 2020

William Brett
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Re: Wetland and Watercourse Delineation Report
Conemaugh River Crossing Project
Blacklick Township, Indiana County, and Derry Township, Westmoreland County, Pennsylvania

Dear Mr. Brett:

AECOM has prepared this *Wetland and Watercourse Delineation Report* as part of the environmental investigation conducted for Texas Eastern Transmission, LP (Texas Eastern), a wholly-owned subsidiary of Enbridge Energy Company, Inc. (Enbridge) for their 2020 Integrity Program (Project). This report pertains to the Conemaugh River Crossing Project (Site). The limit of the Site investigation is defined by the Study Area, as shown on Figure 2. The following report summarizes this investigation.

BACKGROUND

The Site is located in Blacklick Township, Indiana County, and Derry Township, Westmoreland County Pennsylvania (PA) and can be located on the United States Geological Survey (USGS) Blairsville, PA 7.5-minute series topographical quadrangle (National Geographic Society, 2013) (Figure 1).

The Site is a natural gas pipeline ROW and temporary access road, and is surrounded by agricultural and forest land. The Site drains to the Conemaugh River, which is located in the Allegheny River basin.

The Conemaugh River has PA Code, Title 25, Chapter 93 designated protected aquatic life uses of *Warm Water Fishes* (*WWF*) (Commonwealth of PA, 2020a). The Pennsylvania Department of Environmental Protection (PADEP) does not list the Conemaugh River as having an Existing Use Classification (PADEP, 2020).

The Conemaugh River is not listed by the Pennsylvania Fish and Boat Commission (PFBC) as Stocked Trout Waters, nor is it listed by the PFBC as Wild Trout Waters (PFBC, 2020a, 2020b, and 2020c).
According to the *2016 Pennsylvania Integrated Water Quality Monitoring and Assessment Report*, the Conmeaugh River is not listed as a siltation impaired waterbody (PADEP, 2020).

Three wetlands identified by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) are located within the Study Area. They are identified as follows:

- L1UBHh – lacustrine, limnetic, unconsolidated bottom, permanently flooded, diked/impounded wetland,
- L2USAh – lacustrine, littoral, unconsolidated shore, temporary flooded, diked/impounded wetland, and
- PFO1/USAh – palustrine, forested, broad-leaved deciduous, unconsolidated shore, temporary flooded, diked/impounded wetland (USFWS, 2018) (Figure 2).

Seven soil map units are located within the Study Area. Each soil map unit has been given a hydric soil rating by the Natural Resources Conservation Service (NRCS, 2018) (Table 1).

Table 1. Study Area Soil Map Units

Soil Map Unit	Description	Hydric Rating By Map Unit (%)
AhC	Allegheny silt loam, 8 to 15 percent slopes	0
GoF	Gilpin-Rock outcrop complex, 45 to 100 percent slopes	0
MoA	Monongahela silt loam, 0 to 3 percent slopes	5
MoB	Monongahela silt loam, 3 to 8 percent slopes	5
MoC	Monongahela silt loam, 8 to 15 percent slopes	5
W	Water	0
WeA	Weinbach silt loam, 0 to 2 percent slopes	5

METHODOLOGY

On June 23 and 24, 2016; August 19, 2016; and March 5, 2020, AECOM environmental scientists performed site investigations to identify and delineate wetlands and watercourses that may be regulated under the Pennsylvania Clean Streams Law and Dam Safety and Encroachments Act and the federal Clean Water Act (Commonwealth of PA, 2020a and 2020b; Clean Water Act of 1972).

To identify and delineate wetlands, AECOM performed an on-site routine wetland determination as described in the U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual*, *Technical Report Y-87-1* (Environmental Laboratory, 1987) using wetland criteria detailed in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains Piedmont Region (Version 2.0)*

(USACE, 2012). If a wetland was delineated, a USACE Regional Supplement *Wetland Determination Data Form* was completed at each selected data point. Data on the composition of the vegetation community, soil profile characteristics, and hydrology were recorded on the data form. Wetlands were classified following *Classification of Wetlands and Deepwater Habitats of the United States (*Cowardin et al., 1979). The boundaries of each wetland were recorded with a high-precision, mapping-grade Global Positioning System (GPS) unit and photographs were taken of each resource. Additional upland data points were taken in areas where desktop evaluation indicated a potential resource signature or in areas where wetland characteristics were present, but one or more wetland indicators was absent and wetland criteria were not met.

To identify and delineate watercourses, AECOM performed an on-site evaluation based on typical watercourse characteristics such as defined streambed and streambanks, exclusion of terrestrial vegetation, hydrologically-sorted substrate material, and the presence of an ordinary high water mark. If a watercourse was delineated, information was collected for each resource based on the *Physical Characterization/Water Quality Field Data Sheet* found in the Environmental Protection Agency's (EPA) *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (Barbour et al., 1999). The extent of each watercourse was recorded with a GPS unit and photographs were taken of each resource.

RESULTS

Two palustrine emergent (PEM) wetlands, one PEM/palustrine scrub/shrub (PSS) wetland complex, one PEM/PSS/palustrine forested (PFO) wetland complex, and one perennial (PER) watercourse were identified and delineated within the Study Area (Figure 2). Two additional upland (UPL) data points were recorded in areas where visible wetland characteristics were present, but did not meet all wetland criteria. The field data forms and photographs are provided in Appendices A and B, respectively. Each resource is summarized below.

- **Wetland W-BJM-011 (PEM/PSS):** W-BJM-011 consisted of a PEM and PSS wetland complex. The complex was located in a slight depression within the existing pipeline ROW. The delineated PEM component of W-BJM-011 was 1.41 acre in size, was located within the northwestern portion of the complex, and extended outside the Study Area to the north and south. The primary indicators of hydrology observed were Surface Water (A1), High Water Table (A2), Saturation (A3), and Aquatic Fauna (B13). The dominant herbaceous vegetation species were *Juncus effusus, Scirpus cyperinus*, and *Typha angustifolia.* The soil texture at this location was silt loam underlain by silty clay loam and met the criteria for hydric soil field indicator Depleted Matrix (F3).

  The delineated PSS component of W-BJM-011 was 0.06 acre in size and was located within the southeastern portion of the complex. The primary indicators of hydrology observed were Surface

Water (A1), High Water Table (A2), and Saturation (A3). *Platanus occidentalis* dominated the tree stratum, while the dominant vegetation identified within the sapling/shrub stratum included *Cornus racemosa and Rubus occidentalis*. The dominant herbaceous vegetation included *Scirpus cyperinus* and *Dichanthelium clandestinum.* The soil texture at this location was silt loam underlain by silty clay loam and met the criteria for hydric soil indicator Depleted Matrix (F3).

- **Wetland W-BJM-010 (PEM/PSS/PFO):** W-BJM-010 consisted of a PEM, PSS, and PFO wetland complex. The complex was located west of a pipeline meter site within the ROW. The PEM component of W-BJM-010 was 0.47 acre in size and was located within the northwestern and southern portions of the complex. The primary indicators of hydrology observed were Surface Water (A1), High Water Table (A2), Saturation (A3), and Aquatic Fauna (B13). The dominant herbaceous vegetation included *Juncus effusus* and *Cyperus esculentus.* The soil texture at this location was silty clay loam and met the criteria for hydric soil field indicator Depleted Matrix (F3).

  The delineated PSS component of W-BJM-010 was 0.04 acre in size, was located within the southeastern portion of the complex, and extended outside the Study Area to the north. The primary indicators of hydrology observed were High Water Table (A2), Saturation (A3), and Oxidized Rhizospheres along Living Roots (C3). The tree stratum was dominated by *Fraxinus pennsylvanica*, and the dominant vegetation identified within the sapling/shrub stratum included *Acer rubrum* and *Rosa multiflora*. The dominant herbaceous vegetation included *Dichanthelium clandestinum* and *Solidago rugosa.* The soil texture at this location was silt loam underlain by silty clay and met the criteria for hydric soil indicator Depleted Matrix (F3).

  The PFO component of W-BJM-010 was 0.12 acre in size and was located within the northern portion of the complex. The primary indicators of hydrology observed were Surface Water (A1), High Water Table (A2), Saturation (A3), and Water-Stained Leaves (B9). The dominant tree stratum species was Acer rubrum. Dominant vegetation identified within the sapling-sapling/shrub stratum included *Frangula alnus* and *Ulmus americana*. The dominant herbaceous vegetation was *Microstegium vimineum.* The soil texture at this location was silt loam underlain by silty clay and met the criteria for hydric soil indicator Depleted Matrix (F3).

- **Wetland W-CMS-016 (PEM):** This large PEM wetland was located within the floodplain of the Conemaugh River and extended outside of the Study Area to the north and south. The delineated portion of this resource was 3.40 acre in size. There were no primary indicators of hydrology observed; however, two secondary indicators of wetland hydrology were present in the forms of Drainage Patterns (B10) and Geomorphic Position (D2). The dominant herbaceous species were *Fallopia japonica* and *Chamaedaphne calyculata*. The soil texture at this location was clay loam and met the criteria for hydric soil field indicator Depleted Matrix (F3).

- **Wetland W-CMS-007 (PEM):** This PEM wetland originated on a hillside where several spring seeps emerged and extended outside of the Study Area to the southeast. The delineated portion of this resource was 0.13 acre in size. The primary indicators of hydrology observed were Surface Water (A1), High Water Table (A2), Saturation (A3), and Oxidized Rhizospheres along Living Roots (C3). The dominant herbaceous species were *Fallopia japonica, Juncus tenuis,* and *Carex crinita*. The soil texture at this location was loamy clay and met the criteria for hydric soil field indicator Loamy Gleyed Matrix (F2).

- **Watercourse S-JLK-037 (PER):** This PER watercourse was identified as the Conemaugh River and flowed adjacent to wetland W-CMS-016. The watercourse had a top width and overall channel depth of approximately 185 feet and ten feet, respectively. The morphology of watercourse S-JLK-037 consisted entirely of a pool feature. A qualitative review of the substrate for benthic macroinvertebrates was conducted and Ephemeroptera, Plecoptera, and Trichoptera taxa were observed.

SUMMARY

AECOM conducted a wetland and watercourse investigation on June 23 and 24, 2016; August 19, 2016; and March 5, 2020 for Texas Eastern Transmission, LP for the Conemaugh River Project within Blacklick Township, Indiana County, and Derry Township, Westmoreland County, Pennsylvania. Two PEM wetlands, one PEM/PSS wetland complex, one PEM/PSS/PFO wetland complex, and one PER watercourse were identified within the Study Area.

STATEMENT OF LIMITATIONS

- This investigation was limited to the Study Area shown herein. AECOM did not examine areas outside of the Study Area thus no information is provided regarding the presence or absence of regulated wetlands and watercourses outside of the Study Area.
- This investigation was conducted on the date(s) indicated herein. Human-induced or natural changes at the site may occur after this date which may cause changes in the presence and extent of regulated wetlands and watercourses.
- The findings of the site investigation completed by AECOM were limited to the date(s) contained herein and this report reflects the conditions at that time. In circumstances where a site has been developed prior to the site investigation, the presence or absence of pre-construction wetlands or watercourses and their estimated extents within the Study Area is beyond the scope of this report.

SIGNATURES

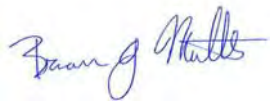
This report was prepared by:

AECOM

Josh Singleton
Environmental Scientist

And reviewed by:

AECOM



Brian J. Miller
Senior Ecologist

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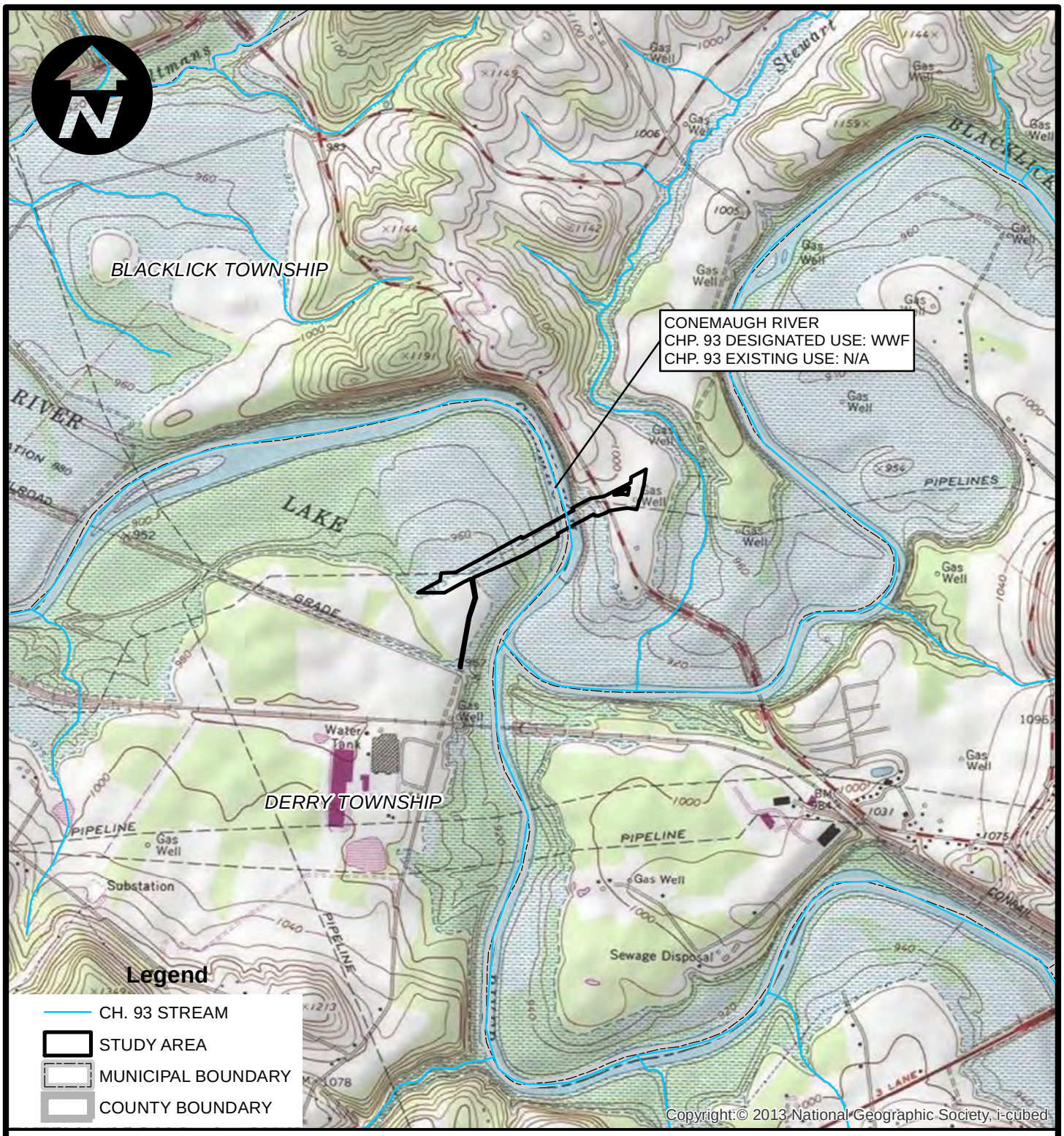
AECOM

FIGURES



USGS QUAD NAME: BLAIRSVILLE, PA
BLACKLICK TOWNSHIP, INDIANA COUNTY AND DERRY TOWNSHIP, WESTMORELAND COUNTY, PA
SITE CENTER: 40° 27' 21.15" N AND 79° 17' 57.81" W

TOPO SOURCE: SEAMLESS DIGITAL RASTER GRAPHIC-N.P.S. NATURAL PHYSICAL MAP & U.S.G.S. TOPOGRAPHIC MAP 2013, NATIONAL GEOGRAPHIC SOCIETY, ICUBED

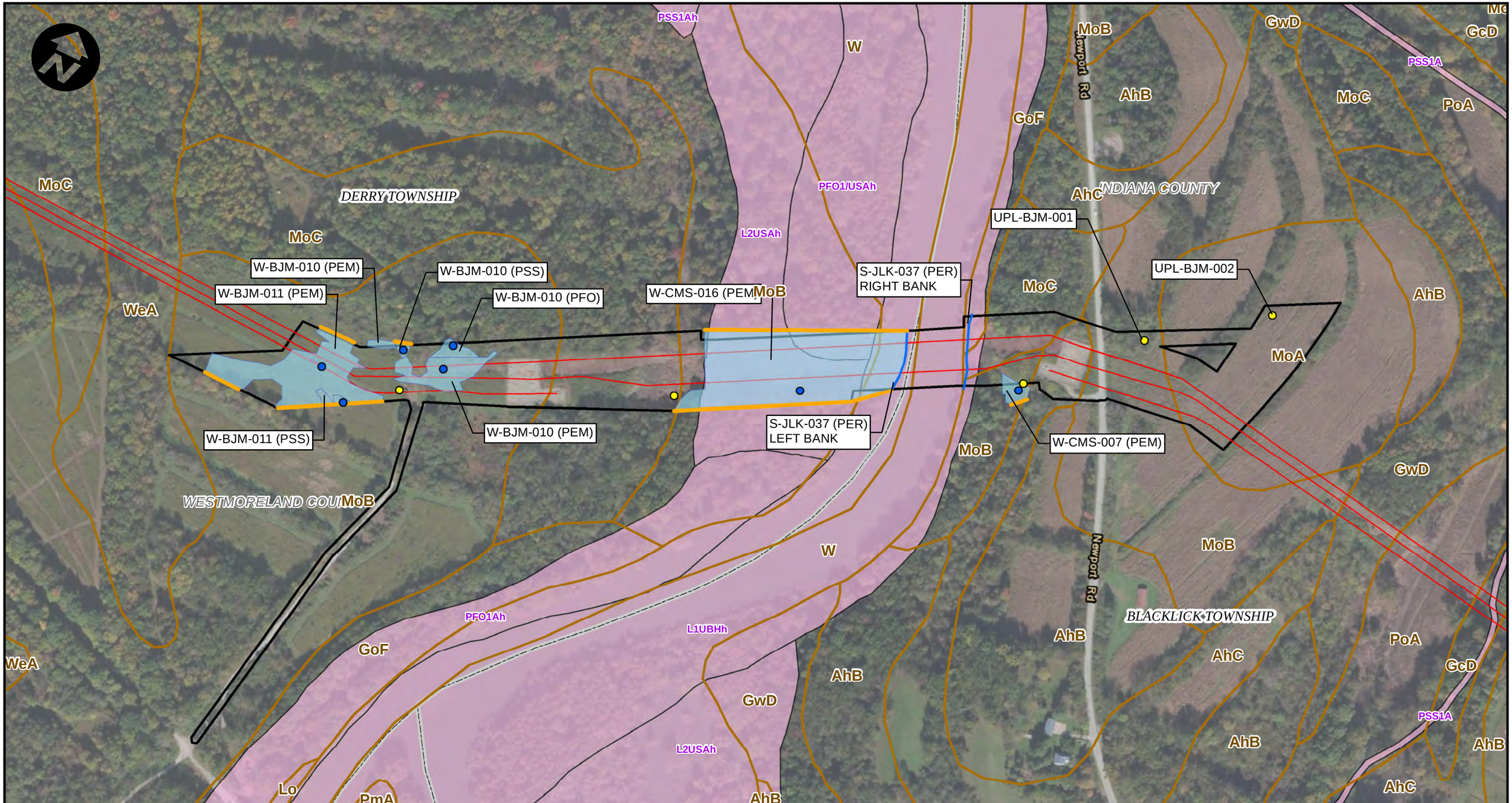
AECOM

FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE 120
PITTSBURGH, PA 15220

ENBRIDGE

TEXAS EASTERN TRANSMISSION, LP

PREPARED BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	DRAWING NO.
JAS	MAB	SLH	5/5/2020	1 " = 2,000 '	**FIGURE 1**
			Page 1 of 1	PROJECT NO. 60594173	LOCATION MAP 2020 INTEGRITY PROGRAM CONEMAUGH RIVER CROSSING PROJECT INDIANA AND WESTMORELAND COUNTIES, PENNSYLVANIA



BASE MAP SOURCES:
AERIAL IMAGERY: ESRI, HERE, GARMIN, (C) OPENSTREETMAP CONTRIBUTORS
SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

NWI WETLAND: USFWS, NATIONAL WETLANDS INVENTORY FOR PA, POLYGON, 10/15/2018

SOIL MAP UNIT: USDA-NRCS, SOIL SURVEY GEOGRAPHIC DATABASE FOR WESTMORELAND AND INDIANA COUNTIES, PA, 9/2018

Legend

- STUDY AREA
- SOIL MAP UNIT
- NWI WETLAND
- WETLAND
- PIPELINE
- OPEN-ENDED WETLAND
- WATERCOURSE
- UPLAND DATA POINT
- WETLAND DATA POINT

0 125 250 500 750 1,000 Feet

ENBRIDGE

FIGURE 2
PLAN VIEW

AECOM

CONEMAUGH RIVER CROSSING PROJECT

40° 27' 21.15" N AND 79° 17' 57.81" W
BLACKLICK TOWNSHIP, INDIANA COUNTY
AND DERRY TOWNSHIP, WESTMORELAND COUNTY, PA

Prepared by: JAS	CHECKED BY: MLN	DATE: 5/5/2020	PAGE 1 OF 1

APPENDIX A – FIELD DATA FORMS

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **W-BJM-011 PEM**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range: S** **T** Derry **R**

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.454165 **Long.:** -79.30405 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 3 to 8 percent slopes (MoB) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
The PEM portion of the PEM/PSS wetland complex identified within the existing pipeline right-of-way that continues outside of the survey area to the north and south. The boundary of the PEM portion of the wetland complex was identified by the dominance of Scirpus cyperinus, Juncus effusus, Typha angustifolia, and a Panicum species located within a slightly depressed area. Based on site conditions and review of previous aerial imagery, it appears the wetland complex drains from the north to the southern tree line. Within the tree line, non-continuous rivets were observed that drained hydrology to the west and could have a potential connection to S-WRA-001.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☑ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches): 2	
Water Table Present?	Yes ◉ No ○	Depth (inches): 0	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches): 0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
NA

Remarks:
Hydrology of this system may have been significantly altered due to the active construction practices within the existing pipeline right-of-way that caused the compaction of soils. ***Frogs and eggs were identified within the surface water of the PEM portion of the wetland located within existing pipeline right-of-way.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-BJM-011 PEM

Tree Stratum (Plot size: None)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		

Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5' radius)				
1. *Juncus effusus*	30	☑	31.6%	FACW
2. *Scirpus cyperinus*	25	☑	26.3%	FACW
3. *Typha angustifolia*	20	☑	21.1%	OBL
4. *Andropogon virginicus*	10	☐	10.5%	FACU
5. *Juncus tenuis*	10	☐	10.5%	FAC
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	95	= Total Cover		

Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	20	x 1 =	20	
FACW species	55	x 2 =	110	
FAC species	10	x 3 =	30	
FACU species	10	x 4 =	40	
UPL species	0	x 5 =	0	
Column Totals:	95	(A)	200	(B)

Prevalence Index = B/A = 2.105

Hydrophytic Vegetation Indicators:

- ☑ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

*Vegetation was naturally problematic and significantly disturbed due to winter conditions and pipeline construction, respectively. Approximately 5 percent of the total cover was open water/soil. Outside of the existing right-of-way, the PEM wetland complex was mostly dominated by Dichanthelium clandestinum, Scirpus cyperinus, Panicum species, Onoclea sensibilis, and Microstegium vimineum.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-BJM-011 PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-8	10YR	5/2	95	10YR	5/6	5	C	M	Silty Loam	
8-16	10YR	5/6	60	10YR	5/2	20	D	M	Silty Clay Loam	
				10YR	5/4	10	C	M		
				10YR	2/2	5	C	M		
				10YR	6/1	5	D	M		

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

The soil profile was identified as being disturbed by previous construction practicies for pipeline installation.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **W-BJM-011 PSS**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range:** **S** **T** Derry **R**

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.453972 **Long.:** -79.303652 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 3 to 8 percent slopes (MoB) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
The PSS portion of the PEM/PSS wetland complex was identified in a wet meadow located south of an existing pipeline right-of-way. The boundary of the PSS portion of the wetland complex was identified by the dominance within the tree/sapling layer of Platanus occidentalis, Cornus alba, and Rubus occidentalis with herbaceous layer dominated by Scirpus cyperinus and a Dichanthelium clandestinum. The PSS wetland complex continues to the edge of an existing mowed lane located outside of the survey area to the south and continues along the grass mowed lane as a PEM habitat into the tree line.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches): 1	
Water Table Present?	Yes ◉ No ○	Depth (inches): 0	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches): 0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
NA

Remarks:
The source of hydrology was identified as precipitation and runoff from the existing right-of-way.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-BJM-011 PSS

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. *Platanus occidentalis*	15	☑	100.0%	FACW
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	15	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: 15' radius)				
1. *Cornus racemosa*	15	☑	60.0%	FAC
2. *Platanus occidentalis*	10	☑	40.0%	FACW
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	25	= Total Cover		

Shrub Stratum (Plot size: 15' radius)				
1. *Rubus occidentalis*	15	☑	60.0%	UPL
2. *Rosa multiflora*	10	☑	40.0%	FACU
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	25	= Total Cover		

Herb Stratum (Plot size: 5' radius)				
1. *Scirpus cyperinus*	30	☑	31.6%	FACW
2. *Dichanthelium clandestinum*	25	☑	26.3%	FAC
3. *Panicum virgatum*	15	☐	15.8%	FAC
4. *Solidago rugosa*	15	☐	15.8%	FAC
5. *Juncus effusus*	10	☐	10.5%	FACW
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	95	= Total Cover		

Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 71.4% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	65	x 2 =	130
FAC species	70	x 3 =	210
FACU species	10	x 4 =	40
UPL species	15	x 5 =	75
Column Totals:	160 (A)		455 (B)

Prevalence Index = B/A = 2.844

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

*Vegetation was naturally problematic due to winter conditions.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-BJM-011 PSS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Type [1]	Loc[2]	Texture	Remarks
0-8	2.5YR	4/1	90	7.5YR	5/4	10	C	M	Silty Loam	
8-16	10YR	5/6	100						Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **W-BJM-010 PEM**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range: S** ___ **T** Derry **R** ___

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.454622 **Long.:** -79.302811 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 3 to 8 percent slopes (MoB) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☑ **, or Hydrology** ☑ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
The PEM portion of the PEM/PSS/PFO wetland complex identified within the existing pipeline right-of-way and west of a gravel meter site. The boundary of the wetland complex was identified by the presence of surface water with the dominance of hydrophytic vegetation including Juncus effuses, Scirupus cyperinus, and Tyhpa angustifolia. The boundary of the wetland complex is also located within a slightly concave area that has been previously disturbed by various construction activities. The PEM boundary was extended across a dirt road due to the presence of surface water and similar vegetation being present on both sides. The boundary of the PSS portion of the wetland is open-ended to the north.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☑ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches):	5
Water Table Present?	Yes ◉ No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
NA

Remarks:
Hydrology of this system may have been significantly altered due to the active construction practices within the existing pipeline right-of-way that caused the compaction of soils. ***Frogs and eggs were identified within the surface water of the wetland.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-BJM-010 PEM

Tree Stratum (Plot size: None)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		
Sapling-Sapling/Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		
Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Herb Stratum (Plot size: 5' radius)				
1. *Juncus effusus*	45	☑	52.9%	FACW
2. *Cyperus esculentus*	25	☑	29.4%	FACW
3. *Typha angustifolia*	15	☐	17.6%	OBL
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	85	= Total Cover		
Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15	
FACW species	70	x 2 =	140	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column Totals:	85	(A)	155	(B)

Prevalence Index = B/A = 1.824

Hydrophytic Vegetation Indicators:

- ☑ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

*Vegetation was naturally problematic due to winter conditions. Approximately 15 percent of the total cover was open water/soil.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-BJM-010 PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-10	10YR	4/1	90	7.5YR	4/6	10	C	M	Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

The soil profile was identified as being disturbed by previous construction practicies and shovel refusal was at 10" due to the presence of rock and/or a compacted clay layer.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **W-BJM-010 PSS**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range:** **S** **T** Derry **R**

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.454618 **Long.:** -79.303314 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 3 to 8 percent slopes (MoB) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
The PSS portion of the PEM/PSS/PFO wetland complex identified north of the existing pipeline right-of-way that continues to the north and outside of the survey area. The boundary of the PSS portion of the wetland complex was identified by the dominance of Dichanthelium clandestinum with Acer rubrum and Fraxinus pennsylvanica within the shrub/tree layers.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	0
Water Table Present?	Yes ◉ No ○	Depth (inches):	6
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
NA

Remarks:
The source of hydrology was identified as precipitation and runoff from the existing right-of-way.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-BJM-010 PSS

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. *Fraxinus pennsylvanica*	5	☑	100.0%	FACW
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	5	= Total Cover		
Sapling-Sapling/Shrub Stratum (Plot size: 15' radius)				
1. *Fraxinus pennsylvanica*	15	☑	60.0%	FACW
2. *Acer rubrum*	10	☑	40.0%	FAC
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	25	= Total Cover		
Shrub Stratum (Plot size: 15' radius)				
1. *Rosa multiflora*	15	☑	100.0%	FACU
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	15	= Total Cover		
Herb Stratum (Plot size: 5' radius)				
1. *Dichanthelium clandestinum*	55	☑	55.0%	FAC
2. *Solidago rugosa*	20	☑	20.0%	FAC
3. *Agrimonia parviflora*	15	☐	15.0%	FACW
4. *Microstegium vimineum*	10	☐	10.0%	FAC
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	100	= Total Cover		
Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	5	(A)
Total Number of Dominant Species Across All Strata:	6	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	83.3%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	35	x 2 =	70	
FAC species	95	x 3 =	285	
FACU species	15	x 4 =	60	
UPL species	0	x 5 =	0	
Column Totals:	145	(A)	415	(B)

Prevalence Index = B/A = 2.862

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

*Vegetation was naturally problematic due to winter conditions.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-BJM-010 PSS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-2	10YR	4/1	90	7.5YR	4/6	10	C	PL	Silty Loam	
2-10	10YR	4/2	100						Silty Clay	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **W-BJM-010 PFO**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range: S** **T** Derry **R**

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.454845 **Long.:** -79.302833 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 3 to 8 percent slopes (MoB) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☑ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
The PFO portion of the PEM/PSS/PFO wetland complex identified along the north of the existing pipeline right-of-way within a slightly concave area along the edge of a mixed deciduous forest. The boundary of the PFO portion of the wetland complex was identified by the presence of water stained leaves, surface water, and concave depressional area.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches):	2
Water Table Present?	Yes ◉ No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
NA

Remarks:
Hydrology of this system may have been significantly altered due to the active construction practices within the existing pipeline right-of-way that caused the compaction of soils. The construction activity within the ROW could attributed to the inundation of the wetland area within and immediately adjacent to the existing ROW.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-BJM-010 PFO

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. *Acer rubrum*	35	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	35	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: 15' radius)				
1. *Frangula alnus*	10	☑	66.7%	FAC
2. *Ulmus americana*	5	☑	33.3%	FACW
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	15	= Total Cover		

Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5' radius)				
1. *Microstegium vimineum*	15	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	15	= Total Cover		

Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	65 (A)		190 (B)

Prevalence Index = B/A = 2.923

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

*Vegetation was naturally problematic due to winter conditions. Approximately 85 percent of the absolute cover within the PFO wetland habitat was exposed soil/ground.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-BJM-010 PFO

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-8	10YR	4/2	100						Silty Loam	
8-18	10YR	5/2	95	10YR	5/6	5	C	M	Silty Clay	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **W-BJM-010/011 UPL**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range: S** **T** Derry **R**

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.45429 **Long.:** -79.303149 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 3 to 8 percent slopes (MoB) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:
Upland reference to W-BJM-010 and W-BJM-011 located within an existing pipeline right-of-way between and situated between both wetland complexes.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
NA

Remarks:
No sources of hydrology were observed.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-BJM-010/011 UPL

Tree Stratum (Plot size: None)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		

Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5' radius)				
1. *Trifolium repens*	35	☑	35.0%	FACU
2. *Trifolium pratense*	25	☑	25.0%	FACU
3. *Plantago lanceolata*	15	☐	15.0%	UPL
4. *Phleum pratense*	15	☐	15.0%	FACU
5. *Dactylis glomerata*	10	☐	10.0%	FACU
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	100	= Total Cover		

Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	85	x 4 =	340
UPL species	15	x 5 =	75
Column Totals:	100 (A)		415 (B)

Prevalence Index = B/A = 4.150

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

*Vegetation was naturally problematic and significantly disturbed due to winter conditions and pipeline construction activities, respectively.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-BJM-010/011 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type [1]	Loc[2]	Texture	Remarks
0-14	10YR 4/3	100					Silty Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

The soil profile was identified as being disturbed by previous pipeline instllation and shovel refusal at 14" was due to compact soils/rock layer.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 24-Jun-16

Applicant/Owner: Spectra Energy **State:** PA **Sampling Point:** **W-CMS-016 PEM**

Investigator(s): CMS, CMG **Section, Township, Range: S** **T** Derry **R**

Landform (hillslope, terrace, etc.): Toeslope/Floodplain **Local relief (concave, convex, none):** none **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.455857 **Long.:** -79.299096 **Datum:** NAD83

Soil Map Unit Name: MoB - Monongahela silt loam, 3 to 8 percent slopes **NWI classification:** L2USAh

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
PEM wetland located at the toe-of-slope and within the floodplain of the Conemaugh River. Feature is depicted as an NWI and extends south and north outside of the study area and to the River. Boundary follows vegetative community dominated by Fallopia japonica and Chamaedaphne calyculata, drainage patterns, and low chroma, mottled soils. Vegetation is disturbed by pipeline construction and mowing. Portions of the system are planted with Secale cereale and also contain Elymus repens.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Primary source of hydrology: surface water runoff collection and flood flow from Conemaugh River

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-CMS-016 PEM

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		
Sapling-Sapling/Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		
Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Herb Stratum (Plot size: 5 ft. Radius)				
1. *Fallopia japonica*	30	☑	44.8%	FACU
2. *Chamaedaphne calyculata*	20	☑	29.9%	OBL
3. *Pilea pumila*	5	☐	7.5%	FACW
4. *Phleum pratense*	3	☐	4.5%	FACU
5. *Carex vulpinoidea*	3	☐	4.5%	OBL
6. *Brassica nigra*	3	☐	4.5%	UPL
7. *Solidago canadensis*	3	☐	4.5%	FACU
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	67	= Total Cover		
Woody Vine Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	23	x 1 =	23	
FACW species	5	x 2 =	10	
FAC species	0	x 3 =	0	
FACU species	36	x 4 =	144	
UPL species	3	x 5 =	15	
Column Totals:	67	(A)	192	(B)

Prevalence Index = B/A = 2.866

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Vegetation disturbed by mowing and pipeline construction. Portions of system planted with rye (Secale cereale) and also contain quackgrass (Elymus repens).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-CMS-016 PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-4	10YR	4/2	90	10YR	5/8	10	C	M	Clay Loam	
4-18	10YR	5/2	80	10YR	5/6	20	C	M	Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Westmoreland **Sampling Date:** 24-Jun-16

Applicant/Owner: Spectra Energy **State:** PA **Sampling Point:** **W-CMS-016 UPL**

Investigator(s): CMS, CMG **Section, Township, Range: S** **T** Derry **R**

Landform (hillslope, terrace, etc.): Hillslope **Local relief (concave, convex, none):** none **Slope:** 5.0% / 2.9 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.455322 **Long.:** -79.300344 **Datum:** NAD83

Soil Map Unit Name: MoC - Monongahela silt loam, 8 to 15 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	
Hydric Soil Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:
Upland area located on a hillslope east of a compressor station. Vegetation disturbed by mowing and pipeline construction.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-CMS-016 UPL

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		

Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5 ft. Radius)				
1. *Solidago nemoralis*	35	☑	36.5%	UPL
2. *Apocynum cannabinum*	15	☑	15.6%	FACU
3. *Solidago canadensis*	10	☐	10.4%	FACU
4. *Toxicodendron radicans*	7	☐	7.3%	FAC
5. *Oxalis stricta*	7	☐	7.3%	FACU
6. *Rumex crispus*	5	☐	5.2%	FAC
7. *Chamaedaphne calyculata*	5	☐	5.2%	OBL
8. *Juncus tenuis*	3	☐	3.1%	FAC
9. *Rubus allegheniensis*	3	☐	3.1%	FACU
10. *Taraxacum officinale*	3	☐	3.1%	FACU
11. *Fallopia japonica*	3	☐	3.1%	FACU
12.	0	☐	0.0%	
	96	= Total Cover		

Woody Vine Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	5	x 1 =	5	
FACW species	0	x 2 =	0	
FAC species	15	x 3 =	45	
FACU species	41	x 4 =	164	
UPL species	35	x 5 =	175	
Column Totals:	96	(A)	389	(B)

Prevalence Index = B/A = 4.052

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

Vegetation disturbed by mowing and pipeline construction.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-CMS-016 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type [1]	Loc[2]	Texture	Remarks
0-8	10YR 4/3	100					Clay Loam	
8-16	10YR 5/6	70	10YR 4/3	30	D	M	Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Gravel refusal at 16"

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Indiana **Sampling Date:** 23-Jun-16

Applicant/Owner: Spectra Energy **State:** PA **Sampling Point:** **W-CMS-007-PEM**

Investigator(s): CMG, CMS **Section, Township, Range: S** **T** Blacklick **R**

Landform (hillslope, terrace, etc.): Hillslope **Local relief (concave, convex, none):** none **Slope:** 2.5% / 1.4 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.456716 **Long.:** -79.296892 **Datum:** NAD83

Soil Map Unit Name: MoB - Monongahela silt loam, 2 to 6 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:
Hillslope PEM wetland that originates from a groundwater seep. Boundary follows drainage patterns, low chroma mottled soils, and a vegetative community dominated by Fallopia japonica, Juncus tenuis, and Carex crinita. Surrounding hillside also exhibited a Fallopia japonica community, but lacked prevalence of other hydrophytic species, indicators of hydrology, and gley soils.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches): 0.25	
Water Table Present?	Yes ◉ No ○	Depth (inches): 8	**Wetland Hydrology Present?** Yes ◉ No ○
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches): 0	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Primary source of hydrology: Groundwater seep and surface water runoff collection

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-CMS-007-PEM

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		
Sapling-Sapling/Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		
Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Herb Stratum (Plot size: 5 ft. Radius)				
1. *Fallopia japonica*	40	☑	24.7%	FACU
2. *Juncus tenuis*	25	☑	15.4%	FAC
3. *Carex crinita*	25	☑	15.4%	OBL
4. *Juncus effusus*	20	☐	12.3%	FACW
5. *Phalaris arundinacea*	15	☐	9.3%	FACW
6. *Impatiens capensis*	10	☐	6.2%	FACW
7. *Solidago latissimifolia*	10	☐	6.2%	OBL
8. *Mentha arvensis*	5	☐	3.1%	FACW
9. *Toxicodendron radicans*	5	☐	3.1%	FAC
10. *Eupatorium perfoliatum*	5	☐	3.1%	FACW
11. *Persicaria hydropiper*	2	☐	1.2%	OBL
12.	0	☐	0.0%	
	162	= Total Cover		
Woody Vine Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	66.7%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	37	x 1 =	37	
FACW species	55	x 2 =	110	
FAC species	30	x 3 =	90	
FACU species	40	x 4 =	160	
UPL species	0	x 5 =	0	
Column Totals:	162	(A)	397	(B)

Prevalence Index = B/A = 2.451

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-CMS-007-PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Type [1]	Loc[2]	Texture	Remarks
0-14	5GY	4/1	75	10YR	5/8	25	C	M	Loamy Clay	Gley 1

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☑ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Highly saturated. Shovel refusal at 14" due to gravel.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Indiana **Sampling Date:** 23-Jun-16

Applicant/Owner: Spectra Energy **State:** PA **Sampling Point:** **W-CMS-007-UPL**

Investigator(s): CMG, CMS **Section, Township, Range: S** **T** Blacklick **R**

Landform (hillslope, terrace, etc.): Hillslope **Local relief (concave, convex, none):** none **Slope:** 2.5% / 1.4 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.456789 **Long.:** -79.296876 **Datum:** NAD83

Soil Map Unit Name: MoB - Monongahela silt loam, 2 to 6 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☑ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:
Upland data point located on a hillslope dominated by Fallopia japonica. Hydric soils are present; area appears to have been disturbed by construction in the recent past.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: W-CMS-007-UPL

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		

Shrub Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5 ft. Radius)				
1. *Fallopia japonica*	60	☑	48.0%	FACU
2. *Poa annua*	25	☑	20.0%	FACU
3. *Solidago nemoralis*	15	☐	12.0%	UPL
4. *Rosa multiflora*	15	☐	12.0%	FACU
5. *Acorus calamus*	5	☐	4.0%	OBL
6. *Fallopia convolvulus*	5	☐	4.0%	FACU
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	125	= Total Cover		

Woody Vine Stratum (Plot size: _____)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	5	x 1 =	5	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	105	x 4 =	420	
UPL species	15	x 5 =	75	
Column Totals:	125	(A)	500	(B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: W-CMS-007-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-2	10YR	4/3	100						Clay Loam	
2-6	10YR	4/2	98	10YR	5/6	2	C	M	Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Shovel refusal at 6" due to gravel

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Indiana **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **UPL-BJM-001**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range:** **S** **T** Blacklick **R**

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.457595 **Long.:** -79.295877 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 0 to 3 percent slopes (MoA) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉		
Hydric Soil Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks:
The sample point was collected within a depression area surrounded by mixed hardwood forest strip that adjoins monocultural corn fields. The depression area collects surface water from the adjacent farm fields that drains into a concave swale that discharges into this depression area that had the presence of surface water. Due to the lack of dominant hydrophytic vegetation, it was determined that the depression area within the survey boundary was associated with an upland community and the presence of hydrology was likely attributed to recent rainfall.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☑ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches):	4
Water Table Present?	Yes ◉ No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

According the AGCIS Wet Climatic Data (Bush Valley 0.5 SE,PA), over the past seven days the weather station recorded an accumulation of precipitation of approximately 0.56 inches. As a result and in-combination of lack of hydrophytic vegetation, the presence of surface water is likely attributed to recent rainfall events.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: UPL-BJM-001

Tree Stratum (Plot size: None)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		
Sapling-Sapling/Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		
Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Herb Stratum (Plot size: 5' radius)				
1. *Stellaria media*	45	☑	75.0%	UPL
2. *Alliaria petiolata*	10	☐	16.7%	FACU
3. *Barbarea vulgaris*	5	☐	8.3%	FACU
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	60	= Total Cover		
Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	15	x 4 =	60	
UPL species	45	x 5 =	225	
Column Totals:	60	(A)	285	(B)

Prevalence Index = B/A = 4.750

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

*Over 40 percent of sample area was bare/open ground. Vegetation was identified as naturally problematic due to winter conditions; however, the species within the sample area could be identified based on the visible characteristics.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: UPL-BJM-001

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type [1]	Loc[2]	Texture	Remarks
0-4	10YR 4/1	85	10YR 4/4	15	C	M	Silty Loam	
4-8	10YR 4/2	90	7.5YR 4/4	10	C	M	Silty Loam	
8-18	10YR 5/3	80	10YR 4/1	20	D	M	Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: Conemaugh River Crossing Project **City/County:** Indiana **Sampling Date:** 05-Mar-20

Applicant/Owner: Enbridge **State:** PA **Sampling Point:** **UPL-BJM-002**

Investigator(s): Brian Miller & Jessica Gumbert **Section, Township, Range: S** **T** Blacklick **R**

Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** concave **Slope:** 2.0% / 1.1 °

Subregion (LRR or MLRA): LRR N **Lat.:** 40.458291 **Long.:** -79.29471 **Datum:** NAD83

Soil Map Unit Name: Monongahela silt loam, 0 to 8 percent slopes (MoB) **NWI classification:** NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☑ **, Soil** ☑ **, or Hydrology** ☑ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☑ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉		
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks:
The sample point was collected within a slightly concave area of an monocultural corn field that displayed the presence of surface water during the site investigation. The density of the remaining corn stalks appeared to be less abundant than the areas that lacked the presence of surface water. Therefore, this sample point reflects the upland conditions due to the lack of hydrophytic vegetation and hydric soils.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches):	5
Water Table Present?	Yes ◉ No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
NA

Remarks:
According the AGCIS Wet Climatic Data, over the past seven days there has been an accumulation of 0.56 inches of precipitation. As a result, the presence of surface water is likely attributed to recent rainfall events.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: UPL-BJM-002

Tree Stratum (Plot size: None)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	0	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
	0	= Total Cover		

Shrub Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5' radius)				
1. *Setaria faberi*	25	☑	45.5%	UPL
2. *Aster sp.*	5	☐	9.1%	
3. *Panicum virgatum*	25	☑	45.5%	FAC
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	55	= Total Cover		

Woody Vine Stratum (Plot size: None)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	25	x 3 =	75	
FACU species	0	x 4 =	0	
UPL species	25	x 5 =	125	
Column Totals:	50	(A)	200	(B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

*Vegetation was significantly disturbed by agricultural practices and winter conditions. Therefore, identification of Aster sp was not possible. The remaining 45 total cover of the sample plot was bare soil and/or corn.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: UPL-BJM-002

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type [1]	Loc[2]	Texture	Remarks
0-8	2.5YR 4/2	100					Silty Loam	
8-18	2.5YR 5/6	100					Silty Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)
- ☐ Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

The soil profile was identified as being disturbed by agricultural practices.

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

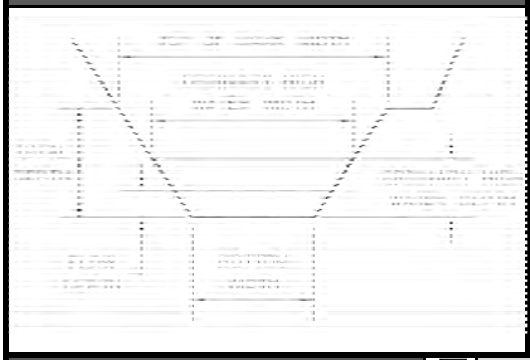
Project/Site:	**Conemaugh River Crossing**	**Stream ID:**	**S-JLK-037 PER**
Applicant/Owner:	Enbridge	State:	Pennsylvania
Investigator(s):	JLK, EMD	City/County:	Indiana, Westmoreland
Sampling Date:	8/19/2016	Township:	Blacklick, Derry
Stream Name:	Conemaugh River	Latitude:	40.456604
Drainage Area (mi^2):	>100	Longitude:	-79.297884
Slope Category:	(1) Low Gradient	Open-Ended?	☑ Upstream ☑ Downstream
FERC Designation:	N/A	Delineation Type:	☐ Centerline ☑ R/L Banks

Stream Description:

Conemaugh River.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
☑	Perennial	☐	Culvert Discharge	☑	Forest	☐	Commercial
☐	Ephemeral	☐	Pond Discharge	☐	Field/Pasture	☐	Industrial
☐	Intermittent	☐	Swamp, Bog or Wetland	☑	Agricultural	☐	Residential
☐	Tidal	☐	Spring Fed	☑	Other	Pipeline ROW	
☐		☑	Mixture of Origins	**Heavy rain in the last 7 days?**	☑ Yes	☐ No	
Other:		☐	Surface Water Runoff	**Turbidity?**	☑ Clear	Other:	
Flow Present?	☑ Yes	☐ No		**Flow Direction:**	North		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream			
Right Bank (Do not include flow depth)	Horiz.	20.00	Ft.
	Vert.	10.00	Ft.
Left Bank (Do not include flow depth)	Horiz.	25.00	Ft.
	Vert.	5.00	Ft.
Water/Flow Depth		5.00	Ft.
Bottom of Channel Width		150.00	Ft.
Ordinary High Water Depth		5.00	Ft.
Top of Bank Width		185.00	Ft.
Ordinary High Water Width		185.00	Ft.
Total Depth		10.00	Ft.

Stream Morphology		
☐	Riffle %	
☑	Pool %	100
☐	Run %	

Canopy Cover	
☑	Open
☐	Partly Open
☐	Shaded

Is Channel Naturalized?			
☑	Yes	☐	No

Fin Fish Present?			
☑	Yes	☐	No

Macroinvertebrates Present? ☑ Yes ☐ No

☑	Ephemeroptera	☑	Plecoptera	☑	Trichpotera	☐	Other:

Aquatic Vegetation - Indicate Dominant Cover Type

☑	N/A	☐	Rooted Emergent	☐	Rooted Floating	☐	Attached Algae
		☐	Rooted Submergent	☐	Floating Algae	☐	Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

☑	Trees:	*Platanus occidentalis*	☐	Grasses:	
☐	Shrubs:		☑	Herbaceous:	*Fallopia japonica*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	20
Cobble	2.5" - 10"	10
Gravel	0.1" - 2.5"	45
Sand	0.06-2 mm	15
Silt	0.004-0.06 mm	10
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	5
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

AECOM

APPENDIX B – PHOTOGRAPHS

Photograph:	Date:
1	03/05/2020
Feature ID: W-BJM-011	
Direction: East	
Description: Wetland W-BJM-011 PEM	

Photograph:	Date:
2	03/05/2020
Feature ID: W-BJM-011	
Direction: South	
Description: Wetland W-BJM-011 PSS	

Photograph:	Date:
3	03/05/2020
Feature ID: W-BJM-010	
Direction: West	
Description: Wetland W-BJM-010 PEM	

Photograph:	Date:
4	03/05/2020
Feature ID: W-BJM-010	
Direction: South	
Description: Wetland W-BJM-010 PSS	

Photograph:	Date:
5	03/05/2020
Feature ID: W-BJM-010	
Direction: East	
Description: Wetland W-BJM-010 PFO	

Photograph:	Date:
6	06/24/2016
Feature ID: W-CMS-016	
Direction: West	
Description: Wetland W-CMS-016 PEM	

Photograph:	Date:
7	06/23/2016
Feature ID: W-CMS-007	
Direction: West	
Description: Wetland W-CMS-007 PEM	

Photograph:	Date:
8	03/05/2020
Feature ID: UPL-BJM-001	
Direction: Southeast	
Description: Upland UPL-BJM-001 UPL	

Photograph:	Date:
9	03/05/2020
Feature ID: UPL-BJM-002	
Direction: South	
Description: Upland UPL-BJM-002 UPL	

Photograph:	Date:
10	03/05/2020
Feature ID: S-JLK-037	
Direction: Downstream	
Description: Watercourse S-JLK-037 PER	

Attachment S-2

Scientist Resumes

AECOM

Mark Benfer
Environmental Scientist

Education
BS/Environmental Resource Management/2008/ Penn State University

Years of Experience
11

Training
38 hour USACE Wetland Delineation Training Program
Hydric Soil Indicators-Field Seminar

Summary
Mr. Benfer's experience includes environmental conservation and wetlands consulting. His expertise in the Marcellus Shale develop includes natural resources and industry compliance. He has managed a field crew to successfully complete conservation projects. More recently, Mr. Benfer has worked in the environmental consulting field, leading watercourse and wetland delineations of resources located on proposed pipeline, well pads, and similar oil and gas improvement projects. His areas of expertise also includes stream and wetland delineation, infiltration testing, erosion and sedimentation inspection, prairie restoration, timber stand improvement, invasive species removal, and portage construction.

Project Experience

Field Lead- Natural Gas Well Pads, Shell Appalachia, Multiple Counties, PA
Conducted wetland and watercourse delineations of proposed well sites to determine the best location for the well pad. Other responsibilities included evaluating the site for constructability, well pad staking, and preparing the wetland report for the ESCGP2 permit application.

Field Lead- Natural Gas Pipeline Wetland and Watercourse Investigation, Howard Energy Partners
Conducted a wetland and watercourse delineations for approximately 20 miles of proposed natural gas pipeline right-of-ways in Bradford and Tioga Counties, PA

Field Lead- Infiltration Testing, Multiple Counties, PA, Shell Appalachia:
Evaluated the rate of infiltration by conducting Falling Head infiltration tests located throughout the proposed natural gas well pad sites and other similar natural gas project sites. Duties also included completing a soil description and submitting an infiltration report in accordance with DEP regulations.

Field Lead I-80 Culvert Replacement Project Drums, PA, PennDot
Assessed approximately 12 miles of I-80 for wetlands and watercourses located within the project area.

Field Lead- I-84 Bridge Replacement Project, Scranton, PA, PennDot
Conducted a wetland and watercourse delineation for approximately 100 acres of proposed project area. Prepared wetland and watercourse data forms as well as Function and Values form for each wetland that was delineated.

Field Lead-Wetland Mitigation Bank Project, Wayne County, PA, RES
Conducted a wetland delineation and watercourse assessment of approximately 31 acres of a conservation easement to be used as a wetland mitigation site.

Field Lead- Natural Gas Pipeline, Multiple Counties, PA, UGI Energy, LLC. Pennsylvania
Conducted a wetland and watercourse delineation for approximately 40 miles of proposed natural gas pipeline right-of-ways.

Field Lead- Project Confidential, Multiple Counties, PA
Ongoing post construction investigation of wetlands and watercourses for post construction impact assessments.

Field Lead- Natural Gas Well Pads, Cabot Oil and Gas, Susquehanna County, PA
Staked out the well pad locations by evaluating the proposed well site for constructability and conducted a wetland and watercourse delineation of the site.

Field Lead- Natural Gas Pipeline: Post-Construction Resource Monitoring, Susquehanna County, PA, Williams Midstream Services, LLC.
Performed post-construction monitoring for wetlands and streams along Williams pipeline projects to determine if pre-construction conditions were restored. Monitoring was conducted at 30 days and one year after the pipeline construction was completed. Completed wetland and stream data forms for each resource within the right of way. Made suggestions for the restoration of resources not meeting pre-construction conditions

T&E Species- Northern Harrier Survey, Tioga Discharge CPF#2, Tioga County, PA, Howard Energy Partners
Assisted in completing a Presence/Absence survey to determine if there are Northern Harriers nesting near the proposed pipeline route. The project included surveying for the harriers twice a day for eight weeks.

Field Lead- Natural Gas Pipeline Wetland and

Watercourse Investigation, Angelina Gathering Company
Conducted a wetland and watercourse delineations for approximately 35 miles of proposed natural gas pipeline right-of-ways in Bradford and Susquehanna Counties, PA and Marshall County, WV.

Erosion and Sedimentation Inspections, Susquehanna County, PA, Cabot Oil and Gas: Conducted evaluations of reclaimed natural gas pipeline areas. Developed and implemented solutions to erosion problems that were detected. Inspection duties included walking each right-of-way and ensuring all the best management practices are in place and completed inspection reports in accordance with DEP regulations.

Experience with a previous employer

Field Lead- National Parks, IA, MN, NE: Projects involved removing invasive plant species from the parks by either treating with chemicals or physically removing the invasive to encourage native vegetation to grow. Over 100 acres of invasive plants were removed. Invasive species removal projects lead to an increase in native vegetation.

Field Lead- Iowa DNR, Multiple Counties, IA: Installed signage along Iowa's major dams warning paddlers of the danger ahead. Constructed take-outs and portages to allow paddlers an easy route around the dam. Managed a crew in the design and development of a campground for paddlers at Lake Red Rock. The campground has provided recreational opportunities for paddlers visiting the area. Created over 5 miles of new hand-carved trails within the state park system.

Field Lead- County Conservation Boards, Multiple Counties, IA: Restored over 200 acres of prairie and oak savanna land through the removal of invasive plant species and prescribed burns. These methods encouraged native plant species to recolonize the area. Used selective cutting methods to improve timber stands. The result of this project was improved habitat for wildlife and healthier trees.

Field Lead- USFWS, Savanna, IL: Protected a population of approximately 30 ornate box turtles by constructing a one square mile enclosure on a wildlife refuge. Removed invasive tree species to encourage the growth of native plant species on sand prairies. Painted and assembled deer blinds for handicapped youth hunt to control the deer population within the wildlife refuge.

Chronology

07/2011 to Present: AECOM, Williamsport, PA
02/2009 to 12/2010: Conservation Corp Iowa, Ames, IA
09/2007 to 05/2008: Weed Ecology Lab, University Park, PA
09/2005 to 05/2007: Dr. Robert Shannon, University Park, PA

Angela J. Chmiel
Environmental Scientist

Education

BS, Environmental Biology, Millersville University, 2005

Professional Affiliations

Society of Women Environmental Professionals
Society of Conservation Biology

Technical Specialties

Environmental Permitting
Wetland Delineations
Threatened and Endangered Species Surveys
Aquatic Macroinvertebrate Surveys

Ms. Chmiel is an environmental scientist with 13 years of experience working with AECOM in the environmental consulting field. She specializes in wetland delineations and permitting, rare, threatened, and endangered species surveys, and aquatic macroinvertebrate surveys. Ms. Chmiel has nationwide experience in wetland delineations and invasive species surveys. Her specific regulatory expertise includes biological assessments, consultations pursuant to Section 7 of the Endangered Species Act and is experienced in the preparation of a variety of environmental reports/applications including United States Army Corps (Clean Water Act Section 404), various state water quality certificates (Clean Water Act Section 401), and Federal Energy Regulatory Commission (FERC). She also has experience using and correcting global positioning system (GPS) for field and mapping purposes.

Experience

Tennessee Gas Pipeline Company, 300 Line Project, New Jersey and Pennsylvania. Wetland biologist and assistant biologist for field surveys of proposed centerline rights-of-way, temporary workspace, meter stations, and access road surveys to complete environmental permitting. Surveys included wetland delineations, water body assessments, T&E species, vernal pool identification and other species of concern habitat assessments, and significant land use types.

Tennessee Gas Pipeline Company, Northeast Upgrade Project, New Jersey and Pennsylvania. Wetland biologist and assistant biologist for field surveys of proposed centerline rights-of-way, temporary workspace, meter stations, and access road surveys to complete environmental permitting. Surveys included wetland delineations, water body assessments, T&E species, vernal pool identification and other species of concern habitat assessments, and significant land use types.

El Paso Gas Corporation, Northeast Expansion, Various Locations, Pennsylvania. Conducted wetland delineations and identified sensitive wildlife habitats in Adams, Berks, Franklin, Lancaster, Northhampton, and York Counties.

Norfolk Southern Railway, Wye Track Railroad, Jersey City, New Jersey. Assisted with field wetland delineations and wetland delineation report preparation. Used a Trimble GPS unit to survey wetland boundaries. Assisted with annual wetland mitigation monitoring.

Sealy (Formerly Stearns & Foster Bedding Co.), Oakeys Brook Mitigation Monitoring, Monmouth County, New Jersey. Conducted surveys to document restoration of wetland vegetation, hydrology, and hydric soils within Oakeys Brook restoration site after first through fourth growing season. Drafted mitigation monitoring reports for years 1 - 4 monitoring. Replanted trees and shrubs lost to deer browse.

Williams Companies, Bay Expansion, Downingtown, Pennsylvania. Authored Resource Report 11 for the Federal Energy Regulatory Commission submittal.

Dominion Resources Inc., Dominion Monroe to Cornwell, Various Locations, West Virginia. Assisted with field wetland delineations and writing the wetland delineation report. Utilized a Trimble GPS unit to survey wetland boundaries. Authored Resource Reports 2 and 3 for the Federal Energy Regulatory Commission submittal.

Liberty Utilities, 2014 Port Ambrose Deepwater Port License Application Support, Various Locations, New York. Team leader/wetland biologist for field surveys of proposed centerline rights of way, temporary workspace, meter stations, plant sites, plant laterals, pipe storage yard, and access road surveys through northeastern New Jersey to complete environmental permitting for the project. Surveys included wetland delineations, water body assessments, threatened and endangered species and other species of concern habitat assessments, and significant land use types. Also, acted as assistant project manager for the Federal Energy Regulatory Commission and US Coast Guard applications.

Williams Companies Inc., Sentinel Expansion, Pennsylvania. Conducted field surveys of proposed and existing linear pipelines throughout southeastern Pennsylvania and north-central New Jersey. Surveys included wetland delineations, waterbody assessments, threatened and endangered and other species of concern habitat assessments, significant land use observations, macroinvertebrate sampling, and invasive species surveys. Assisted with the permitting process.

Williams Companies Inc, Constitution Pipeline Environmental Support, Various Locations, Pennsylvania and New York. Team leader/wetland biologist for field surveys of proposed and existing linear pipelines through Pennsylvania and New York. Surveys included wetland delineations, water body assessments, threatened and endangered and other species of concern habitat assessments, and significant land use observations. Responsible for compiling Pennsylvania joint permit application.

Tennessee Gas Pipeline, Northeast Energy Direct Pipeline - Environmental Assessment and Permitting Servi, Chelmsford, New Hampshire; New York; Massachusetts; Pennsylvania; Connecticut. Assisted with field wetland delineations and writing the wetland delineation report. Utilized a Trimble GPS unit to survey wetland boundaries. Authored Resource Report 2 for the Federal Energy Regulatory Commission submittal. Acted as the liaison between AECOM's resource report writers and the engineers on the project.

Williams Companies, Garden State Expansion Project, Trenton, New Jersey. Assisted with field wetland delineations and writing the wetland delineation report. Utilized a Trimble GPS unit to survey wetland boundaries. Authored Resource Report 3 for the Federal Energy Regulatory Commission submittal.

AECOM

Brian Miller
Senior Ecologist

Education
BS / Environmental Studies / Washington & Jefferson College

Years of Experience
With AECOM / URS: 1 year and 11 months
With other firms: 8 years

Professional History
05/2010 - 05/2012, GAI Consultants, Inc. Lead Environmental Scientist

05/2012 - 05/2013, Rettew Associates, Inc. Environmental Scientist II

05/2013 - 05/2018, GAI Consultants, Inc. Project Environmental Specialist

05/2018 - Present, AECOM Senior Ecologist

Specialized Training
Wetland delineation certified

Safeland certified

Summary
Mr. Miller has almost 10 years of experience as an environmental scientists/consultant for energy related Projects including natural gas pipelines, electric overhead/underground lines, well pads, impoundments, wind farms, temporary above ground and permanent below ground waterlines located within the Northeast and Southeast Regions of the U.S.

During the past eight years, Mr. Miller has provided his assistance on several energy related projects involving environmental permitting (Section 401/404 Clean Water Act, Section 10 Rivers and Harbors Act) and rare species consultation with various agencies in Pennsylvania (PA), West Virginia (WV), Ohio (OH), and Maryland (MD). Additional regulatory assistance on related energy projects included Federal Energy Regulatory Commission (FERC) wetland monitoring and comprehensive environmental reviews.

Furthermore, Mr. Miller also is proficient in completing wetland delineations in accordance to the 1987 USACE Wetland Delineation Manual and Regional Supplements. Over the past several years, he has lead multiple field teams on small to large energy related Projects located in Pennsylvania, Ohio, Virginia, West Virginia, Maryland, and Texas. Additional field experience includes completion of various rapid assessment methodologies (PA Level 2 Rapid Assessments and OH-ORAMS, HEEI, and QHEI), problematic delineations for atypical situations (i.e. undocumented fills), monitoring projects (PASPG-5/USACE and FERC requirements), environmental routing, and habitat assessments / presence and absence surveys for rare plants and animals. A summary of work experiences and projects completed with current project work and experience with previous employers has been provided below.

Current Experience with AECOM
During the past several months with AECOM, Mr. Miller has provided his assistance on several Projects in Pennsylvania and West Virginia. A summary of these project have been provided below.

Lead Ecologist, Electric Utility Projects in Various Counties, OH. Task manager of all ecological activities including field delineation of wetland and stream assessments; Section 404 and Section 401 authorizations; Section 10 requests; as well as threatened and endangered species consultation.

Permitting Lead, Biologist, Permanent Water Intake in Brooke County, WV USACE Permitting assistance for Section 404 and Section 10 authorization; Rare species consultation with USFWS and WVDNR; and Office of Land and Stream (OLS) Application.

Wetland Delineation, Biologist, Delineation for Pipeline Insertion Project in Greene County, PA. Wetland delineation for replacement of existing pipeline and facilities via insertion. Mr.Miller was responsible for completing the wetland delineation report and mapping and coordination.

Permitting Lead, Biologist, for water lines, gas pipelines, and intake facilities in Tioga and Potter Counties, PA. Mr. Miller conducted wetland and stream investigations for a permanent waterline facility located within Tioga and Potter County. Upon completion, Mr. Miller was responsible for the completion of the section 401/404 report authorization under a Joint Permit Application and/or General Permit 5 and 8. Furthermore, Mr. Miller was responsible for managing and updating the project's Geographic Information System (GIS) data.

Wetland Delineation, Biologist, Delineation for Electrical Transmission Line in Portage County, OH. Mr. Miller conducted wetland and stream investigations for an electrical transmission line and substation in Portage County. Upon completion of the environmental survey, Mr. Miller completed a review of the wetland delineation report and findings.

Wetland Delineation, Biologist, Delineation for Electrical Transmission Line in Cambridge, OH. Mr. Miller conducted wetland and stream investigations for an electrical transmission line project in Portage County.

Wetland Delineation, Biologist, Delineation for Electrical Transmission Line in Carrollton, OH. Mr. Miller conducted wetland and stream investigations for an electrical transmission line project in Portage County.

Project Experience with Previous Employers

Mr. Miller has assisted as an environmental consultant for several natural gas pipeline projects located in various counties in PA, WV, OH, and MD. Task associated with these energy related projects include section 401/404 agency consultation and permitting, pipeline/utility line/electric transmission line routing with field and desktop analysis with identifying environmental and constructability constraints. Mr. Miller also coordinated and completed endangered species consultation, wetland delineation and stream identification, and site visits with regulatory agencies for jurisdictional determinations. A summary of previous projects have been provided below.

Pennsylvania

Greene and Washington Counties, PA – Natural Gas Pipeline Projects
Task/Permitting/Field Lead for General Permit Authorizations (GP-5, GP-8, and GP-11) for three individual natural gas pipelines projects submitted to Greene and Washington Counties Conservation Districts and USACE for consultation under Section 401/404 of the Clean Water Act. Additional consultation for rare, threaten, and endangered species was required with Pennsylvania Game Commission (PGC) and United States Fish and Wildlife Service (USFWS) for Indiana Bat and Northern Long Eared Bat. As per USACE conditions, additional monitoring and reporting services were provided for these projects as result of temporary impacts to wetlands.

Allegheny, Washington, Westmoreland, and Greene Counties, PA – Electrical Overhead Line
Permitting/Field Lead for General Permit Authorizations (GP-5 and GP-8) for multiple overhead electrical utility lines and temporary access road submitted to Allegheny County Conservation District with USACE approval for Section 404 as well as Section 10 authorizations. Additional consultation was required for PADEP as result of several projects requiring a Submerged Land Licenses Agreement (SLLA) and several agencies (PGC, USFWS, PA Fish and Boat [PFBC], and PA Department of Conservation and Natural Resources [PADCNR] regarding rare, threaten, and endangered species.

Various Counties, PA – Electrical Overhead Line

Routing/Field Lead associated with the preliminary development of an electrical overhead line as part of a large network to repair, rebuild, and enhance existing utilities lines located near Grove City, PA. Mr. Miller along with representatives from the electric company and construction provided in-field adjustments and suggestions to avoid environmental sensitive areas including wetlands, watercourses, and rare species.

Allegheny, Westmoreland, Greene, and Washington Counties, PA – Natural Gas Pipeline Project
Task/Field lead for Federal Energy Regulatory Commission (FERC) wetland monitoring and reporting for a 110-mile natural gas pipeline (extends into WV). Responsibilities included yearly monitoring and reporting to FERC with designing and managing re-seeding events for impacted wetlands; agency coordination; and invasive species presence/absence surveys.

Cambria County, PA – Natural Gas Pipeline Project
Task/Permitting/Field lead for a Joint Permit Authorization (JPA) of a natural gas pipeline located in Gallitzin State Forest in Cambria County, PA. The Project resulted in an incidental inadvertent return and required additional emergency permitting for an additional access road (GP-8) as well as mitigation for the wild trout stream under a General Permit 1 (GP-1; Fish Habitat Enhancement Structures). Additional services required consultation for State Forest Right of Entry Application resulting in additional environmental survey for invasive species and timber rattle snake habitats within Gallitzin State Forest.

Clarion County, PA – Natural Gas Pipeline and Well Pad Projects
Task/Permitting/Field Lead for General Permit (GP-5 and GP-8) authorization of a natural gas project composed of pipelines, well pads, temporary water lines and intakes, and well pads and impoundments in Clarion County, PA. Services included routing for environmental and constructability constraints with field and desktop reviews; agency coordination including site visits, phone calls, and pre-application meetings with the PaDEP and USACE; and agency consultation for rare, threaten, and endangered species.

Butler County, PA – Natural Gas Pipeline Project
Permitting/Field Lead for General Permit (GP-5 and GP-8) authorization of a natural gas project composed of pipelines and well pads. Environmental services included preparation of permit application, site visits for identification of Eastern Massasauga Rattlesnake habitat with PFBC representative, and field delineations for wetland and streams.

Butler County, PA – Natural Gas Pipeline Project
Public Utility Commission (PUC) / FERC filing Project required Section 401 individual authorization for impacts associated with wetland and streams. Environmental services for this project included wetland and stream delineations, PA level 2 rapid

assessments for riverine and wetland resources, development of environmental assessment report, and preparation of a JPA.

Centre County, PA – Natural Gas Pipeline Project
Task Manger for monitoring and design services for a created wetland that involved coordination and field visits with PA Department of Environmental Protection (PaDEP) and United States Army Core of Engineers (USACE). Project required yearly reporting of monitoring results of wetland creation and establishment of invasive species.

Various Counties, PA – Natural Gas Pipelines, Well Pads, Temporary Waterlines, and Impoundments
Field Lead for wetland and waterbodies delineations and environmental router for avoidance of environmental sensitive areas including wetlands, streams, and rare species habitats. Also provided construction environmental inspector support on multiple temporary waterlines.

Ohio and West Virginia

Marshall, Wetzel, and Kanawha Counties, WV – Natural Gas Pipeline Project
Task/Field lead for Federal Energy Regulatory Commission (FERC) wetland monitoring and reporting for a 110-mile natural gas pipeline (extends into PA). Responsibilities included yearly monitoring and reporting to FERC with designing and managing re-seeding events for impacted wetlands; agency coordination; and invasive species presence/absence surveys.

Marshall and Wetzel Counties, WV – Natural Gas Pipeline Project
Permit/Field lead for a 60-mile pipeline authorized under Pre-Construction Notification (PCN) Nationwide Permit Authorization (NWP) under NWP-12 (utility lines). Environmental services included desktop and field routing for environmental sensitive areas, rare species consultation, and environmental permitting.

Various Counties in Ohio – Natural Gas Pipeline Projects

Performed several wetland and stream investigations associated with natural gas network in various counties in Ohio. Additionally tasks included preparation of Section 404 and 401 authorizations, Section 10 approvals, and Endangered Species Consultation with the United States Fish and Wildlife Service (USFWS) and Ohio Division of Natural Resources (ODNR).

Various Counties in WV and OH – Temporary Water Line Projects associated with Gas Well Developments – Field/Routing Lead for temporary water lines permitted under the USACE Nationwide Permit Authorization Process in Ohio and West Virginia.

Various Counties in WV and OH – Electric Overhead Transmission Projects – Field/Routing Lead for preliminary site assessments and engineering designs of access road, staging areas, and towers locations associated with replacement of overhead electric lines. Additional task included consultation for Section 401 and 404 authorizations, desktop analysis, and rare species consultation.

Electrical Substation Projects in WV and OH – Performed as an environmental lead for wetland and stream investigations, section 401/404 authorizations, and rare species consultation for various counties in WV and Ohio.

Other States

Houston, Texas – Gas Impoundment Site – Field assistant for a wetland delineation and stream identification of a 40-acre gas development site located in the coastal plain area of Texas. Delineations methodology included mosaic classifications of wetland and upland communities

Fairfax, Virginia – Water Quality Assessments - Field technician for water quality sampling and reporting of discharges associated with a confidential coal ash impoundment and energy facility in Virginia.

Various Counties, Virginia – Electric Overhead Line – Field lead for wetland and waterbody delineations for a replacement of an electric transmission line and towers.

Various Counties, Virginia – Natural Gas Pipeline - Field lead f or wetland and waterbody delineations for a pipeline replacement project.

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Eileen Banach Piskura
Biologist

Professional History

Education

MS, Biology, Louisiana State University Shreveport
BS, Biology, Fordham University
Graduate Level coursework in Ecology and Natural History, Drexel University,

Years of Experience

With AECOM 13

Technical Specialties

Major Capital Projects Permitting
Wetland Permitting
Wetland Mitigation
Environmental Impact Assessment & Statements
Threatened & Endangered Species Consultation

Training

Hazardous Waste Operations and Emergency Response (HAZWOPER)

Ms. Piskura has 13 years of technical experience in the environmental consulting field with an emphasis on linear permitting, habitat assessment, threatened & endangered species consultation and erosion and sediment control plans. Ms. Piskura has experience in filings required for utility project permit applications in Massachusetts, Connecticut, Rhode Island, New York, and Pennsylvania. She has also conducted regulatory compliance activities, including environmental monitoring on numerous maintenance, improvement, and new installation projects for natural gas and electrical transmission lines.

Ms. Piskura has experience in the preparation of a variety of environmental permit applications and reports on a wide range of projects requiring an understanding of the environmental permitting process using federal, state, and local criteria. Ms. Piskura's work on utility projects includes preparation of applications for the Federal Energy Regulatory Commission, U.S. Army Corps of Engineers, Pennsylvania Department of Environmental Protection, Connecticut Siting Council, Connecticut Department of Energy and Environmental Protection, Rhode Island Energy Facilities Siting Board, Rhode Island Department of Environmental Management, Massachusetts Wetlands Protection Act, Storm Water Pollution Prevention Plans, and Rhode Island Pollution Discharge Elimination System.

Experience

Enbridge, Inc. Penn Jersey Integrity Project, Pennsylvania. 2016-Present. Ms. Piskura is Deputy Project Manager for the Penn Jersey Integrity Project. Responsibilities include tracking anomaly investigations, desktop review, evaluating and coordinating field survey, evaluating and completing environmental permitting needs, threatened and endangered species coordination, providing site-specific mapping to Environmental Inspection personnel, and close coordination with Enbridge environmental and construction staff. Since the initiation of the Project, Ms. Piskura has reviewed and completed necessary tasks for approximately 1,300 anomaly investigations along Enbridge's right-of-way under the Pennsylvania Programmatic General Permit.

Enbridge, Inc. Seconded Employee in Enbridge's Environmental Projects US Group. 2019-Present. Ms. Piskura is currently a part of Enbridge's Environmental Projects US Group, supporting the Penn Jersey Integrity Program as well as other related maintenance and replacement projects. In addition to tracking and

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evaluating anomaly investigations, Ms. Piskura is assigned as the environmental manager within Enbridge's Environmental Construction Permits Database and is responsible for processing new projects within the Database in coordination with Enbridge Project staff and for providing final Construction Clearance authorization.

Enbridge Inc. Conemaugh River Crossing Project. 2019-Present. Ms. Piskura is currently acting as Deputy Project Manager for the Conemaugh River Crossing Project, which will replace a section of Enbridge's existing Line 12 across the Conemaugh River in Pennsylvania. Ms. Piskura is responsible for US Army Corps of Engineers and Pennsylvania Department of Environmental Protection permit preparation, agency coordination, threatened and endangered species consultation, and Enbridge project team coordination.

Enbridge Inc. EAGL-LAMT DOT 2020 Project. 2019-Present. Ms. Piskura is currently acting as Deputy Project Manager for the EAGL-LAMT DOT 2020 Project, which will replace a section of Enbridge's existing Line 2 in Chester County, Pennsylvania. Ms. Piskura is responsible permit preparation, agency coordination, threatened and endangered species consultation, and Enbridge project team coordination.

Enbridge Inc. Line 19 Kulps Road Project. 2019-2020. Ms. Piskura acted as the Deputy Project Manager for the Line 19 Kulps Road Project, which involved two anomaly repairs requiring enhanced permitting due to impacts to threatened and endangered species habitat. Ms. Piskura ws responsible for US Army Corps of Engineers and Pennsylvania Department of Environmental Protection permit preparation, agency coordination, threatened and endangered species consultation, and Enbridge project team coordination.

Tennessee Gas Pipeline Company, LLC Northeast Energy Direct Project, Pennsylvania, New York, Massachusetts, New Hampshire, and Connecticut. Ms. Piskura managed environmental report preparation and permitting under the Federal Energy Regulatory Commission. Responsible for overall data collection and assimilation for delivery of all resource reports and supporting documents. The project consisted of the construction of approximately 420 miles of pipeline and supporting facilities originating in Pennsylvania and traversing New York, Massachusetts, New Hampshire, and Connecticut.

Tennessee Gas Pipeline Company, LLC Connecticut Expansion Project, New York, Massachusetts, and Connecticut. Ms. Piskura managed environmental report preparation and permitting under the Federal Energy Regulatory Commission, and was the principal author of several resource reports. Supported permitting needs for state wetland applications, and Section 401 Water Quality Certification application. The project consists of approximately 13 miles of new 24 and 36-inch pipeline along existing rights-of ways in New York, Massachusetts, and Connecticut.

Iroquois Gas Transmission System Wright Transfer Compressor Project, New York. Ms. Piskura managed environmental report preparation and permitting under the Federal Energy Regulatory Commission, and was the principal author of several resource reports. The project consists of construction of a new compressor, natural gas cooling and metering facilities in New York.

Constitution Pipeline Company, LLC Constitution Pipeline Project, Pennsylvania and New York. Ms. Piskura served as a project technical specialist for environmental report preparation and permitting under the Federal Energy Regulatory Commission. The project consists of the construction of approximately 123 miles of 30-inch pipeline along green field right-of-way in Pennsylvania and New York.

Tennessee Gas Pipeline Company Northeast Upgrade Project, Pennsylvania and New Jersey. Ms. Piskura was responsible for field investigations and supporting documentation related to wetlands and habitat assessments under the Federal Energy Regulatory Commission as well as state and local municipal review

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processes. The project consists of the construction of approximately 40 miles of 30-inch pipeline in Pennsylvania and New Jersey.

Josh Singleton
Environmental Scientist

Key skills
Wetland Delineation, Avian Surveying, Post-construction Monitoring for Solar and Wind

Years of experience
8+

Years with AECOM
3

Education
Associate of Science in Wildlife Science and Technology from Penn State University

Mr. Singleton has over 8 years of experience as a staff biologist in environmental and related fields. Experience includes:

- Wetland delineations; Prepare reports summarizing the findings of investigations for submittal to clients and the Pennsylvania Department of Environmental Protection (PADEP);
- Avian migration surveys, bird use counts, breeding bird surveys, raptor nest monitoring;
- Bird and bat mist-netting surveys;
- Post-construction mortality monitoring on active wind and solar facilities;

Professional history

2010 – 2015 Western Ecosystems Technology, Inc (WEST).

2015 – Present AECOM

Selected project experience

Post-Construction Mortality Monitoring, NextEra Energy
Conducted standardized searches for bird and bat fatalities on an operating wind farm. North Sky River, Kern County, CA.

Golden Eagle Radar Project, Next Era Energy
Conducted radar ground-truthing to detect Golden Eagles. North Sky River, Kern County, CA.

Northern Harrier Presence/Absence Survey, HEP Pennsylvania Gathering, LLC
Assisted with field surveys. Tioga CPF#2 Discharge, Lycoming and Tioga Counties, PA, HEP Pennsylvania Gathering, LLC.

Northern Harrier and Short Eared Owl Presence/Absence Survey, Shell Appalachia
Assisted with field surveys. Falcon Ethane Pipeline, Allegheny County, PA, Shell Appalachia, LLC.

Avian Migration Surveys, Next Era Energy
Conducted spring and fall migration surveys in proximity to IBAs and operating wind farms. North Sky River, Kern County, CA.

Bias and Removal Trials, Pattern Energy
Carried out searcher efficiency trials and conducted experiments to determine scavenging rates. Ocotillo Wind Project, Imperial County, CA.

Wetland and Watercourse Investigation, Shell Appalachia
Conduct wetland watercourse delineations at proposed and existing well sites in Elk and Tioga Counties, PA. Shell Appalachia, LLC.

Invasive Species Control and Removal, Panther Swamp, Columbia Gas Corporation
Support the ongoing control/removal of *Phragmites australis* from a wetland mitigation site Pike County, PA.

Phase II Bog Turtle Surveys, Quaker Mitigation Project
Assist with habitat assessment and population survey using survey protocols established by the U.S Fish and Wildlife Service and Pennsylvania Fish and Boat Commission for the Quaker Mitigation Project. Berks County, PA

Bat Mist-Netting and Telemetry, Iberdrola Renewables
Conducted mist-netting surveys for sensitive bat species and radio telemetry on radio-tagged bats. Blue Creek Wind Farm, Van Wert and Paulding Counties, OH.

Post-Construction Monitoring, NextEra Energy
Carried out several duties involved with post-construction monitoring on an active solar farm, including Searcher Efficiency Trials, Carcass Removal Trials, Species Relocation, Avian Surveys and Erosion Control. Desert Sunlight Solar Farm, Riverside County, CA.

Attachment S-3

PA Riverine L2RAP Data Sheets and Mapping

Riverine Assessment Form 1

Pennsylvania Riverine Condition Level 2 Rapid Assessment Protocol (Document No. 310-2137-003)

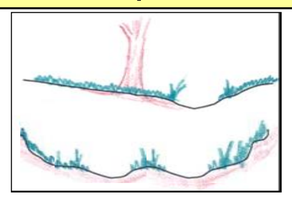
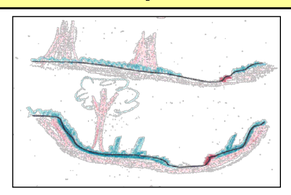
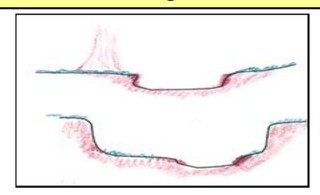
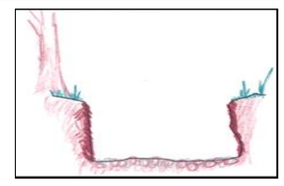
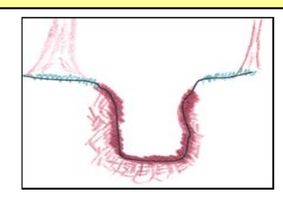
Pennsylvania Department of Environmental Protection

For use in intermittent or perennial watercourses with drainage areas ≤ 2,000 square mile drainage areas.

Project #	Project Name		Locality	Date	Ch 93 Classification		AA Id	Length
					Designated:	Existing:		
60624893	Line 12 Conemaugh River Crossing Project		Westmoreland and Indiana Counties	3/5/2020	WWF	-	S-JLK-037	195'
Latitude	40.456669	Longitude	-79.298122	FGM Level 1 Channel Classification			B	

Evaluator(s)	Stream Name and Information	Notes:
B. Miller	S-JLK-037 PER	

1. CHANNEL/FLOODPLAIN: Assess the cross-section of the stream and prevailing conditions along the AA.

	Condition Category				
	Optimal	Suboptimal	Marginal	Poor	Severe
Channel / Floodplain	 **Channel Geometry:** These channels show very little incision or widening and little or no evidence of active erosion. Anastomosing channels may be present. **Channel Stability:** Visual indicators include: 1) the banks are not eroding along greater than 5% of the reach; 2) natural vegetative or rock stability features are present along greater than 80% of the banks; 2) stable point bars and bankfull benches may be present; 3) mid-channel bars and transverse bars are rare and if transient channel sediment deposition is present, it covers less than or equal to 10% of the stream bottom; 4) baseflow is connected to the rooting depths of vegetation in the active floodplain. **Active Floodplain Connection:** The bankfull stream flows have frequent access to the active floodplain and fully developed point bars or bankfull benches that are accessed at most flows greater than baseflow.	 **Channel Geometry:** These channels are slightly incised or overwidened and contain a few areas of active erosion. **Channel Stability:** Visual indicators include: 1) the banks are actively eroding along less than 25% of the reach; 2) depositional features such as point bars and bankfull benches are present and stable during high flows and occur along greater than 50% of the reach; 3) natural bank protection like vegetation or rock is providing stability along greater than 50% of the reach; 4) baseflow is connected to vegetated point bars and bankfull benches. **Active Floodplain Connection:** The bankfull stream flows frequently access bankfull benches, or point bars along portions of the reach and may frequently inundate the active floodplain.	 **Channel Geometry:** These channels are over-widened or incised, but to a lesser degree than the Severe and Poor channel conditions. **Channel Stability:** Visual indicators include: 1) the banks are eroding or severely undercut along greater than 25% and less than or equal to 50% of the reach; 2) depositional features like point bars or bankfull benches occur along greater than 25% and less than or equal to 50% of the reach; 3) the stream banks may consist of some vertical or undercut banks or nick points associated with head cuts; **Active Floodplain Connection:** The bankfull stream flows have infrequent connection to the active floodplain.	 **Channel Geometry:** These channels are over-widened or incised and eroding vertically and/or laterally. **Channel Stability:** Visual indicators include: 1) the banks are eroding or severely undercut along greater than 50% of the reach; 2) active or recent bank sloughing is present along greater than 50% of the reach; 3) natural bank protection like vegetation is not preventing bank erosion along the reach; 4) depositional features, such as point bars and bank full benches, are absent from the reach or newly developing along less than 25% of the reach; 5) bank full benches and point bars frequently scour during high flows; 6) baseflow is disconnected from plant rooting depths and the active floodplain. **Active Floodplain Connection:** The bankfull stream flows are not connected to the active floodplain.	 **Channel Geometry:** These channels are deeply incised and actively eroding vertically and/or laterally. Over widened channels may contain sections of unstable braided channels from aggradation. **Channel Stability:** Visual indicators include: 1) the banks are actively eroding or being undercut along greater than 80% of the reach; 2) active or recent bank sloughing is occurring along greater than 80% of the reach; 3) natural bank protection like vegetation is not preventing bank erosion or sloughing; 4) depositional features such as point bars and bankfull benches are absent; 5) flood flows are disconnected from the active floodplain. **Active Floodplain Connection:** The bankfull stream flows are never connected to the active floodplain.
SCORE	20 19 18 17	16 15 14 13	12 11 10 9	8 7 6 5	4 3 2 1

Comments:

CI = (Score)/20		CI
SCORE:	12	0.60

2. RIPARIAN VEGETATION: Assess the floodplain along the entire AA (Visual estimates of areal coverage from aerial photos with field verification acceptable).

	Condition Category																							
	Optimal					Suboptimal					Marginal					Poor								
Riparian Vegetation (Floodplain)	Riparian area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.					**High Suboptimal:** Riparian area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.			**Low Suboptimal:** Riparian area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.		**High Marginal:** Riparian area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.			**Low Marginal:** Riparian area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover with maintained understory.		**High Poor:** Riparian area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.			**Low Poor:** Riparian area consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.	
						High			Low		High			Low		High			Low				
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1				

Comments:

1. Identify Condition Category areas along the floodplain using the descriptors above.
2. Estimate the % area within each condition category.
3. Enter the % Riparian Area in in decimal form (0.00) and Score for each category in the blocks below.

Ensure the sum of the % Riparian Area Blocks equal 100

	Condition Category	Optimal	High Suboptimal	Low Suboptimal	High Marginal	Low Marginal	High Poor	Low Poor	Side Sub-Index	
Right Side	% Riparian Area:	96%	0%	0%	0%	0%	0%	4%	0.87	Side Sub-Index = SUM(%Areas*Scores)/20
	Score:	18	0	0	0	0	0	2		
	Total Sub-score:	**17.33**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**		
	Condition Category	**Optimal**	**High Suboptimal**	**Low Suboptimal**	**High Marginal**	**Low Marginal**	**High Poor**	**Low Poor**		
Left Side	% Riparian Area:	98%	0%	0%	0%	0%	0%	2%	0.88	CI = (Left Side CI + Right Side CI)/2
	Score:	18	0	0	0	0	0	2		
	Total Sub-score:	**17.58**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**		

CI
0.88

Riverine Assessment Form 1 - Page 2

2/4/2017

3. RIPARIAN ZONE OF INFLUENCE: Assess land cover along both sides, 100 feet from edge of floodplain into the upland along the entire AA. (rough measurements of length & width may be acceptable)

	Condition Category					Comments:
	Optimal	**Suboptimal**		**Marginal**		**Poor**	
Riparian ZOI	Riparian ZOI area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.	**High Suboptimal:** Riparian ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.	**High Marginal:** Riparian ZOI area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.	**Low Marginal:** Riparian ZOI area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover with maintained understory.	**High Poor:** Riparian ZOI area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Riparian ZOI area consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.	
		High	**Low**	**High**	**Low**	**High**	**Low**	
SCORE	20 19 18 17 16	15 14 13 12 11		10 9 8 7 6		5 4 3 2 1		

1. Identify Condition Category areas along the floodplain using the descriptors above.
2. Estimate the % area within each condition category.
3. Enter the % Riparian Area in decimal form (0.00) and Score for each category in the blocks below. Ensure the sums of % Riparian ZOI Blocks equal 100

	Condition Category	Optimal	High Suboptimal	Low Suboptimal	High Marginal	Low Marginal	High Poor	Low Poor	Side Sub-Index		
Right Side	% Riparian Area:	79%	0%	0%	0%	8%	0%	13%	**0.75**	**Side Sub-Index = SUM(%Areas*Scores)/20**	
	Score:	18	0	0	0	7	0	2			
	Total Sub-score:	**14.24**	**0.00**	**0.00**	**0.00**	**0.56**	**0.00**	**0.26**			
	Condition Category	**Optimal**	**High Suboptimal**	**Low Suboptimal**	**High Marginal**	**Low Marginal**	**High Poor**	**Low Poor**			
Left Side	% Riparian Area:	58%	0%	0%	0%	26%	0%	16%	**0.63**	**CI = (Left Side CI + Right Side CI)/2**	**CI**
	Score:	18	0	0	0	7	0	2			**0.69**
	Total Sub-score:	**10.52**	**0.00**	**0.00**	**0.00**	**1.80**	**0.00**	**0.32**			

4. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths, woody and leafy debris, stable substrate, low embeddedness, shade, undercut banks, root mats, SAV, macrophytes, emergent vegetation, riffle-pool complexes, stable features.

	Condition Category				Comments:		
	Optimal	**Suboptimal**	**Marginal**	**Poor**			
Instream Habitat/ Available Cover	Physical Elements that enhance a stream's ability to support aquatic organisms are present in greater than or equal to 50% of the reach. Substrate is favorable for colonization by a diverse and abundant epifaunal community, and there are many suitable areas for epifaunal colonization and/or fish cover.	Physical Elements that enhance a stream's ability to support aquatic organisms are present in greater than or equal to 30% and less than 50% of the reach. Conditions are mostly desirable and are generally suitable for full colonization by a moderately diverse and abundant epifaunal community.	Physical Elements that enhance a stream's ability to support aquatic organisms are present in greater than or equal to 10% and less than 30% of the reach. Conditions are generally suitable for partial colonization by epifaunal and/or fish communities.	Physical Elements that enhance a stream's ability to support aquatic organisms are present in less than 10% of the reach. Conditions are generally unsuitable for colonization by epifaunal and/or fish communities. The reach.		**CI = (Score)/20**	**CI**
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	**SCORE:**	13	**0.65**

5. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel/channelization, embankments, spoil piles, constrictions, etc.

	Condition Category					Comments:	
	Negligible	**Minor**		**Moderate**		**Severe**	
Channel Alteration	Channel alterations listed above are absent in the SAR. The stream has unaltered pattern or has normalized.	**Minor High:** Less than or equal to 20% of the stream reach is disrupted by any of the channel alterations listed above. Alteration or channelization present, usually adjacent to structures, (such as bridge abutments or culverts); evidence of past alteration, (i.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration is not present.	**Minor Low:** Greater than 20% and less than or equal to 40% of the stream reach is disrupted by any of the channel alterations listed above. Alteration or channelization present, usually adjacent to structures, (such as bridge abutments or culverts); evidence of past alteration, (i.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration is not present.	**Moderate High:** Greater than 40% and less than or equal to 60% of reach is disrupted by any of the channel alterations listed above. If the stream has been channelized, normal stable stream meander pattern has not recovered.	**Moderate Low:** Greater than 60% and less than or equal to 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If the stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed above. Greater than 80% of banks shored with gabion, riprap, or concrete.		
		High	**Low**	**High**	**Low**		**CI = (Score)/20**	**CI**
SCORE	20 19 18 17 16	15 14 13 12 11		10 9 8 7 6		5 4 3 2 1	**SCORE:** 20	**1.00**

RIVERINE CONDITION INDEX (RCI)		**RCI**
NOTE: **The CIs and RCI should be rounded to 2 decimal places.**	**RCI = (Sum of all CI's)/5 or Ephemeral/Intermittent RCI = (Sum non instream CI's)/4**	**0.76**

If a CI is not applicable (e.g. due to use on intermittent watercourse or >100 sq. mile drainage area) in order to utilize the auto calculator feature the user will need to modify the RCI formula or enter the maximum score for that CI to achieve a CI of 1.0 which will offset the divisor difference.

General Comments:

Riparian Vegetation Worksheet

Desktop Review

Condition Category	R Size (Ac)	R %	L Size (Ac)	L %
Optimal	172.18	96%	172.81	98%
High Suboptimal	0.00	0%	0.00	0%
Low Suboptimal	0.00	0%	0.00	0%
High Marginal	0.00	0%	0.00	0%
Low Marginal	0.00	0%	0.00	0%
High Poor	0.00	0%	0.00	0%
Low Poor	6.70	4%	4.11	2%
Calculated total area	178.88	100%	176.92	100%

Field View

Condition Category	R Size (Ac)	R %	L Size (Ac)	L %
Optimal	171417.66	96%	172.81	98%
High Suboptimal	0.00	0%	0.00	0%
Low Suboptimal	0.00	0%	0.00	0%
High Marginal	0.00	0%	0.00	0%
Low Marginal	0.00	0%	0.00	0%
High Poor	0.00	0%	0.00	0%
Low Poor	6670.34	4%	4.11	2%
Calculated total area	178088.00	100%	176.92	100%

Entered Total Area **178088.00** **176.92** From shape file for RV (zone)

Calculated total area and Entered Total Area must be equal

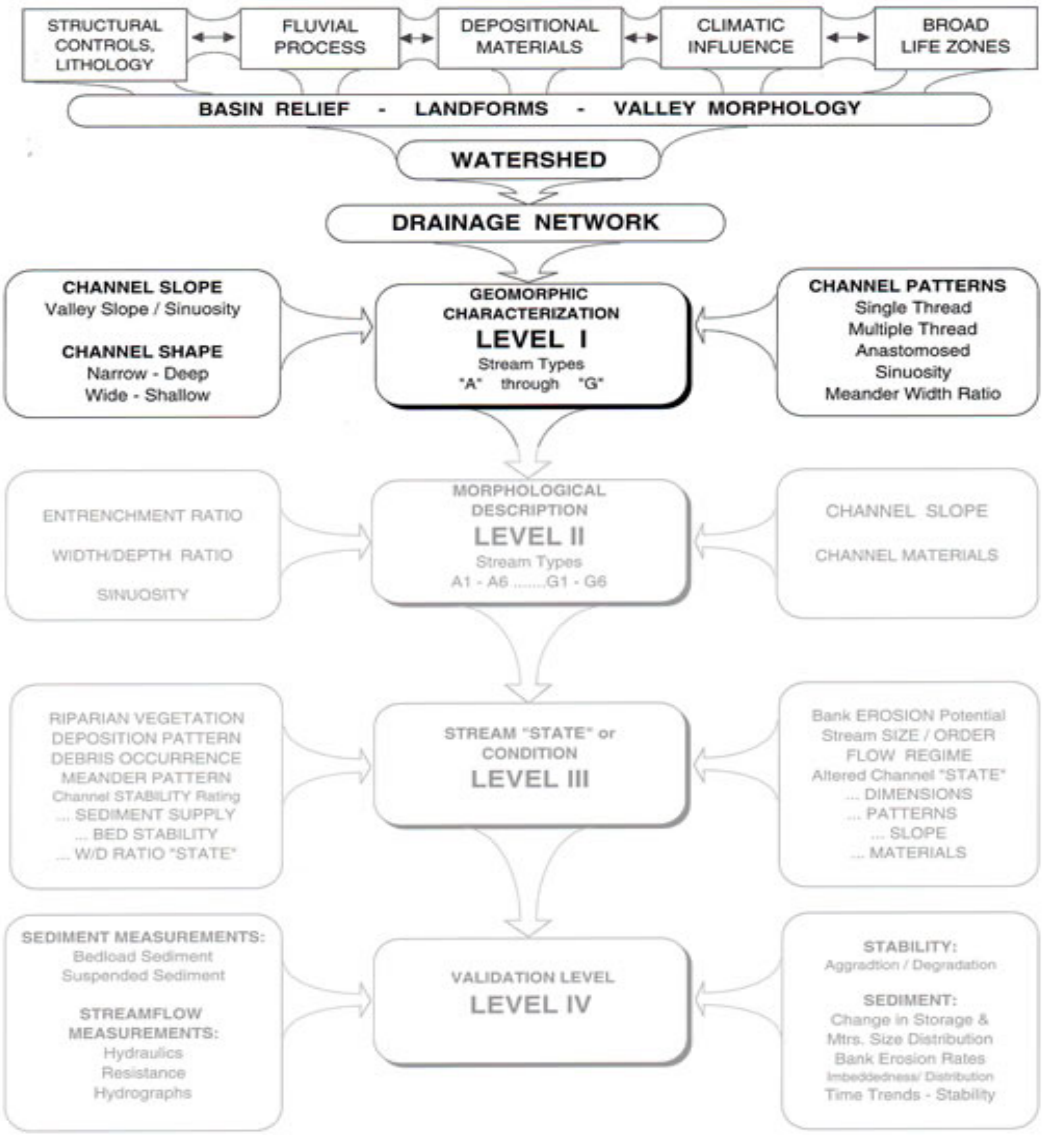
Riparian ZOI Worksheet

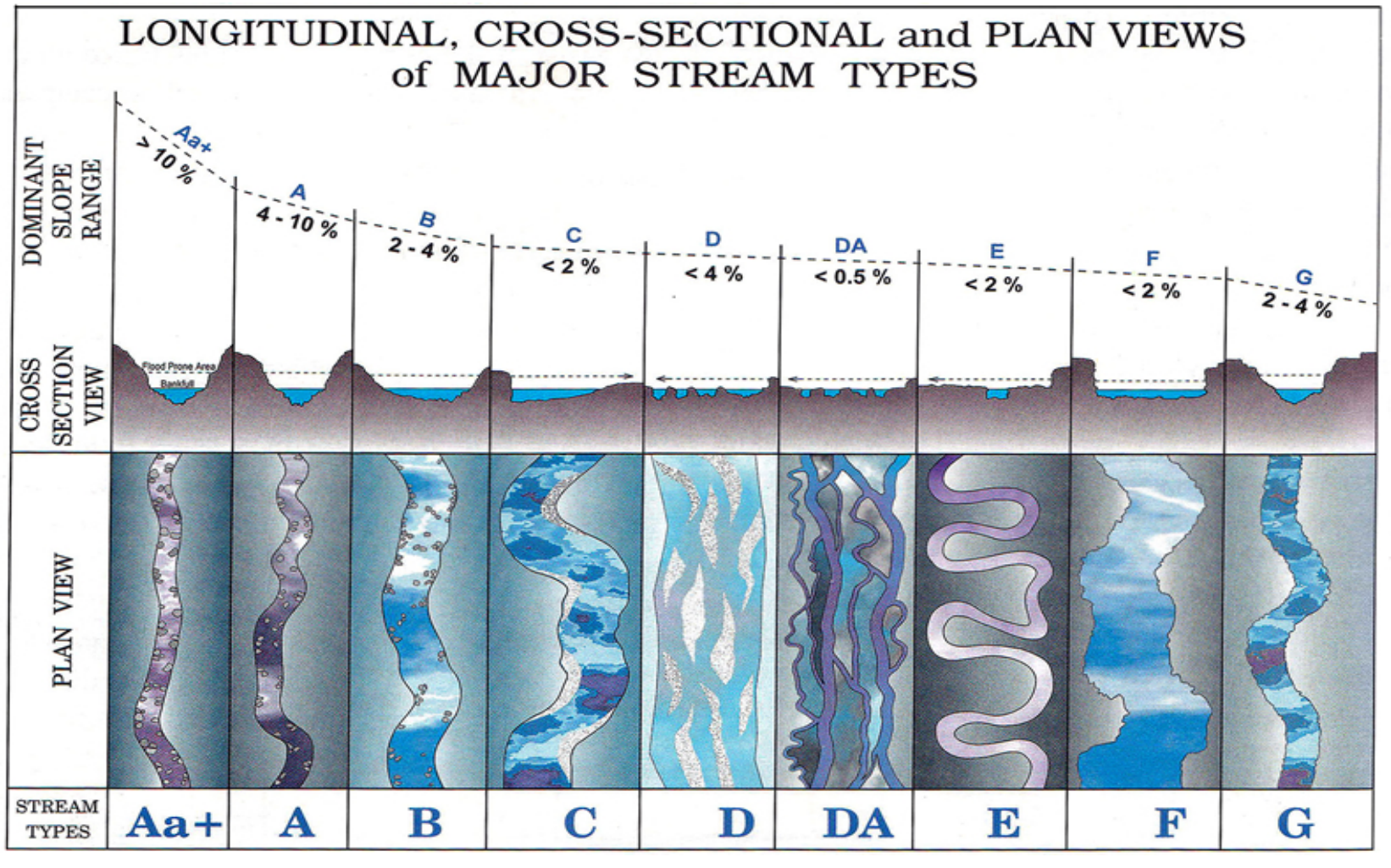
Desktop Review					Field View				
Condition Category	R Size (Ac)	R %	L Size (Ac)	L %	Condition Category	R Size (Ac)	R %	L Size (Ac)	L %
Optimal	20.69	79%	6.49	58%	Optimal	20.69	79%	6.49	58%
High Suboptimal	0.00	0%	0.00	0%	High Suboptimal	0.00	0%	0.00	0%
Low Suboptimal	0.00	0%	0.00	0%	Low Suboptimal	0.00	0%	0.00	0%
High Marginal	0.00	0%	0.00	0%	High Marginal	0.00	0%	0.00	0%
Low Marginal	2.11	8%	2.85	26%	Low Marginal	2.11	8%	2.85	26%
High Poor	0.00	0%	0.00	0%	High Poor	0.00	0%	0.00	0%
Low Poor	3.36	13%	1.76	16%	Low Poor	3.36	13%	1.76	16%
Calculated total area	26.16	100%	11.10	100%	Calculated total area	26.16	100%	11.10	100%

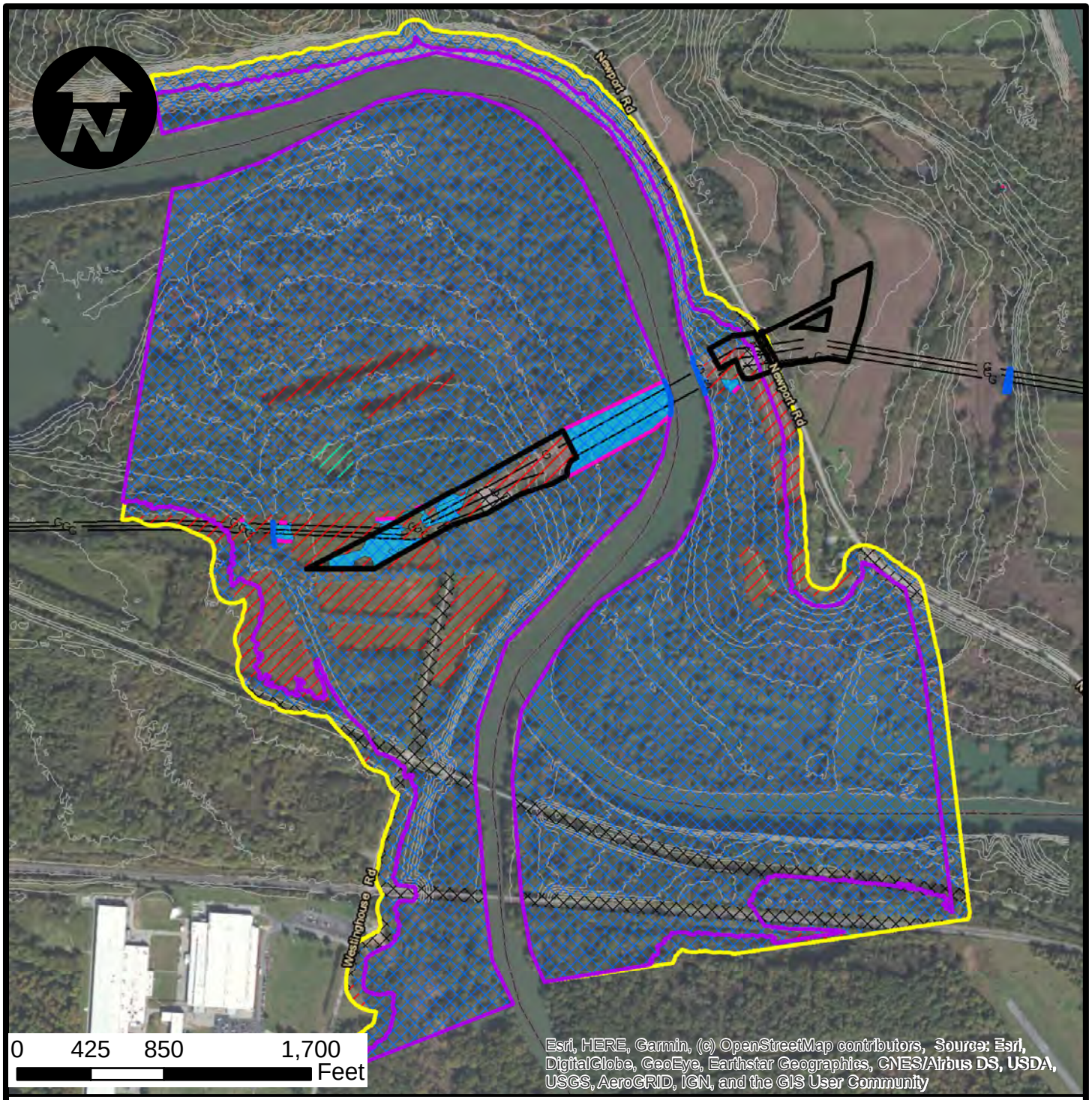
Entered Total Area **26.16** **11.10** From shape file for Riparian ZOI

Calculated total area and Entered Total Area must be equal

http://www.fgmorph.com/fg_5_1.php (details for each classification start on page 15)




LONGITUDINAL, CROSS-SECTIONAL and PLAN VIEWS
of MAJOR STREAM TYPES
DOMINANT SLOPE RANGE
CROSS SECTION VIEW
PLAN VIEW
STREAM TYPES
Aa+
> 10 %
A
4 - 10 %
B
2 - 4 %
C
< 2 %
D
< 4 %
DA
< 0.5 %
E
< 2 %
F
< 2 %
G
2 - 4 %
Flood Prone Area
Bankfull
Aa+
A
B
C
D
DA
E
F
G



LEGEND

- PROPOSED LOD
- EXISTING TETLP PIPELINE
- WATERCOURSE
- OPEN-END
- RIVERINE ZOI
- RIVERINE VEGETATION
- WETLAND
- WETLAND AA
- WETLAND 100-FT ZOI
- WETLAND 300-FT ZOI

CONDITION CATEGORY

- OPTIMAL
- HIGH MARGINAL
- MARGINAL
- POOR

AECOM
FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE 120
PITTSBURGH, PA 15220

ENBRIDGE

TEXAS EASTERN TRANSMISSION, LP

PREPARED BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	FIGURE 3
MLN	SLH	KJT	5/19/2020	1 " = 833 feet	STREAM: S-JLK-037 LEVEL 2 RAPID ASSESSMENT PROTOCOL CONEMAUGH RIVER CROSSING PROPOSED 24" HDD PIPELINE
			PAGE NO: Page 4 of 4	PROJECT NO. 60612899	

Attachment S-4

PA Wetland L2RAP Data Sheets and Mapping

Wetland Condition Assessment Form

Pennsylvania Wetland Condition Level 2 Rapid Assessment (Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

For use in all wetland classifications found within Pennsyvlania except those found within the banks of a watercourse.

Project #	Project Name	Date	Proposed Impact Size (acres)	AA #	AA Size (acres)
60624893	Line 12 Conemaugh River Crossing Project	3/5/20	0.6030	W-BJM-010	0.67

Name(s) of Evaluator(s)	Lat (dd)	Long (dd)	Resource Identifier:			
B. Miller	40.454614	-79.302808	Classification:	PEM/PSS/PFO	Delineated Area (acres):	0.672094

General Comments:

1. Wetland Zone of Influence Condition Index

	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
Wetland Zone of Influence (300 foot area around AA perimeter)	ZOI area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.					**High Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.			**Low Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.		**High Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.			**Low Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover with maintained understory.			**High Poor:** ZOI area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.			**Low Poor:** ZOI area vegetation consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.			**CI = Total Score/20**
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

1. Identify all applicable Condition Category areas within the wetland zone of influence using the descriptors above.
2. Estimate the % area within each condition category. Calculators are provided for you below.
3. Enter the % ZOI Area in decimal form (0.00) and Score for each category in the blocks below.

Total Score = SUM(%Areas*Scores)

	Condition Category:	Optimal	High Suboptimal	Low Suboptimal	High Marginal	Low Marginal	High Poor	Low Poor	Total Score:	CI
Scoring:	% ZOI Area:	73%	0%	0%	0%	27%	0%	0%		
	Score:	18	0	0	0	7	0	0		
	Total Sub-score:	13.15	0.00	0.00	0.00	1.89	0.00	0.00	15.03	0.75

Comments:

2. Roadbed Presence Index

	Condition Categories																				
	Optimal					Suboptimal					Marginal					Poor					
a. Roadbed Presence (within 0 - 100 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 feet of the AA boundary			**Low Optimal:** Roadbed presence score within 0-100 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 12.		
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

Comments: Roadbed 0-100 Total score is 2

	Condition Categories																				
	Optimal					Suboptimal					Marginal					Poor					
b. Roadbed Presence (within 100 - 300 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 - 300 feet of the AA boundary			**Low Optimal:** Roadbed presence score within 100 - 300 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 100 - 300 feet AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than 12.		**CI = Total Score/20**
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

Comments: Roadbed 100-300 Total score is 2

	Condition Score	Weighting	Sub-Scores	
a. Roadbed 0-100:	17	* (0.67)	11	
b. Roadbed 100-300:	17	* (0.33)	6	
		Total Score:	**17**	**0.85**

Comments:

Wetland Condition Assessment Form

Pennsylvania Wetland Condition Level 2 Rapid Assessment (Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

For use in all wetland classifications found within Pennsyvlania except those found within the banks of a watercourse.

3. Vegetation Condition Index

	Condition Category			
a. Invasive Species Presence	Optimal	Suboptimal	Marginal	Poor
	High Optimal: No invasives present. **Low Optimal:** <5% of the total AA contains invasive species.	**High Suboptimal:** >5% but less than 10% of the total AA contains invasive species. **Low Suboptimal:** >10% but less than 20% of the total AA contains invasive species.	**High Marginal:** >20% but less than 30% of the total AA contains invasive species. **Low Marginal:** >30% but less than 50% of the total AA contains invasive species.	> 50% of the total AA contains invasive species.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Comments: Total % relative cover of all invasives, collectively on site is 15

	Condition Category				
b. Vegetation Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/40**
	High Optimal: No vegetation stressors present within the AA boundary. **Low Optimal:** One vegetation stressor present within the AA boundary.	**High Suboptimal:** Two vegetation stressors present within the AA boundary. **Low Suboptimal:** Three vegetation stressors present within the AA boundary.	**High Marginal:** Four vegetation stressors present within the AA boundary. **Low Marginal:** Five vegetation stressors present within the AA boundary.	Greater than five vegetation stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	

Comments: Total number of vegetation stressors present - 0

a. Invasive Sub-Score:	12	**Total Score:**	
b. Vegetation Sub-Score:	20	**32**	**0.80**

4. Hydrologic Modification Index

	Condition Category				
Hydrologic Modification Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/20**
	High Optimal: No hydrologic stressors present within the AA boundary. **Low Optimal:** One hydrologic stressor present within the AA boundary.	**High Suboptimal:** Two hydrologic stressors present within the AA boundary. **Low Suboptimal:** Three hydrologic stressors present within the AA boundary.	**High Marginal:** Four hydrologic stressors present within the AA boundary. **Low Marginal:** Five hydrologic stressors present within the AA boundary.	Greater than five hydrologic stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	**1.00**

Comments: Total number of hydrologic modifications present - 0

Score:	20

5. Sediment Stressor Index

	Condition Category				
Sediment Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/20**
	High Optimal: No sediment stressors present within the AA boundary. **Low Optimal:** One sediment stressor present within the AA boundary.	**High Suboptimal:** Two sediment stressors present within the AA boundary. **Low Suboptimal:** Three sediment stressors present within the AA boundary.	**High Marginal:** Four sediment stressors present within the AA boundary. **Low Marginal:** Five sediment stressors present within the AA boundary.	Greater than five sediment stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	**1.00**

Comments: Total number of sediment stressors present - 0

Score:	20

6. Water Quality Stressor Index

	Condition Category			
a. Eutro- phication Stressor Presence	Optimal	Suboptimal	Marginal	Poor
	No eutrophication stressors present within the AA boundary.	One eutrophication stressors present within the AA boundary.	Two eutrophication stressors present within the AA boundary.	Three eutrophication stressors present within the AA boundary.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Comments: Total number of Eutrophication stressors present - 0

	Condition Category				
b. Contaminant / Toxicity Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/40**
	No contaminant / toxicity stressors present within the AA boundary.	One contaminant / toxicitystressors present within the AA boundary.	Two contaminant / toxicity stressors present within the AA boundary.	Three contaminant / toxicity stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	

Comments: Total number of Contaminant/Toxicity stressors present - 0

a. Eutrophication Score	20	**Total Score:**	**1.00**
b. Contaminant Score	20	**40**	

Overall Wetland Level 2 Condition Score: Sum all six of the Condition Indexes and divide by 6 to calculate the overall condition score.	**Overall Condition Index:**	**0.90**

Wetland ZOI Worksheet

Desktop Review			Field View		
Condition Category	Size (Ac)	Percentage	Condition Category	Size (Ac)	Percentage
Optimal	10.27	73%	Optimal	10.27	73%
High Suboptimal	0.00	0%	High Suboptimal	0.00	0%
Low Suboptimal	0.00	0%	Low Suboptimal	0.00	0%
High Marginal	0.00	0%	High Marginal	0.00	0%
Low Marginal	3.79	27%	Low Marginal	3.79	27%
High Poor	0.00	0%	High Poor	0.00	0%
Low Poor	0.00	0%	Low Poor	0.00	0%
Calculated total area	14.06	100%	Calculated total area	14.06	100%

Enter Total Area 14.06 From ZOI shapefile

Calculated total area and Entered Total Area must be equal

2/4/2017

Pennsylvania Wetland Condition Level 2 Rapid Assessment

(Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

Roadbed Worksheet

Project Name / Identifier		Date	Name(s) of Evaluator(s)
Line 12 Conemaugh River Crossing Project		3/5/2020	B. Miller
Resource Identifier / AA #	**Lat (dd)**	**Long (dd)**	**Notes:**
W-BJM-010	40.454614	-79.302808	#VALUE!

Roadbeds: Record the number of occurrences by roadbed type and distance category. Multiply the number of occurrences by the weighting factors for each roadbed type and distance category then sum the total score for each distance category. The total scores for each distance category are then compared to the condition category descriptions.

Roadbed Type	Distance	Occurrences	Weighting Factor	Score	Distance	Occurrences	Weighting Factor	Score
≥ 4 Lane Paved	0-100 ft.	0	4	0	100-300 ft.	0	4	0
2 Lane Paved	0-100 ft.	0	2	0	100-300 ft.	0	2	0
1 Lane Paved	0-100 ft.	0	1	0	100-300 ft.	0	1	0
Gravel Road	0-100 ft.	1	1	1	100-300 ft.	1	1	1
Dirt Road	0-100 ft.	0	2	0	100-300 ft.	0	2	0
Railroad	0-100 ft.	0	2	0	100-300 ft.	0	2	0
Other Roadbeds	0-100 ft.	1	1, 2 or 4	1	100-300 ft.	1	1, 2 or 4	1
Total Scores:	0-100 ft.	2			100-300 ft.	2		

Road Comments:

Pennsylvania Wetland Condition Level 2 Rapid Assessment
(Document No. 310-2137-002)
Pennsylvania Department of Environmental Protection

Invasive Species Presence Worksheet

Are invasive species (from list) present at the site in any layer? **YES**

If listed species present, enter the percent areal coverage for each species below:

Species Code	<5%	≥ 5-20%	≥ 20 - 50%	≥ 50%	*Species Code*	<5%	≥ 5-20%	≥ 20 - 50%	≥ 50%
tyan		X							

Total % relative cover of all invasives, collectively on site: 15 **%**

Comments:

Common Invasives/Aggressives List

Code	Common Name	*Scientific*	Status	Code	Common Name	*Scientific*	Status
aggi2	Redtop	*Agrostis gigantea*	FACW	luhe	Water primrose	*Ludwigia hexapetala*	OBLW
algl2	European Alder	*Alnus glutinosa*	FACW	lyvu	Garden loosestrife	*Lysimachia vulgaris*	OBLW
arhi3	Carpetgrass	*Arthraxon hispidus*	FAC-	lysa2	Purple loosestrife	*Lythrum salicaria*	FACW
beth	Japanese barberry	*Berberis thunbergii*	FACW	maqu	European waterclover	*Marsilea quadrifolia*	OBLW
bevu	European barberry	*Berberis vulgaris*	FACW	mivi	Japanese stiltgrass	*Microstegium vimineum*	FAC
butom	Flowering Rush	*Butomus umbellatus*	OBLW	nami2	Water cress	*Nasturtium officinale*	OBLW
calli6	Pond water-starwort	*Callitriche stagnalis*	OBLW	pelo	Low smartweed	*Persicaria longiseta*	FACW
egde	Brazilian waterweed	*Egeria densa*	OBLW	phar	Reed canary grass	*Phalaris arundinacea*	FACW
elan	Russian olive	*Elaeagnus angustifolia*	FACU	phau7	Common Reed	*Phragmites australis*	OBLW
elum	Autumn olive	*Elaeagnus umbellata*	FACU	potr	Rough bluegrass	*Poa trivialis*	FACW
ephi	Hairy willow-herb	*Epilobium hirsutum*	FACW	pocu6	Japanese knotweed	*Polygonum (Faloia) cuspidatum*	FAC-
eppa5	Willow-herb	*Epilobium parviflorum*	FACW	pgpf	Mile-a-minute	*Polygonum perfoliatum*	FAC-
fasa	Giant knotweed	*Fallopia sachalinensis*	OBLW	puera	Kudzu-vine	*Pueraria lobata*	FAC-
gldi	Mudmats	*Glossostigma diandrum*	OBLW	pysp1	Apple/crabapple/pear	*Pyrus sp.*	FAC?
hola	Velvetgrass	*Holcus lanatus*	FAC	rhfr	Glossy Buckthorn	*Rhamnus frangula*	FAC-
huja	Japanese Hops	*Humulus japonicus*	FACU	romu	Multiflora rose	*Rosa multiflora*	FACU
loja	Japanese honeysuckle	*Lonicera japonica*	FAC-	tyan	Cattail (hybrid)	*Typha angustifolia*	OBLW
lomo	Morrow's honeysuckle	*Lonicera morrowii*	NI	tygl	Hybrid cattail	*Typha x glauca*	OBLW
lota	Tartarian honeysuckle	*Lonicera tatarica*					

Pennsylvania Wetland Condition Level 2 Rapid Assessment

(Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

STRESSOR WORKSHEET

2/4/2017

	Occurrence in AA		
	Y	#'s	N
Vegetation Alteration			
Mowing			x
Moderate livestock grazing (within one year)			x
Crops (annual row crops, within one year)			x
Selective tree harvesting/cutting (>50% removal, within 5 years)			x
Right-of-way clearing (mechanical or chemical)			x
Clear cutting or Brush cutting (mechanized removal of shrubs and saplings)			x
Removal of woody debris			x
Aquatic weed control (mechanical or herbicide)			x
Excessive herbivory (deer, muskrat, nutria, carp, insects, etc.)			x
Plantation (conversion from typical natural tree species, including orchards)			x
Other:			x
Total Number:		**0**	
Hydrologic Modification			
Ditching, tile draining, or other dewatering methods			x
Dike/weir/dam			x
Filling/grading			x
Dredging/excavation			x
Stormwater inputs (culvert or similar concentrated urban runoff)			x
Microtopographic alterations (e.g., plowing, forestry bedding, skidder/ATV tracks)			x
Dead or dying trees (trunks still standing)*			x
Stream alteration (channelization or incision)			x
Other:			x
Total Number:		**0**	
Sedimentation			
Sediment deposits/plumes			x
Eroding banks/slopes			x
Active construction (earth disturbance for development)			x
Active plowing (plowing for crop planting in past year)			x
Intensive livestock grazing (in one year, ground is >50% bare)			x
Active selective forestry harvesting (within one year)			x
Active forest harvesting (within two years, includes roads, borrow areas, pads, etc.)			x
Turbidity (moderate concentration of suspended solids in the water column, obvious sediment discharges)			x
Other:			x
Total Number:		**0**	
Eutrophication			
Direct discharges from agricultural feedlots, manure pits, etc.			
Direct discharges from septic or sewage treatment plants, fish hatcheries, etc.			
Heavy or moderately heavy formation of algal mats			
Other:			
Total Number:		**0**	
Contaminant/Toxicity			
Severe vegetation stress (source unknown or suspected)			
Obvious spills, discharges, plumes, odors, etc.			
Acidic drainages (mined sites, quarries, road cuts)			
Point discharges from adjacent industrial facilities, landfills, railroad yards, or comparable sites			
Chemical defoliation (majority of herbaceous and woody plants affected, within one year)			
Fish or wildlife kills or obvious disease or abnormalities observed			
Excessive garbage/dumping			
Other:			
Total Number:		**0**	

**** Dead or dying trees attributed to beaver activity or emerald ash borer (or other identifiable insect infestation) should not be recorded as a stressor present. The assessor is responsible for recording observations in the comment section concerning presence of these conditions.***

Wetland Condition Assessment Form

Pennsylvania Wetland Condition Level 2 Rapid Assessment (Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

For use in all wetland classifications found within Pennsyvlania except those found within the banks of a watercourse.

Project #	Project Name	Date	Proposed Impact Size (acres)	AA #	AA Size (acres)
60624893	Line 12 Conemaugh River Crossing Project	3/5/20	1.3570	W-BJM-011	1.04

Name(s) of Evaluator(s)	Lat (dd)	Long (dd)	Resource Identifier:			
B. Miller	40.454092	-79.304022	Classification:	PEM/PSS	Delineated Area (acres):	1.0384

General Comments:

1. Wetland Zone of Influence Condition Index

	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
Wetland Zone of Influence (300 foot area around AA perimeter)	ZOI area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.					**High Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.			**Low Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.		**High Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.			**Low Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover with maintained understory.		**High Poor:** ZOI area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.		**Low Poor:** ZOI area vegetation consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.		**CI = Total Score/20**
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

1. Identify all applicable Condition Category areas within the wetland zone of influence using the descriptors above.
2. Estimate the % area within each condition category. Calculators are provided for you below.
3. Enter the % ZOI Area in decimal form (0.00) and Score for each category in the blocks below.

Total Score = SUM(%Areas*Scores)

	Condition Category:	Optimal	High Suboptimal	Low Suboptimal	High Marginal	Low Marginal	High Poor	Low Poor	Total Score:	CI
Scoring:	% ZOI Area:	64%	0%	0%	0%	36%	0%	0%		
	Score:	18	0	0	0	7	0	0		
	Total Sub-score:	11.45	0.00	0.00	0.00	2.55	0.00	0.00	14.00	0.70

Comments:

2. Roadbed Presence Index

	Condition Categories																				
	Optimal					Suboptimal					Marginal					Poor					
a. Roadbed Presence (within 0 - 100 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 feet of the AA boundary			**Low Optimal:** Roadbed presence score within 0-100 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 12.		
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

Comments: Roadbed 0-100 Total score is 2

	Condition Categories																				
	Optimal					Suboptimal					Marginal					Poor					
b. Roadbed Presence (within 100 - 300 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 - 300 feet of the AA boundary			**Low Optimal:** Roadbed presence score within 100 - 300 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 100 - 300 feet AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than 12.		**CI = Total Score/20**
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

Comments: Roadbed 100-300 Total score is 2

	Condition Score	Weighting	Sub-Scores	
a. Roadbed 0-100:	17	* (0.67)	11	
b. Roadbed 100-300:	17	* (0.33)	6	
		Total Score:	**17**	**0.85**

Comments:

Wetland Condition Assessment Form

Pennsylvania Wetland Condition Level 2 Rapid Assessment (Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

For use in all wetland classifications found within Pennsyvlania except those found within the banks of a watercourse.

3. Vegetation Condition Index

	Condition Category			
a. Invasive Species Presence	**Optimal**	**Suboptimal**	**Marginal**	**Poor**
	High Optimal: No invasives present. **Low Optimal:** <5% of the total AA contains invasive species.	**High Suboptimal:** >5% but less than 10% of the total AA contains invasive species. **Low Suboptimal:** >10% but less than 20% of the total AA contains invasive species.	**High Marginal:** >20% but less than 30% of the total AA contains invasive species. **Low Marginal:** >30% but less than 50% of the total AA contains invasive species.	> 50% of the total AA contains invasive species.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Comments: Total % relative cover of all invasives, collectively on site is 20

	Condition Category				
b. Vegetation Stressor Presence	**Optimal**	**Suboptimal**	**Marginal**	**Poor**	**CI = Total Score/40**
	High Optimal: No vegetation stressors present within the AA boundary. **Low Optimal:** One vegetation stressor present within the AA boundary.	**High Suboptimal:** Two vegetation stressors present within the AA boundary. **Low Suboptimal:** Three vegetation stressors present within the AA boundary.	**High Marginal:** Four vegetation stressors present within the AA boundary. **Low Marginal:** Five vegetation stressors present within the AA boundary.	Greater than five vegetation stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	

Comments: Total number of vegetation stressors present - 0

a. Invasive Sub-Score:	11	**Total Score:**	
b. Vegetation Sub-Score:	20	**31**	**0.78**

4. Hydrologic Modification Index

	Condition Category				
Hydrologic Modification Stressor Presence	**Optimal**	**Suboptimal**	**Marginal**	**Poor**	**CI = Total Score/20**
	High Optimal: No hydrologic stressors present within the AA boundary. **Low Optimal:** One hydrologic stressor present within the AA boundary.	**High Suboptimal:** Two hydrologic stressors present within the AA boundary. **Low Suboptimal:** Three hydrologic stressors present within the AA boundary.	**High Marginal:** Four hydrologic stressors present within the AA boundary. **Low Marginal:** Five hydrologic stressors present within the AA boundary.	Greater than five hydrologic stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	**1.00**

Comments: Total number of hydrologic modifications present - 0

Score:	20

5. Sediment Stressor Index

	Condition Category				
Sediment Stressor Presence	**Optimal**	**Suboptimal**	**Marginal**	**Poor**	**CI = Total Score/20**
	High Optimal: No sediment stressors present within the AA boundary. **Low Optimal:** One sediment stressor present within the AA boundary.	**High Suboptimal:** Two sediment stressors present within the AA boundary. **Low Suboptimal:** Three sediment stressors present within the AA boundary.	**High Marginal:** Four sediment stressors present within the AA boundary. **Low Marginal:** Five sediment stressors present within the AA boundary.	Greater than five sediment stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	**1.00**

Comments: Total number of sediment stressors present - 0

Score:	20

6. Water Quality Stressor Index

	Condition Category			
a. Eutro- phication Stressor Presence	**Optimal**	**Suboptimal**	**Marginal**	**Poor**
	No eutrophication stressors present within the AA boundary.	One eutrophication stressors present within the AA boundary.	Two eutrophication stressors present within the AA boundary.	Three eutrophication stressors present within the AA boundary.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Comments: Total number of Eutrophication stressors present - 0

	Condition Category				
b. Contaminant / Toxicity Stressor Presence	**Optimal**	**Suboptimal**	**Marginal**	**Poor**	**CI = Total Score/40**
	No contaminant / toxicity stressors present within the AA boundary.	One contaminant / toxicitystressors present within the AA boundary.	Two contaminant / toxicity stressors present within the AA boundary.	Three contaminant / toxicity stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	

Comments: Total number of Contaminant/Toxicity stressors present - 0

a. Eutrophication Score	20	**Total Score:**	**1.00**
b. Contaminant Score	20	**40**	

Overall Wetland Level 2 Condition Score: Sum all six of the Condition Indexes and divide by 6 to calculate the overall condition score.	**Overall Condition Index:**	**0.89**

Wetland ZOI Worksheet

Desktop Review		
Condition Category	Size (Ac)	Percentage
Optimal	9.24	64%
High Suboptimal	0.00	0%
Low Suboptimal	0.00	0%
High Marginal	0.00	0%
Low Marginal	5.29	36%
High Poor	0.00	0%
Low Poor	0.00	0%
Calculated total area	14.53	100%

Field View		
Condition Category	Size (Ac)	Percentage
Optimal	9.24	64%
High Suboptimal	0.00	0%
Low Suboptimal	0.00	0%
High Marginal	0.00	0%
Low Marginal	5.29	36%
High Poor	0.00	0%
Low Poor	0.00	0%
Calculated total area	14.53	100%

Enter Total Area 14.53 From ZOI shapefile

Calculated total area and Entered Total Area must be equal

2/4/2017

Pennsylvania Wetland Condition Level 2 Rapid Assessment

(Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

Roadbed Worksheet

Project Name / Identifier		Date	Name(s) of Evaluator(s)
Line 12 Conemaugh River Crossing Project		3/5/2020	B. Miller
Resource Identifier / AA #	**Lat (dd)**	**Long (dd)**	**Notes:**
W-BJM-011	40.454092	-79.304022	#VALUE!

Roadbeds: Record the number of occurrences by roadbed type and distance category. Multiply the number of occurrences by the weighting factors for each roadbed type and distance category then sum the total score for each distance category. The total scores for each distance category are then compared to the condition category descriptions.

Roadbed Type	Distance	Occurrences	Weighting Factor	Score	Distance	Occurrences	Weighting Factor	Score
≥ 4 Lane Paved	0-100 ft.	0	4	0	100-300 ft.	0	4	0
2 Lane Paved	0-100 ft.	0	2	0	100-300 ft.	0	2	0
1 Lane Paved	0-100 ft.	0	1	0	100-300 ft.	0	1	0
Gravel Road	0-100 ft.	1	1	1	100-300 ft.	1	1	1
Dirt Road	0-100 ft.	0	2	0	100-300 ft.	0	2	0
Railroad	0-100 ft.	0	2	0	100-300 ft.	0	2	0
Other Roadbeds	0-100 ft.	1	1, 2 or 4	1	100-300 ft.	1	1, 2 or 4	1
Total Scores:	0-100 ft.	2			100-300 ft.	2		

Road Comments:

Pennsylvania Wetland Condition Level 2 Rapid Assessment
(Document No. 310-2137-002)
Pennsylvania Department of Environmental Protection

Invasive Species Presence Worksheet

Are invasive species (from list) present at the site in any layer? **YES**

If listed species present, enter the percent areal coverage for each species below:

Species Code	<5%	≥ 5-20%	≥ 20 - 50%	≥ 50%	*Species Code*	<5%	≥ 5-20%	≥ 20 - 50%	≥ 50%
tyan			X						

Total % relative cover of all invasives, collectively on site: 20 **%**

Comments:

Common Invasives/Aggressives List

Code	Common Name	*Scientific*	Status	Code	Common Name	*Scientific*	Status
aggi2	Redtop	*Agrostis gigantea*	FACW	luhe	Water primrose	*Ludwigia hexapetala*	OBLW
algl2	European Alder	*Alnus glutinosa*	FACW	lyvu	Garden loosestrife	*Lysimachia vulgaris*	OBLW
arhi3	Carpetgrass	*Arthraxon hispidus*	FAC-	lysa2	Purple loosestrife	*Lythrum salicaria*	FACW
beth	Japanese barberry	*Berberis thunbergii*	FACW	maqu	European waterclover	*Marsilea quadrifolia*	OBLW
bevu	European barberry	*Berberis vulgaris*	FACW	mivi	Japanese stiltgrass	*Microstegium vimineum*	FAC
butom	Flowering Rush	*Butomus umbellatus*	OBLW	nami2	Water cress	*Nasturtium officinale*	OBLW
calli6	Pond water-starwort	*Callitriche stagnalis*	OBLW	pelo	Low smartweed	*Persicaria longiseta*	FACW
egde	Brazilian waterweed	*Egeria densa*	OBLW	phar	Reed canary grass	*Phalaris arundinacea*	FACW
elan	Russian olive	*Elaeagnus angustifolia*	FACU	phau7	Common Reed	*Phragmites australis*	OBLW
elum	Autumn olive	*Elaeagnus umbellata*	FACU	potr	Rough bluegrass	*Poa trivialis*	FACW
ephi	Hairy willow-herb	*Epilobium hirsutum*	FACW	pocu6	Japanese knotweed	*Polygonum (Faloia) cuspidatum*	FAC-
eppa5	Willow-herb	*Epilobium parviflorum*	FACW	pgpf	Mile-a-minute	*Polygonum perfoliatum*	FAC-
fasa	Giant knotweed	*Fallopia sachalinensis*	OBLW	puera	Kudzu-vine	*Pueraria lobata*	FAC-
gldi	Mudmats	*Glossostigma diandrum*	OBLW	pysp1	Apple/crabapple/pear	*Pyrus sp.*	FAC?
hola	Velvetgrass	*Holcus lanatus*	FAC	rhfr	Glossy Buckthorn	*Rhamnus frangula*	FAC-
huja	Japanese Hops	*Humulus japonicus*	FACU	romu	Multiflora rose	*Rosa multiflora*	FACU
loja	Japanese honeysuckle	*Lonicera japonica*	FAC-	tyan	Cattail (hybrid)	*Typha angustifolia*	OBLW
lomo	Morrow's honeysuckle	*Lonicera morrowii*	NI	tygl	Hybrid cattail	*Typha x glauca*	OBLW
lota	Tartarian honeysuckle	*Lonicera tatarica*					

Pennsylvania Wetland Condition Level 2 Rapid Assessment

(Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

STRESSOR WORKSHEET

2/4/2017

	Occurrence in AA		
	Y	#'s	N
Vegetation Alteration			
Mowing			x
Moderate livestock grazing (within one year)			x
Crops (annual row crops, within one year)			x
Selective tree harvesting/cutting (>50% removal, within 5 years)			x
Right-of-way clearing (mechanical or chemical)			x
Clear cutting or Brush cutting (mechanized removal of shrubs and saplings)			x
Removal of woody debris			x
Aquatic weed control (mechanical or herbicide)			x
Excessive herbivory (deer, muskrat, nutria, carp, insects, etc.)			x
Plantation (conversion from typical natural tree species, including orchards)			x
Other:			x
Total Number:		**0**	
Hydrologic Modification			
Ditching, tile draining, or other dewatering methods			x
Dike/weir/dam			x
Filling/grading			x
Dredging/excavation			x
Stormwater inputs (culvert or similar concentrated urban runoff)			x
Microtopographic alterations (e.g., plowing, forestry bedding, skidder/ATV tracks)			x
Dead or dying trees (trunks still standing)*			x
Stream alteration (channelization or incision)			x
Other:			x
Total Number:		**0**	
Sedimentation			
Sediment deposits/plumes			x
Eroding banks/slopes			x
Active construction (earth disturbance for development)			x
Active plowing (plowing for crop planting in past year)			x
Intensive livestock grazing (in one year, ground is >50% bare)			x
Active selective forestry harvesting (within one year)			x
Active forest harvesting (within two years, includes roads, borrow areas, pads, etc.)			x
Turbidity (moderate concentration of suspended solids in the water column, obvious sediment discharges)			x
Other:			x
Total Number:		**0**	
Eutrophication			
Direct discharges from agricultural feedlots, manure pits, etc.			x
Direct discharges from septic or sewage treatment plants, fish hatcheries, etc.			x
Heavy or moderately heavy formation of algal mats			x
Other:			x
Total Number:		**0**	
Contaminant/Toxicity			
Severe vegetation stress (source unknown or suspected)			
Obvious spills, discharges, plumes, odors, etc.			
Acidic drainages (mined sites, quarries, road cuts)			
Point discharges from adjacent industrial facilities, landfills, railroad yards, or comparable sites			
Chemical defoliation (majority of herbaceous and woody plants affected, within one year)			
Fish or wildlife kills or obvious disease or abnormalities observed			
Excessive garbage/dumping			
Other:			
Total Number:		**0**	

**** Dead or dying trees attributed to beaver activity or emerald ash borer (or other identifiable insect infestation) should not be recorded as a stressor present. The assessor is responsible for recording observations in the comment section concerning presence of these conditions.***

Wetland Condition Assessment Form

Pennsylvania Wetland Condition Level 2 Rapid Assessment (Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

For use in all wetland classifications found within Pennsyvlania except those found within the banks of a watercourse.

Project #	Project Name	Date	Proposed Impact Size (acres)	AA #	AA Size (acres)
60624893	Line 12 Conemaugh River Crossing Project	3/5/20	0.0290	W-CMS-016	0.96

Name(s) of Evaluator(s)	Lat (dd)	Long (dd)	Resource Identifier:			
B. Miller	40.455750	-79.300044	Classification:	PEM	Delineated Area (acres):	0.962934

General Comments:

1. Wetland Zone of Influence Condition Index

	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
Wetland Zone of Influence (300 foot area around AA perimeter)	ZOI area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.					**High Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.			**Low Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.		**High Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.			**Low Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover with maintained understory.		**High Poor:** ZOI area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.			**Low Poor:** ZOI area vegetation consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.		**CI = Total Score/20**
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

1. Identify all applicable Condition Category areas within the wetland zone of influence using the descriptors above.
2. Estimate the % area within each condition category. Calculators are provided for you below.
3. Enter the % ZOI Area in decimal form (0.00) and Score for each category in the blocks below.

Total Score = SUM(%Areas*Scores)

	Condition Category:	Optimal	High Suboptimal	Low Suboptimal	High Marginal	Low Marginal	High Poor	Low Poor	Total Score:	CI
Scoring:	% ZOI Area:	91%	0%	0%	0%	9%	0%	0%		
	Score:	18	0	0	0	7	0	0		
	Total Sub-score:	16.38	0.00	0.00	0.00	0.63	0.00	0.00	17.01	0.85

Comments:

2. Roadbed Presence Index

	Condition Categories																				
	Optimal					Suboptimal					Marginal					Poor					
a. Roadbed Presence (within 0 - 100 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 feet of the AA boundary			**Low Optimal:** Roadbed presence score within 0-100 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 12.		
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

Comments: Roadbed 0-100 Total score is 0

	Condition Categories																				
	Optimal					Suboptimal					Marginal					Poor					
b. Roadbed Presence (within 100 - 300 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 - 300 feet of the AA boundary			**Low Optimal:** Roadbed presence score within 100 - 300 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 100 - 300 feet AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than 12.		**CI = Total Score/20**
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	

Comments: Roadbed 100-300 Total score is 0

	Condition Score	Weighting	Sub-Scores	
a. Roadbed 0-100:	20	* (0.67)	13	
b. Roadbed 100-300:	20	* (0.33)	7	
		Total Score:	**20**	**1.00**

Comments:

Wetland Condition Assessment Form

Pennsylvania Wetland Condition Level 2 Rapid Assessment (Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

For use in all wetland classifications found within Pennsyvlania except those found within the banks of a watercourse.

3. Vegetation Condition Index

	Condition Category			
a. Invasive Species Presence	Optimal	Suboptimal	Marginal	Poor
	High Optimal: No invasives present. **Low Optimal:** <5% of the total AA contains invasive species.	**High Suboptimal:** >5% but less than 10% of the total AA contains invasive species. **Low Suboptimal:** >10% but less than 20% of the total AA contains invasive species.	**High Marginal:** >20% but less than 30% of the total AA contains invasive species. **Low Marginal:** >30% but less than 50% of the total AA contains invasive species.	> 50% of the total AA contains invasive species.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Comments: Total % relative cover of all invasives, collectively on site is 0

	Condition Category				
b. Vegetation Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/40**
	High Optimal: No vegetation stressors present within the AA boundary. **Low Optimal:** One vegetation stressor present within the AA boundary.	**High Suboptimal:** Two vegetation stressors present within the AA boundary. **Low Suboptimal:** Three vegetation stressors present within the AA boundary.	**High Marginal:** Four vegetation stressors present within the AA boundary. **Low Marginal:** Five vegetation stressors present within the AA boundary.	Greater than five vegetation stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	

Comments: Total number of vegetation stressors present - 1

a. Invasive Sub-Score:	20	**Total Score:**	
b. Vegetation Sub-Score:	17	**37**	**0.93**

4. Hydrologic Modification Index

	Condition Category				
Hydrologic Modification Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/20**
	High Optimal: No hydrologic stressors present within the AA boundary. **Low Optimal:** One hydrologic stressor present within the AA boundary.	**High Suboptimal:** Two hydrologic stressors present within the AA boundary. **Low Suboptimal:** Three hydrologic stressors present within the AA boundary.	**High Marginal:** Four hydrologic stressors present within the AA boundary. **Low Marginal:** Five hydrologic stressors present within the AA boundary.	Greater than five hydrologic stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	**1.00**

Comments: Total number of hydrologic modifications present - 0

Score:	20

5. Sediment Stressor Index

	Condition Category				
Sediment Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/20**
	High Optimal: No sediment stressors present within the AA boundary. **Low Optimal:** One sediment stressor present within the AA boundary.	**High Suboptimal:** Two sediment stressors present within the AA boundary. **Low Suboptimal:** Three sediment stressors present within the AA boundary.	**High Marginal:** Four sediment stressors present within the AA boundary. **Low Marginal:** Five sediment stressors present within the AA boundary.	Greater than five sediment stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	**1.00**

Comments: Total number of sediment stressors present - 0

Score:	20

6. Water Quality Stressor Index

	Condition Category			
a. Eutro- phication Stressor Presence	Optimal	Suboptimal	Marginal	Poor
	No eutrophication stressors present within the AA boundary.	One eutrophication stressors present within the AA boundary.	Two eutrophication stressors present within the AA boundary.	Three eutrophication stressors present within the AA boundary.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Comments: Total number of Eutrophication stressors present - 0

	Condition Category				
b. Contaminant / Toxicity Stressor Presence	Optimal	Suboptimal	Marginal	Poor	**CI = Total Score/40**
	No contaminant / toxicity stressors present within the AA boundary.	One contaminant / toxicitystressors present within the AA boundary.	Two contaminant / toxicity stressors present within the AA boundary.	Three contaminant / toxicity stressors present within the AA boundary.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	

Comments: Total number of Contaminant/Toxicity stressors present - 0

a. Eutrophication Score	20	**Total Score:**	**1.00**
b. Contaminant Score	20	**40**	

Overall Wetland Level 2 Condition Score: Sum all six of the Condition Indexes and divide by 6 to calculate the overall condition score.	**Overall Condition Index:**	**0.96**

Wetland ZOI Worksheet					
Desktop Review			**Field View**		
Condition Category	Size (Ac)	Percentage	Condition Category	Size (Ac)	Percentage
Optimal	15.46	91%	Optimal	15.46	91%
High Suboptimal	0.00	0%	High Suboptimal	0.00	0%
Low Suboptimal	0.00	0%	Low Suboptimal	0.00	0%
High Marginal	0.00	0%	High Marginal	0.00	0%
Low Marginal	1.53	9%	Low Marginal	1.53	9%
High Poor	0.00	0%	High Poor	0.00	0%
Low Poor	0.00	0%	Low Poor	0.00	0%
Calculated total area	16.99	100%	Calculated total area	16.99	100%

Enter Total Area 16.99 From ZOI shapefile

Calculated total area and Entered Total Area must be equal

Pennsylvania Wetland Condition Level 2 Rapid Assessment
(Document No. 310-2137-002)
Pennsylvania Department of Environmental Protection

Invasive Species Presence Worksheet

Are invasive species (from list) present at the site in any layer? **NO**

If listed species present, enter the percent areal coverage for each species below:

Species Code	<5%	≥ 5-20%	≥ 20 - 50%	≥ 50%	*Species Code*	<5%	≥ 5-20%	≥ 20 - 50%	≥ 50%

Total % relative cover of all invasives, collectively on site: 0 **%**

Comments:

Common Invasives/Aggressives List

Code	Common Name	*Scientific*	Status	Code	Common Name	*Scientific*	Status
aggi2	Redtop	*Agrostis gigantea*	FACW	luhe	Water primrose	*Ludwigia hexapetala*	OBLW
algl2	European Alder	*Alnus glutinosa*	FACW	lyvu	Garden loosestrife	*Lysimachia vulgaris*	OBLW
arhi3	Carpetgrass	*Arthraxon hispidus*	FAC-	lysa2	Purple loosestrife	*Lythrum salicaria*	FACW
beth	Japanese barberry	*Berberis thunbergii*	FACW	maqu	European waterclover	*Marsilea quadrifolia*	OBLW
bevu	European barberry	*Berberis vulgaris*	FACW	mivi	Japanese stiltgrass	*Microstegium vimineum*	FAC
butom	Flowering Rush	*Butomus umbellatus*	OBLW	nami2	Water cress	*Nasturtium officinale*	OBLW
calli6	Pond water-starwort	*Callitriche stagnalis*	OBLW	pelo	Low smartweed	*Persicaria longiseta*	FACW
egde	Brazilian waterweed	*Egeria densa*	OBLW	phar	Reed canary grass	*Phalaris arundinacea*	FACW
elan	Russian olive	*Elaeagnus angustifolia*	FACU	phau7	Common Reed	*Phragmites australis*	OBLW
elum	Autumn olive	*Elaeagnus umbellata*	FACU	potr	Rough bluegrass	*Poa trivialis*	FACW
ephi	Hairy willow-herb	*Epilobium hirsutum*	FACW	pocu6	Japanese knotweed	*Polygonum (Faloia) cuspidatum*	FAC-
eppa5	Willow-herb	*Epilobium parviflorum*	FACW	pgpf	Mile-a-minute	*Polygonum perfoliatum*	FAC-
fasa	Giant knotweed	*Fallopia sachalinensis*	OBLW	puera	Kudzu-vine	*Pueraria lobata*	FAC-
gldi	Mudmats	*Glossostigma diandrum*	OBLW	pysp1	Apple/crabapple/pear	*Pyrus sp.*	FAC?
hola	Velvetgrass	*Holcus lanatus*	FAC	rhfr	Glossy Buckthorn	*Rhamnus frangula*	FAC-
huja	Japanese Hops	*Humulus japonicus*	FACU	romu	Multiflora rose	*Rosa multiflora*	FACU
loja	Japanese honeysuckle	*Lonicera japonica*	FAC-	tyan	Cattail (hybrid)	*Typha angustifolia*	OBLW
lomo	Morrow's honeysuckle	*Lonicera morrowii*	NI	tygl	Hybrid cattail	*Typha x glauca*	OBLW
lota	Tartarian honeysuckle	*Lonicera tatarica*					

Pennsylvania Wetland Condition Level 2 Rapid Assessment (Document No. 310-2137-002) Pennsylvania Department of Environmental Protection **STRESSOR WORKSHEET**	2/4/2017 **Occurrence in AA**		
	Y	**#'s**	**N**
Vegetation Alteration			
Mowing	X		x
Moderate livestock grazing (within one year)			x
Crops (annual row crops, within one year)			x
Selective tree harvesting/cutting (>50% removal, within 5 years)			x
Right-of-way clearing (mechanical or chemical)			x
Clear cutting or Brush cutting (mechanized removal of shrubs and saplings)			x
Removal of woody debris			x
Aquatic weed control (mechanical or herbicide)			x
Excessive herbivory (deer, muskrat, nutria, carp, insects, etc.)			x
Plantation (conversion from typical natural tree species, including orchards)			x
Other:			x
Total Number:	**1**		
Hydrologic Modification			
Ditching, tile draining, or other dewatering methods			x
Dike/weir/dam			x
Filling/grading			x
Dredging/excavation			x
Stormwater inputs (culvert or similar concentrated urban runoff)			x
Microtopographic alterations (e.g., plowing, forestry bedding, skidder/ATV tracks)			x
Dead or dying trees (trunks still standing)*			x
Stream alteration (channelization or incision)			x
Other:			x
Total Number:	**0**		
Sedimentation			
Sediment deposits/plumes			x
Eroding banks/slopes			x
Active construction (earth disturbance for development)			x
Active plowing (plowing for crop planting in past year)			x
Intensive livestock grazing (in one year, ground is >50% bare)			x
Active selective forestry harvesting (within one year)			x
Active forest harvesting (within two years, includes roads, borrow areas, pads, etc.)			x
Turbidity (moderate concentration of suspended solids in the water column, obvious sediment discharges)			x
Other:			x
Total Number:	**0**		
Eutrophication			
Direct discharges from agricultural feedlots, manure pits, etc.			x
Direct discharges from septic or sewage treatment plants, fish hatcheries, etc.			x
Heavy or moderately heavy formation of algal mats			x
Other:			x
Total Number:	**0**		
Contaminant/Toxicity			
Severe vegetation stress (source unknown or suspected)			x
Obvious spills, discharges, plumes, odors, etc.			x
Acidic drainages (mined sites, quarries, road cuts)			x
Point discharges from adjacent industrial facilities, landfills, railroad yards, or comparable sites			x
Chemical defoliation (majority of herbaceous and woody plants affected, within one year)			x
Fish or wildlife kills or obvious disease or abnormalities observed			x
Excessive garbage/dumping			x
Other:			x
Total Number:	**0**		

**** Dead or dying trees attributed to beaver activity or emerald ash borer (or other identifiable insect infestation) should not be recorded as a stressor present. The assessor is responsible for recording observations in the comment section concerning presence of these conditions.***

2/4/2017

Pennsylvania Wetland Condition Level 2 Rapid Assessment

(Document No. 310-2137-002)

Pennsylvania Department of Environmental Protection

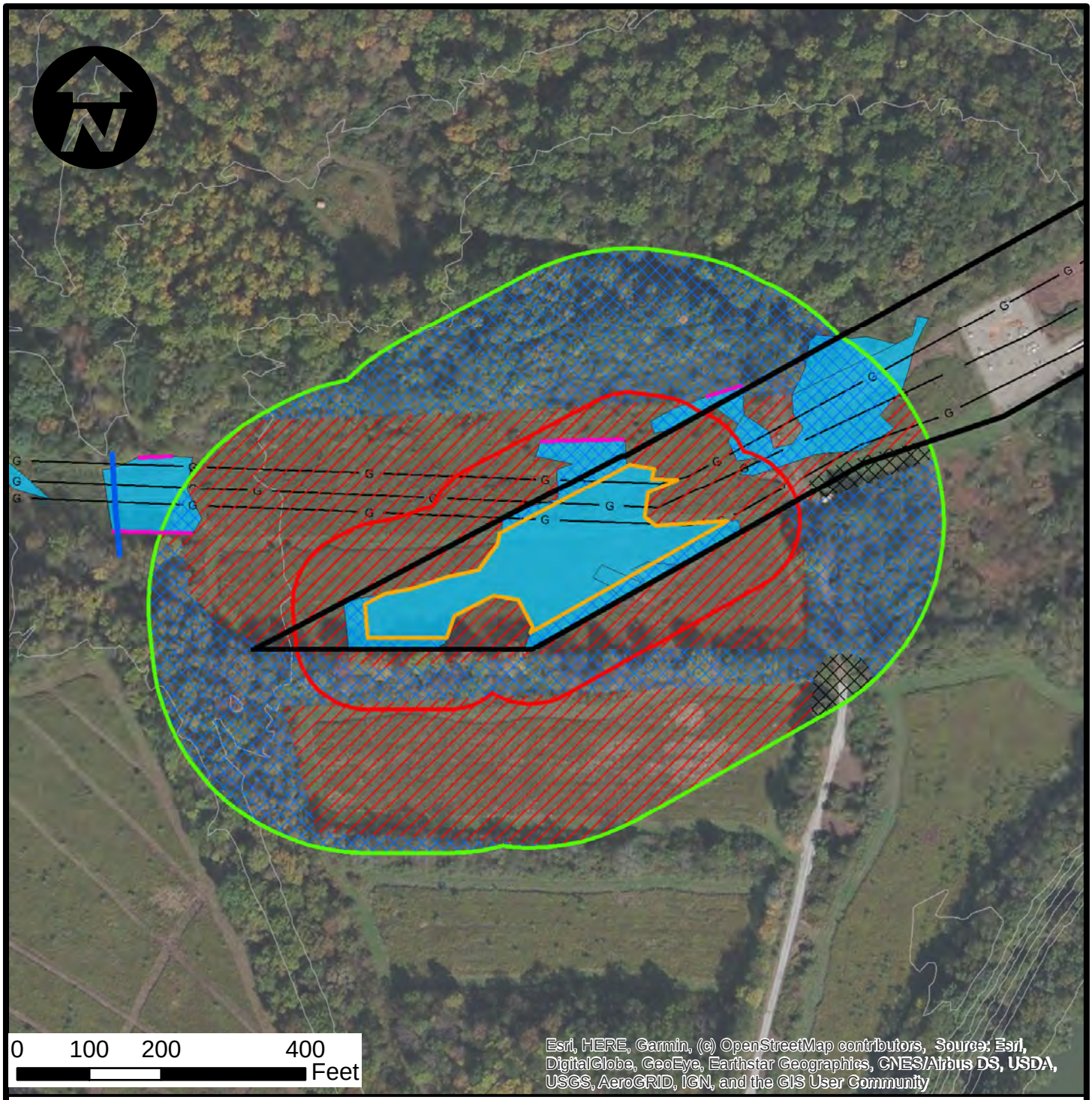
Roadbed Worksheet

Project Name / Identifier		Date	Name(s) of Evaluator(s)
Line 12 Conemaugh River Crossing Project		3/5/2020	B. Miller
Resource Identifier / AA #	**Lat (dd)**	**Long (dd)**	**Notes:**
W-CMS-016	40.455750	-79.300044	#VALUE!

Roadbeds: Record the number of occurrences by roadbed type and distance category. Multiply the number of occurrences by the weighting factors for each roadbed type and distance category then sum the total score for each distance category. The total scores for each distance category are then compared to the condition category descriptions.

Roadbed Type	Distance	Occurrences	Weighting Factor	Score	Distance	Occurrences	Weighting Factor	Score
≥ 4 Lane Paved	0-100 ft.	0	4	0	100-300 ft.	0	4	0
2 Lane Paved	0-100 ft.	0	2	0	100-300 ft.	0	2	0
1 Lane Paved	0-100 ft.	0	1	0	100-300 ft.	0	1	0
Gravel Road	0-100 ft.	0	1	0	100-300 ft.	0	1	0
Dirt Road	0-100 ft.	0	2	0	100-300 ft.	0	2	0
Railroad	0-100 ft.	0	2	0	100-300 ft.	0	2	0
Other Roadbeds	0-100 ft.	0	1, 2 or 4	0	100-300 ft.	0	1, 2 or 4	0
Total Scores:	0-100 ft.	0			100-300 ft.	0		

Road Comments:



LEGEND

- PROPOSED LOD
- EXISTING TETLP PIPELINE
- WATERCOURSE
- OPEN-END
- RIVERINE ZOI
- RIVERINE VEGETATION
- WETLAND
- WETLAND AA
- WETLAND 100-FT ZOI
- WETLAND 300-FT ZOI

CONDITION CATEGORY

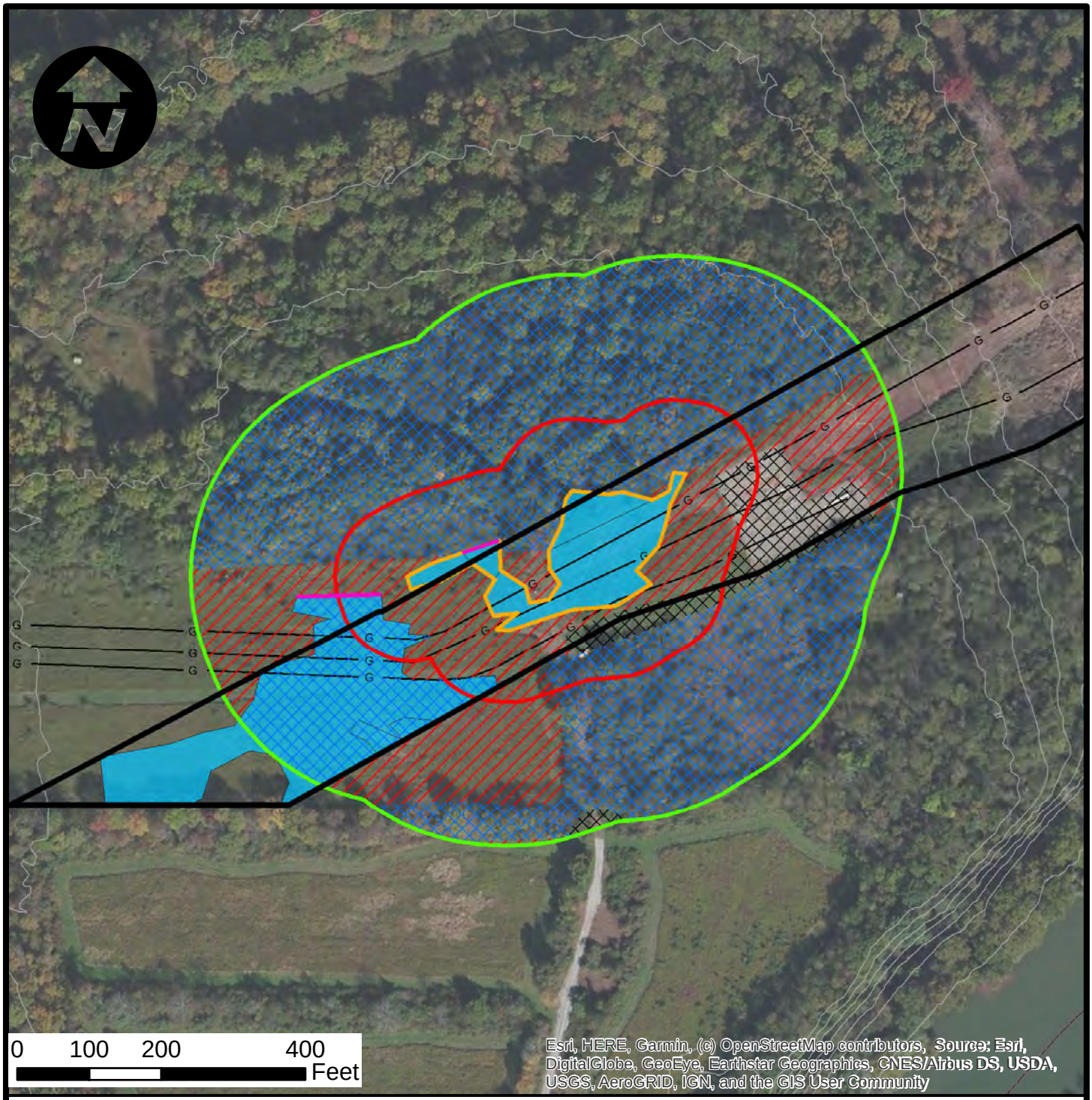
- OPTIMAL
- HIGH MARGINAL
- MARGINAL
- POOR

AECOM
FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE 120
PITTSBURGH, PA 15220

ENBRIDGE

TEXAS EASTERN TRANSMISSION, LP

PREPARED BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	FIGURE 3
MLN	SLH	KJT	5/19/2020	1 " = 200 feet	WETLAND: W-BJM-011 LEVEL 2 RAPID ASSESSMENT PROTOCOL CONEMAUGH RIVER CROSSING PROPOSED 24" HDD PIPELINE
			PAGE NO: Page 1 of 4	PROJECT NO. 60612899	



LEGEND

- PROPOSED LOD
- EXISTING TETLP PIPELINE
- WATERCOURSE
- OPEN-END
- RIVERINE ZOI
- RIVERINE VEGETATION
- WETLAND
- WETLAND AA
- WETLAND 100-FT ZOI
- WETLAND 300-FT ZOI

CONDITION CATEGORY

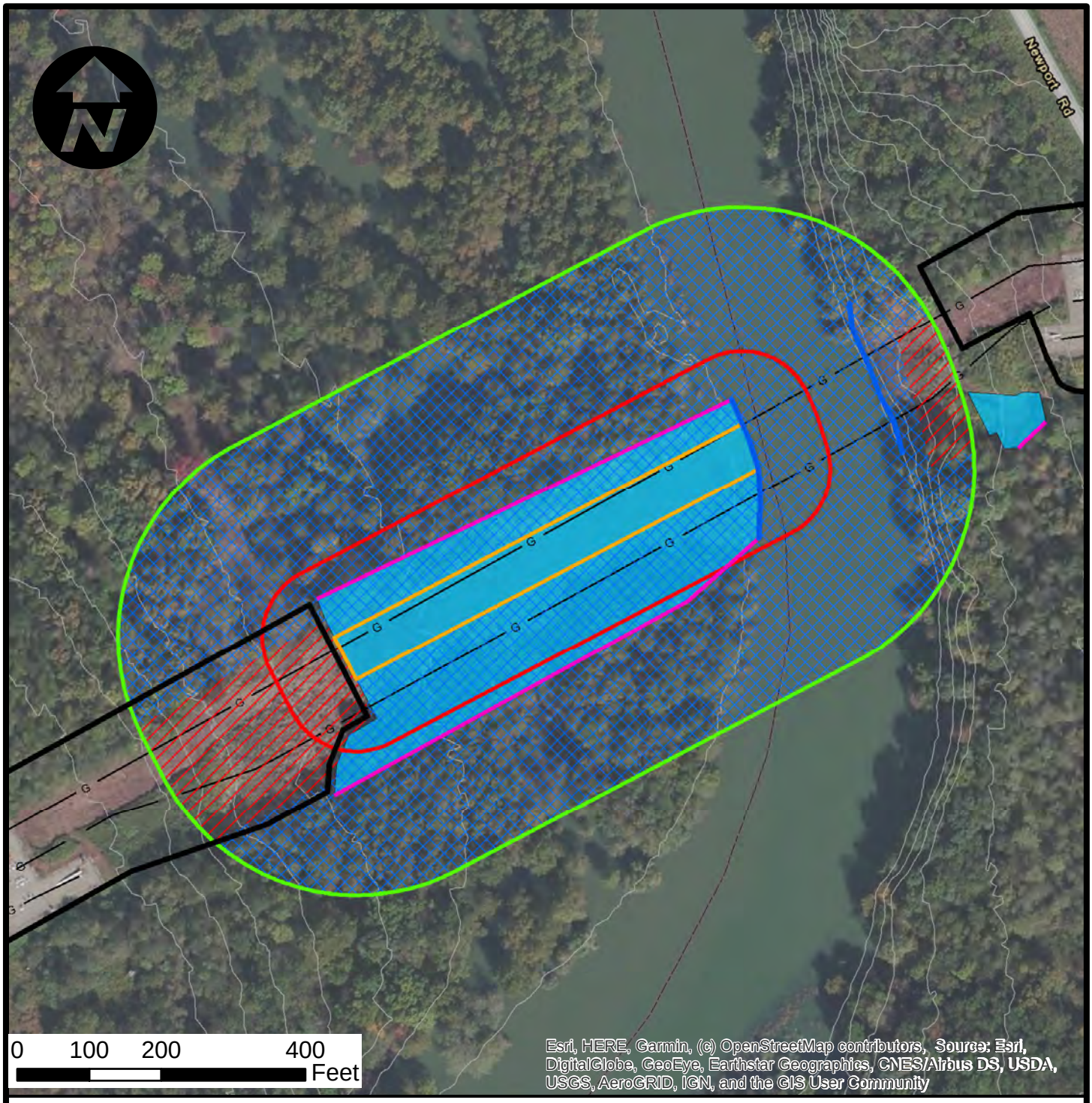
- OPTIMAL
- HIGH MARGINAL
- MARGINAL
- POOR

AECOM
FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE 120
PITTSBURGH, PA 15220

ENBRIDGE

TEXAS EASTERN TRANSMISSION, LP

PREPARED BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	FIGURE 3
MLN	SLH	KJT	5/19/2020	1 " = 200 feet	WETLAND: W-BJM-010 LEVEL 2 RAPID ASSESSMENT PROTOCOL CONEMAUGH RIVER CROSSING PROPOSED 24" HDD PIPELINE
			PAGE NO: Page 2 of 4	PROJECT NO. 60612899	



LEGEND

- PROPOSED LOD
- EXISTING TETLP PIPELINE
- WATERCOURSE
- OPEN-END
- RIVERINE ZOI
- RIVERINE VEGETATION
- WETLAND
- WETLAND AA
- WETLAND 100-FT ZOI
- WETLAND 300-FT ZOI

CONDITION CATEGORY

- OPTIMAL
- HIGH MARGINAL
- MARGINAL
- POOR

AECOM
FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE 120
PITTSBURGH, PA 15220

ENBRIDGE

TEXAS EASTERN TRANSMISSION, LP

PREPARED BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	FIGURE 3
MLN	SLH	KJT	5/19/2020	1 " = 200 feet	WETLAND: W-CMS-016 LEVEL 2 RAPID ASSESSMENT PROTOCOL CONEMAUGH RIVER CROSSING PROPOSED 24" HDD PIPELINE
			PAGE NO: Page 3 of 4	PROJECT NO. 60612899	

Requirement M

Erosion and Sediment Control Plan

(ESCGP-3 Application submitted concurrently with this application, provided under separate cover)

Requirement N

Hydrologic and Hydraulic Analysis

HYDROLOGIC AND HYDRAULIC ANALYSIS

No permanent stream crossings impacting stream banks or substrate are proposed for this project; therefore, no hydrologic and hydraulic analysis is provided.

Requirement O

Stormwater Management Analysis and Consistency Letter

STORMWATER MANAGEMENT PLAN ANALYSIS

Westmoreland County has enacted an Act 167 Watershed Stormwater Management Plan under the Pennsylvania Stormwater Management Act of 1978. Under Act 167 municipalities must enact ordinances consistent with the County plan. Texas Eastern has submitted a request to Derry Township, Westmoreland County to confirm the Project's consistency with any municipal stormwater ordinances. Results of that request will be forwarded to PADEP upon receipt. Indiana County has not enacted an Act 167 plan and as such a consistency letter from Blacklick Township is not required.

Texas Eastern will submit an Erosion and Sediment Control General Permit (ESCGP-3) and anticipates Project Erosion and Sediment Control Plan approval from the Westmoreland and Indiana County Conservation Districts, and has completed Act 14 and Acts 67/68/127 notification (Requirement C).

Requirement P

Floodplain Management Analysis and Consistency Letter

FLOODPLAIN MANAGEMENT ANALYSIS AND CONSISTENCY LETTER

The Project will be constructed in a FEMA-mapped floodplain of the Conemaugh River. However, no structures or permanent impacts are planned within the floodplain. Accordingly, an analysis of the Project's impact on the floodplain delineation and surface water profiles is not applicable.

Requirement Q

Risk Assessment

RISK ASSESSMENT

No permanent stream crossings are proposed for this project; therefore, no risk assessment is provided.

Requirement R

Professional Engineer's Seal and Certification

PROFESSIONAL ENGINEER'S SEAL AND CERTIFICATION

I, Brandon M. Walker, PE, do hereby certify pursuant to the penalties of 18 Pa. C.S.A., Section 4904 to the best of my knowledge, information and belief, that the information contained in the accompanying plans, specifications and reports has been prepared in accordance with accepted engineering practice, is true and correct, and is in conformance with Chapter 105 of the rules and regulations of the Department of Environmental Protection.

Engineer Name (typed): Brandon M. Walker, PE
Registration Number: PE077056

Signature: COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL BRANDON M. WALKER ENGINEER PE077056

Date: May 28, 2020

Requirement S

Alternative Analysis

ALTERNATIVES ANALYSIS

The following sections discuss the alternatives to the Project that were considered by Texas Eastern to avoid and minimize impacts to wetlands and watercourses.

The Project will result in temporary impacts to approximately 1.96 acres of wetlands within the existing previously disturbed pipeline right-of-way (ROW) as well as additional temporary workspace adjacent to the existing ROW. The horizontal directional drill (HDD) operation will install a new segment of Line 12 beneath one PEM wetland resulting in 0.03 acres of permanent impact, and beneath one perennial watercourse and its assumed floodway resulting 0.02 acres of permanent impact. There will be no net loss in resource area. Section 105.13(d)(1)(viii) of the Pennsylvania Code requires consideration of alternative locations, routings or designs that may potentially avoid or minimize adverse environmental impacts.

ALTERNATIVE 1: Repair Anomaly in Existing Line 12

As described previously in the Project Narrative in Section J, an anomaly was identified approximately 25 feet from the west bank of the Conemaugh River in Texas Eastern's existing Line 12, as a result of a routine in-line inspection in 2018. Texas Eastern received a General Permit 11 (GP116518226) from the Pennsylvania Department of Environmental Protection (PADEP) and U.S. Army Corps of Engineers (USACE) to cross and excavate wetland W-CMS-016 in order to repair the anomaly as part of their Integrity maintenance program. The General Permit authorized 0.98 acres of impact to cross and excavate the wetland to repair the anomaly. However, the existing Line 12 is approximately 30 feet below grade adjacent to the river, likely as a result of silt deposits from the river flooding. The Conemaugh River in the vicinity of the existing ROW is part of an USACE flood control area and as a result the river routinely overflows its western bank. Texas Eastern attempted during the construction season in 2018 and again in 2019 to repair the anomaly via conventional construction methods. The depth of the pipeline, the proximity of the anomaly to the riverbank, and the frequent flooding of the river, particularly with the record rainfalls received during those years, meant that it was not possible to dewater the trench box sufficiently to safely assess and repair the anomaly. After two years of attempts Texas Eastern concluded that repairing the anomaly via the previously permitted typical anomaly repair approach is not feasible. Therefore, this alternative was eliminated from consideration.

ALTERNATIVE 2: In-Situ Replacement of Line 12 Segment via Conventional Construction and Open-Cut of the Conemaugh River

Texas Eastern investigated in-situ replacement of the existing Line 12, from the existing mainline valve (MLV) on the west side of the river to the existing MLV on the east side of the river, through wetland W-CMS-016 and the Conemaugh River using conventional open-cut construction. The replacement would

involve approximately 1,700 feet of pipeline. This is the most common method for installing pipeline under aquatic resources. Both wet and dry crossings were evaluated for the open-cut crossing.

For the wet crossing use of a barge as a construction platform in the river was evaluated. Texas Eastern communicated with the USACE and there is no adequate boat launch in the immediate area. Therefore, this would necessitate the transport of the barge across upland area and through over 600 feet of wetland to the western bank of the river. Excavation of the bank for launching the barge, mooring of the barge, side casting of the spoil during construction into the channel or moving it through the wetland area to a temporary stockpile area were all evaluated. It was determined that the impacts to the wetland, riverbank and channel as well as potential risks associated with a flood event during construction made this alternative undesirable.

A dry crossing using a bladder dam, temporary sheet pile wall, dam and pump and other similar techniques was also evaluated. In the case of watercourse crossing, the water (if flowing) is diverted around the construction area creating a dry workspace. A trench is then excavated through the dry channel. The pipeline is installed at a predetermined depth, backfilled to original contours and completed by replacing the stockpiled substrate. For wetlands, a trench is created through the wetland, segregating the topsoil removed from the wetland surface. The pipeline is then installed at a predetermined depth, backfilled to original contours and completed by replacing the segregated topsoil. The Conemaugh River is considered a navigable water by the USACE so construction within the river would have to be coordinated with the dam operation downstream.

In order to replace the required segment of Line 12 using open-cut construction workspace approximately 100 feet wide would be required for the entire length of wetland W-CMS-016, approximately 640 feet, totaling 2.04 acres of impact. The Conemaugh River would also be open cut, impacting both riverbanks and river bed, totaling 0.29 acres of impact as well as the river's floodway, totalling 0.18 acres of impact. Construction within the Conemaugh River would incur the same safety issues as described in the previous alternative, namely the frequent flooding and water depth changes from high rainfall and flood control activities creates the possibility that the trench would need to be abandoned mid-construction.

Line 12 is the northernmost line on the existing ROW, but the extent of the permanent easement has not been maintained. In order to get the required 100-foot wide construction workspace, Texas Eastern would need to clear the extent of their easement and remove trees in the entire 640-foot length of forested wetland at the northern end of the easement.

While technically feasible, this alternative would require greater wetland impacts, direct impacts to the Conemaugh River, safety concerns, and greater forested wetland clearing. Therefore, this alternative was eliminated from consideration.

ALTERNATIVE 3 (Preferred Alternative): In-Situ Replacement of a Segment of Line 12 and HDD a New Segment of Line 12

A described above, Alternatives 1 and 2 were deemed infeasible or undesirable due to potential increased impacts and safety concerns. Alternative 3 would be to implement the Project as described throughout this application and take into consideration appropriate construction avoidance and minimization measures. There would be no direct impacts to the banks or channel of the Conemaugh River with an HDD. Impacts to the wetlands on the western side would be primarily limited to temporarily matted workspace within the maintained ROW and small areas of expansion necessary at the bore pit. Alternative 3 will accomplish the Project purpose and need safely and with less impacts.

Avoidance and Minimization

Reduce Workspace to Avoid/Minimize Impacts to Wetland Habitats

Construction workspace requirements are a function of construction method, equipment size, and topography. Where feasible, construction activities are restricted to the ROW limits identified on the construction drawings. Because the ROW changes direction west of the HDD entry point temporary workspace is required outside of the ROW for pipe pullback. The construction workspace includes area for HDD operations, the trench excavated around the pipeline, areas for soil stockpiling, and areas that construction equipment will utilize to complete required activities. Texas Eastern must provide sufficient workspace to permit the safe operation of construction equipment at the Project site. The construction workspace at the Project site is identified as the limit of disturbance or “LOD” on the Site Plan (Requirement H).

Requirement T

Mitigation Plan

MITIGATION PLAN

As discussed in the preceding Project alternatives analysis, Texas Eastern has incorporated all practicable measures to avoid and minimize environmental impacts associated with the Project. Texas Eastern's construction procedures have also been developed to minimize unavoidable impacts to wetlands. During Project construction two wetlands and one floodway will be crossed via temporary structure and one wetland along with one perennial watercourse will be crossed via horizontal directional drill (HDD) bore. Texas Eastern chose the HDD construction method in order to reduce wetland impacts and eliminate impacts to the riverbanks and bed of the Conemaugh River, as detailed in the alternatives analysis. In addition, the portion of existing Line 12 located in wetland W-CMS-016 and under the Conemaugh River will be capped, grouted, and left in place to avoid impacts associated with removing it. No trenching in wetlands will be required. Using HDD to bore under wetland W-CMS-016 rather than in-situ replacement of Line 12 also eliminates the need to convert forested wetland at the northern end of the ROW, which would be needed for workspace for conventional construction.

The construction procedures used to cross unsaturated wetlands are similar to those used on dry land. Stable temporary work surfaces may be required in wetlands where soils are saturated and unstable. Installing construction mats in the equipment travel lane and work surface is a typical method of site stabilization that Texas Eastern will employ, as necessary. During site preparation activities, vegetation will be cut to ground level within the wetland. Vegetation removal and grading will be limited to the area within the limit of disturbance (LOD), which has been reduced to the minimum necessary for safe construction of the Project. Original topographic conditions and contours will be restored as close to pre-construction as possible after completion of construction.

Within wetland areas a total of 26 trees that meet the regulatory classification of trees will need to be removed, these trees will be cut with the stumps left intact. Twelve of the trees that need to be removed are located in a Palustrine Forested (PFO) wetland within the limits of Texas Eastern's existing easement, which will be maintained following construction resulting in approximately 0.10 acres of permanent wetland conversion and which will require compensatory wetland mitigation. Texas Eastern assumes a mitigation of 1:1 will be required to offset the conversion of PFO wetland to PEM. To provide this, Texas Eastern intends to purchase off-site mitigation credits at a ratio of 1:1 (0.10 acres). Details of the plan/agreement will be discussed and shared with PADEP prior to issuance of the permit authorization.

The remainder of trees to be removed are in the HDD pullback area outside of the existing easement, this workspace is required to complete the operation and will be restored following construction and allowed to regenerate. The trees that will be cut in the HDD pullback area are located within wetland W-BJM-011, classified as Palustrine Emergent (PEM) and Palustrine Scrub-shrub (PSS) and as such, will not constitute a conversion of forested wetland. Construction will be in accordance with the Project

Description (see Requirement J) and Texas Eastern's Erosion and Sediment Control Plan (E&SCP) to minimize the potential for adverse effects to wetlands.

Requirement U

USACE Linear Project Upload Spreadsheet

Conemaugh River Crossing Project
USACE Project Upload Spreadsheet

Single & Complete Project Number*	Crossing Number	Waters Name**	Cowardin Code	HGM Code	Estimated Amount of Aquatic Resource in Review Area*** (sq. ft.)	Estimated Amount of Aquatic Resource in Review Area Linear (ft.)	Waters Types	Latitude (dd nad83)	Longitude (dd nad83)	PA Code Chapter 93 Designation	Local Waterway	Class of Aquatic Resources (Sec. 10 or Sec. 404)	Stream Type (P-Perennial, I-Intermittent, or E-Ephemeral)	Impact Type (T-Temporary P-Permanent C-Conversion)	Stream Impact Stream Width - top of bank to top of bank	Stream Impact Center line of Stream (l. ft.)	Stream Impact Area (sq.ft.)	Wetland Impact (sq. ft.)	Impact Description	Alignment Sheet, Plan Sheet, or Figure #
	1	W-BJM-011	PEM/PSS	FLn	64,970	–	DELINEATE	40.454229	-79.303831	–	–	404	–	T	–	–	–	59,116	Temporary workspace	ES DELM-P-8201
	2	W-BJM-010	PEM/PSS/ PFO	FLn	29,442	–	DELINEATE	40.454614	-79.302808	–	–	404	–	T	–	–	–	26,264	Temporary workspace	ES DELM-P-8202

NOTES:

*** Single & Complete Project Number - Consultants/Applicant leave this column blank. The USACE Project Manager assigned to your project will complete this column.**

**** Waters Name is the Stream or Wetland Identification Number the Consultant/Applicant provides to each Stream or Wetland crossed by the Project.**

***** Estimated Amount of Aquatic Resource in Review Area reflects the total size of a wetland or wetland complex, not only the size of the classification type to be impacted.**

Requirement V
HDD Contingency Plan

Best Practices Plan for Horizontal Directional Drill Operations

Drill Procedures and Monitoring; Inadvertent Return Monitoring, Response and Cleanup; and Contingency Plan Implementation

Conemaugh River Crossing Project

Westmoreland and Indiana Counties, Pennsylvania

Texas Eastern Transmission, LP

June 2020

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Table A-1. Drilling Fluid Additive Human Health Standards
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1.0 INTRODUCTION

Texas Eastern Transmission, LP, (Texas Eastern) is using their blanket authorization from the Federal Energy Regulatory Commission (FERC) pursuant to Section 157 of the Natural Gas Act (NGA) to construct and operate the Conemaugh River Crossing Project (Project) located in Westmoreland and Indiana Counties, Pennsylvania. The Horizontal Directional Drill (HDD) pipeline installation method is proposed for the Project. Texas Eastern has developed this Best Practices Plan for HDD Operations (Plan) for planning and personnel involved in HDD operations. While the HDD pipe installation method is a proven technology, use of an HDD has potential adverse implications for its success to avoid and minimize impacts to sensitive environmental resources and may not be successful due to unknown subsurface obstructions or geological conditions. The HDD procedures listed in this Plan describe some of the items in FERC's "*Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response, and Contingency Plans"* (FERC HDD Guidance [FERC2019]). The components of the FERC HDD Guidance in this Plan include personnel training, responsibilities, work processes and procedures; stakeholder notification procedures; monitoring and reporting procedures; response procedures for inadvertent returns (IR) of drilling fluid; and contingency plans if the HDD is determined to be unsuccessful.

This Plan is to be used in conjunction with the Project's HDD Feasibility Report that was developed during the planning and design stages of the Project. The HDD Feasibility Report details known geological conditions, pipe bend specifications, and feasibility determinations.

HDD activities during construction will be managed in accordance with this Plan and will be kept on-site during construction, available to and implemented by the responsible parties and personnel described in Section 2.2.1 below. Section 1.1 describes the typical HDD installation method procedures. These procedures may be modified to adjust to site-specific conditions.

1.1 General HDD Installation Method Procedures

The HDD pipe installation method is a trenchless method that avoids disturbance to the earth's surface along the majority of its length. HDD is typically used in areas where trenching is not feasible due to availability of workspace, avoidance of subsurface utilities, roadways and railroads, and sensitive resources. An HDD always involves establishing Construction ROW staging areas at both ends of the HDD. Equipment and operations within the Construction ROW include the drilling equipment, control cab, tool storage trailers, power generators, bentonite storage, bentonite slurry mixing equipment, slurry pump, cuttings separation equipment, cuttings return/settlement pit, water trucks and water storage, slurry containment pit, cuttings return/settlement pit, cuttings separation and slurry reclamation equipment, drill

string pipe storage, and the heavy construction equipment necessary to support the operation.

The HDD process commences with the drilling of a pilot hole into the ground beneath the obstruction or sensitive resource and then enlarging the hole with one or more passes using reamer tools and swab passes until the hole is the necessary diameter to facilitate the pull-back (i.e., installation) of the pipe. Conditions can be present where the HDD contractor chooses an underground intersect drilling and reaming operation (HDD Intersect). An HDD Intersect is conducted by placing drilling equipment at both drill extents and drilling toward one another until the drill heads meet. The drill pipe then forms a continuous connection between the two drills. Once this connection occurs, reaming equipment can be both pushed and pulled simultaneously to reduce pipe stress.

Throughout the drilling and reaming process, a pressurized slurry drilling fluid is circulated through the equipment to lubricate the equipment; support the hole's structure and minimize the potential for collapse; and to remove earthen material cuttings from the hole. Once the reaming and swab passes are complete, prefabricated pipe segments (i.e., pipe stings) are pulled through the hole to complete the installation. Additional welding between segments is required to connect the pipe segments and complete a continuous pipeline.

IRs occur when the slurry drilling fluid inadvertently migrates to the surface or subsurface cavities through rock fractures and fissures. The slurry drilling fluid is a mixture of primarily water and bentonite clay. Water used for the HDD operation is typically sourced from a local water purveyor and is potable. Surface water extractions for HDD operation are tested to ensure no contaminates are present. If contaminates are present the water source will not be used or could be treated prior to use. Bentonite clay is classified as non-toxic to the aquatic environment and is a non-hazardous substance. Additives may be mixed into the drilling fluid as needed depending on the anomaly they are proposed to solve. IR drilling fluids typically contain a lower concentration of bentonite clay than what was originally mixed as the movement of the drilling fluid is filtered as its passes through the earthen material before its surface release.

2.0 BEST AVAILABLE DRILLING PRACTICES

Texas Eastern proposes to use one HDDs to install the new section of pipeline. This HDD was designed using known geological conditions, pipe bend specifications, and avoidance measures required by permitting entities. Texas Eastern has developed an HDD Design Report that details this information. The HDD plan and profile drawings are located within the HDD Design Report. Details regarding the HDD are presented below.

Conemaugh River HDD

The Conemaugh River HDD proposed length is approximately 1,880 feet and extends between stations 5+00 and 26+69 on the proposed realignment of the existing Line 12 pipeline in Derry Township and Blacklick Township, east and west of the Conemaugh River. The proposed HDD is designed to avoid impacts to the Conemaugh River and a large wetland west of the river. The HDD process is anticipated have a duration of approximately 8-12 weeks.

HDD Tie-in Connections

The two ends of the HDD will tie into the existing Line 12 using short sections of conventional trenched pipeline construction methods on the east and west side of the Conemaugh River. Temporary workspace areas at the locations of western tie-in will provide adequate Construction ROW for pipe staging, stringing and pullback. A small section of new permanent easement on the east side of the river is necessary to tie into the existing Line 12 via a new main-line valve (MLV).

2.1 Pre-Construction Activities

2.1.1 Personnel

Texas Eastern and its HDD Contractor will employ qualified personnel prior to the start of HDD operations that have responsibilities in their field. These personnel and responsibilities include the following:

Chief Inspector – Texas Eastern will designate a Chief Inspector (CI) for the Project. The CI will have overall authority for construction activities that occur on the Project, including the HDD.

Environmental Inspector – One EI will be assigned during active construction or restoration. The EI will have peer status with all other activity inspectors and will report directly to the Texas Eastern Construction Chief who has overall authority on the Construction ROW. The EI will have the authority to stop activities that violate the environmental conditions of the FERC Certificate (if applicable), other federal and state

permits, or landowner requirements and to order corrective action.

HDD Superintendent – The HDD Superintendent will be the senior on-site representative of the HDD contractor and will have the overall responsibility for implementing this Plan on behalf of the HDD Contractor. The HDD Superintendent will be familiar with all aspects of the drilling activities, the contents of the Plan, and the conditions of approval under which the activity is permitted to take place. The HDD Superintendent will make a copy of this Plan available at the drill site and will distribute it to the appropriate construction personnel. The HDD Superintendent will ensure that workers are properly trained and familiar with the necessary procedures for response to an IR.

HDD Operator – The HDD Operator will be responsible for operating the drilling equipment and mud pumps, monitoring circulation back to the entry and exit locations, and monitoring annular pressures during pilot- hole drilling. In the event of loss of circulation or higher than expected annular pressures, the HDD Operator must communicate the event to the HDD Superintendent and HDD contractor field crews, as well as the on-site Texas Eastern inspection staff. The HDD Operator is responsible for stoppage or changes to the drilling program in the event of observed or anticipated IR.

HDD Contractor Personnel – During HDD installation, field crews will be responsible for monitoring the HDD alignment along with the Texas Eastern's field representatives. Field crews, in coordination with the EI, will be responsible for timely notifications and responses to observed releases in accordance with this Plan. The EI ultimately must sign-off on the action plan for mitigating the release.

2.1.2 Training

Consistent with the FERC guidelines, environmental training will be given to Project personnel and to contractor personnel whose activities may impact the environment during pipeline and aboveground facilities construction. The training protocol and content will be outlined in the Project E&SCP, as well as specific training packages developed on the basis of conditions and specific requirements of environmental permits. The level of training will be commensurate with the type of duties of the personnel. All construction personnel will be given the appropriate level of environmental training. The training will be given prior to the start of construction and throughout the construction process, as needed. The training program will cover the FERC Plan and Procedures, job-specific permit conditions, company policies, cultural resource procedures, threatened and endangered species restrictions, the Project E&SCP, the SPCC Plan and PPC Plan, and any other pertinent information related to the job. In addition to the EIs, all other construction personnel are expected to play an important role in maintaining strict compliance with all

permit conditions to protect the environment during construction.

2.1.3 Site Inspection

The HDD contractor and Texas Eastern representatives will conduct a site visit prior to movement of equipment into the workspace to assess the current conditions and document any changes or discrepancies observed not presented on the construction plans. The site visit will take place to observe locations where access is restricted and to ensure access and notification requirements on and near the utility ROW and the railroads are understood. Observations of new obstructions in the drill and monitoring path will be assessed and a resolution of the issues will be conducted with the appropriate Project representatives including ROW agents as needed. Any required modifications will be incorporated into the Plan prior to the start of HDD operations and variances for federal and state and local permit modifications will be obtained as applicable. Updated documents will be provided to the involved personnel and environmental training updates will take place as needed.

2.1.4 Notification Procedures

Agency Notification

Applicable Pennsylvania Department of Environmental Protection (PADEP) resource management divisions, the Westmoreland and Indiana County Conservation Districts, Derry Township and Blacklick Township will be notified in advance of relative activities according to permit requirements.

Land Owner Notification

Texas Eastern will notify landowners in writing prior to the start of construction. This notice will include:

- A description of the proposed work;
- The name and phone number of the Texas Eastern ROW Agent that the landowner can contact if there are any questions or concerns regarding the proposed work;
- A toll-free phone number to contact Texas Eastern can be used as an alternative to contacting the ROW Agent; and
- A toll free phone number to contact FERC in the event that the landowner believes that Texas Eastern has not resolved their concerns.

3.0 HDD MONITORING AND MITIGATION PROCEDURES

3.1 HDD Process and Procedures

HDD activities can be characterized by three operating conditions:

- Normal Drilling (full drilling fluid circulation);

- Loss of Drilling Fluid Circulation; and
- Inadvertent Returns.

Monitoring procedures for each operational condition and response actions that could be taken in the event of significant or complete loss of drilling fluid circulation and confirmation of an IR are described below. Prior to HDD pipeline installation operations, site-specific HDD operation procedures will be prepared by the HDD contractor. If deviations from operations described here-in occur, this PLAN will be updated and provided to each Project representative described below that is involved with HDD operations.

3.2 Drilling Fluids

The HDD pipeline installation process uses drilling fluids to facilitate many of the HDD operations. Drilling fluid is a slurry composed of water and bentonite clay (typically 95 percent water) intended to maintain hole stability, lubricate the drilling head, remove cuttings and reduce soil friction. Bentonite clay (sodium montmorillonite) is a naturally occurring clay which is extremely hydrophilic and can absorb up to ten times its weight in water. Bentonite is non-toxic to the aquatic environment and is a non-hazardous substance. At this time, Texas Eastern anticipates using the Conemaugh River as the source of drilling water for the Project. The HDD contractor will be responsible for obtaining the required water volumes from the river. The composition of the drilling fluids and its engineering properties would be formulated to be suitable for the given subsurface conditions encountered to ensure a successful HDD installation. The drilling fluid is formulated to:

- Stabilize the bore hole against collapse, stabilize formations, and prevent fluid loss;
- Lubricate, cool, and clean the tooling cutters and cool guidance electronics;
- Transport cuttings by suspension to enable flow to the surface at entry/exit points for recycling;
- Produce lubrication for drill string and downhole assembly while drilling, thereby reducing friction forces from the formation and pull loads;
- Produce hydrostatic fluid pressure in the bore hole to offset ground formation/groundwater pressure; and
- Drive downhole drill motor for rock drilling.

The HDD contractor will maintain fluid performance through sampling, testing, and recording the fluid properties during drilling operations. The HDD contractor also analyzes, adjusts, and maintains the fluids as necessary to afford the most efficient drilling fluid rheology (i.e., deformation and flow of matter) to adapt to various geological conditions. Depending on subsurface conditions encountered, lost circulation materials (LCMs) and special polymers would also be introduced in the drilling fluid mixture. Lost circulation materials would be used during IR events and/or in certain cases when drilling fluid circulation is diminishing. An LCM could be used in an attempt to seal around the borehole and prevent drilling fluid

from escaping into the formation and allow for the reestablishment of drilling fluid returns to the entry and/or exit pits if voids are encountered. A drilling fluid specialist would be employed by the HDD contractor to determine the fluid properties required to prevent an IR from occurring or to maintain hole stability for successful completion of the HDD. The HDD contractor will describe the frequency of this monitoring and the documentation that will be maintained.

3.2.1 Drilling Fluid Additive Lists

A list of proposed drilling fluid additives is located in Attachment A - Table A-1 that describe Human Health Standards and Table and A-2 that describe Ecotoxicity and Toxicity for Relevant Biotic Receptors. Attachment B contains the Material Safety Data Sheets (MSDS).

3.2.2 Drilling Fluid Disposal

Drilling fluid disposal will comply with the FERC's Upland Erosion Control, Revegetation and Maintenance Plan (FERC Plan) at section III.E and applicable federal, state and local requirements. Drilling fluid would be tested to determine potential contaminates if suspected. Drilling fluid could be reused at other locations if feasible or disposed of at an applicable commercial facility.

3.3 HDD Working Procedures

Prior to drilling operations, site-specific HDD procedures will be prepared by the HDD contractor and submitted to Texas Eastern for review and approval. Procedures for potential Loss of Circulation, Annular Pressure or Release Mitigation and Hole Collapse are presented below.

3.3.1 Loss of Circulation, Annular Pressure or Release Mitigation

Once it is indicated to the driller that annular pressures are abnormally high or fluid loss is apparent and that a loss of circulation or potential inadvertent release has occurred, the driller has the following options (or any combination of these options):

- Decrease pump pressure;
- Decrease penetration rate;
- Temporarily cease drilling operations and shut down mud pump;
- Re-start pump and stroke bore hole to restore circulation ("swab" the hole);
- Introduce additional flow along the borehole using "weeper" subs; and
- Modify the drilling fluid with a change in viscosity and/or lost circulation additives.

3.3.2 Hole Collapse

In general, hole collapse is a phenomenon that occurs in loose, cohesionless soils when the positive pressure

exerted by drilling fluid is not enough to provide stabilization, resulting in loose debris caving into the drilled hole. In most cases however, this is not detrimental, since the reamed hole need not be fully open for installation by HDD to be successful. In many cases, the agitation of the reaming tool, coupled with the injection of drilling fluid reduces the shear stress of the material to such a degree that the pipe can be pulled through it. In some cases, however, particularly when there is significant coarse granular material (i.e., gravel, cobbles, boulders), additional reaming passes would be performed to clean out the debris, or a temporary steel surface casing could be installed to stabilize the hole and serve as an open conduit for HDD operations.

It is anticipated that the subsurface conditions are amenable to HDD installation. In the event of collapse, the areas will either be re-reamed as necessary to open the hole, or temporary surface casing could be installed so that HDD operations can be conducted through the open casing.

3.4 HDD Contingency Plans

In the unlikely event the proposed HDD is unsuccessful on the first attempt, the contractor will perform additional attempts by adjusting the drills depth and horizontal configuration to minimize contact with problematic formational zones encountered. The drilling data collected during each attempt will be utilized to create a new alignment. Potential alignment changes assume that each attempt can be performed within the existing Construction ROW and will not breach landowner agreements. If the additional attempts require new Construction ROW, Texas Eastern will request landowner approval and applicable state and federal clearances and authorizations. If each attempt proves unsuccessful and an HDD method is determined not to be feasible, alternative construction methods and alternative route alignment would be required.

3.5 Inadvertent Return Monitoring

Company personnel detailed in Section 2.1.1 will be dispatched to monitor the area in the vicinity of the drilled path for potential IRs. If IRs are observed on the ground surface along portions of the alignment that are accessible, containment and recovery operations will be completed in accordance with the procedures discussed in Section 4.0. Inadvertent return monitoring and reporting actions during the HDD operation will be as follows:

- Perform pedestrian monitoring of the drill path during normal operations at least once daily;
- If the HDD Operator observes an increase in annular fluid pressure or loss of circulation, the Operator will notify the HDD Superintendent and field crews of the event and approximate position of the tooling;
- Where practical, a member of the field crew will visually inspect the ground surface near the

position of the cutting head;

- If an inadvertent release is observed:
  - Field crew will notify the HDD Operator;
  - The HDD Operator will temporarily cease pumping of the drilling fluid to notify the HDD Superintendent and CI;
  - The CI will notify and coordinate a response with the EI; and
  - The EI will notify appropriate permit authorities, as necessary, and provide information regarding the proposed IR response, proposed mitigation and cleanup, and potential impacts.
- The CI will prepare a report that summarizes the incident.

Texas Eastern will notify landowners of the IR if their land incurs potential impacts.

3.4 Monitoring Obstructions and Access Procedures

Texas Eastern has conducted environmental and civil surveys along the proposed Project area and has coordinated with affected landowners to establish access strategies. The HDD path has obstructions and safety implications if procedures and processes are not adhered to. If an IR occurs in an accessible area the procedures detailed above in the HDD Working Procedures will be followed (Section 4.0). If an IR is observed surfacing on the ground surface at a location that is inaccessible, the following procedures will be followed:

- Contractor will ensure all reasonable measures within the limitations of current technology have been taken to re-establish circulation; and
- Continue drilling utilizing a minimal amount of drilling fluid as required to penetrate the formation or to maintain a successful product pull back.

Below is a description of obstructions and proposed access procedures for the Conemaugh River HDD.

<u>Conemaugh River HDD</u>

The Conemaugh River is a potential obstruction along the HDD path. Free access movements by personnel may only occur on foot and will likely not be safe under most river conditions. Safety must be taken into account in and near the watercourse before pedestrian monitoring for IRs can occur. Close coordination with and notification to site supervisors and safety personnel is required during pedestrian monitoring events. This typically involves monitoring of recent and forecasted precipitation and current and anticipated flow conditions to determine if it is safe to be within proximity to the waterbody at a given time. Proximity limitations will be placed by the site supervisor that must be adhered to during the pedestrian monitoring event. The banks of the Conemaugh River will be the safest position from which to monitor the HDD path. Beyond the Conemaugh River, the remainder of the HDD route is easily accessible from the proposed

workspace and public roadways.

3.6 Documentation and Record Keeping

Documentation will be maintained during HDD activities. This documentation will include the items listed in Table 3.6-1 below.

Table 3.6-1
Documentation to be Maintained for Conemaugh River Crossing Project HDD Activities

Procedure	Documentation
Employee Training	Record of employee training detailing when training was conducted, material covered, and employees in attendance. Refer to Section 2.1.2 for additional information on training.
HDD Visual and Pedestrian Monitoring	The personnel monitoring the HDD alignment, location along the HDD alignment visually inspected, time of the examination, and observations of the personnel shall be logged following each inspection.
HDD Instrument Logs	The HDD contractor shall maintain instrumentation logs that document pilot hole progression, drill string axial and torsional loads, drilling fluid discharge rate and pressure, and down-hole annular pressure monitoring during drilling of the pilot hole (or provide alternative monitoring methods and/or best drilling practices to ensure that the drilled and bored [reamed] holes do not become plugged with drill cuttings leading to hydrofracture and IR.
Drilling Fluid Composition	Use of loss control materials and other drilling fluid additives, including the quantity, timing, and location of use.
	Monitoring logs of drilling fluid physical properties throughout drilling activities (e.g., fluid weight, viscosity, sand content, additives, and pH).
	A clear description of the intent to reuse drilling fluid between HDD locations, as well as documented consultation with local and state agencies for such reuse. Laboratory results of sampled drilling fluid/source water for any inorganic and organic environmental contaminants should also be retained.
Public and Agency Inquiries/Comments	A record of communication with the public and agencies that has occurred during HDD activities. This record shall include inquiries and comments, as well as response actions.

4.0 RESPONSE TO INADVERTENT RETURNS

Typically, IRs are detected near the drill entry or exit points when the pilot bore is at shallow depths, above bedrock, and/or is in permeable/porous soils. For these reasons, equipment and materials required to contain an IR will be available at each HDD Construction ROW. An IR will be assessed by the HDD Superintendent, EI, and CI to determine an estimated volume and footprint. An IR with the potential to reach waterbodies, wetlands, or other sensitive resources or public infrastructure will be assessed, and a mitigation strategy will be implemented.

The HDD Superintendent will assess the drilling parameters (depth, annular pressures, fluid flow rate, and drill fluid characteristics) and incorporate appropriate strategies to mitigate the IR effectively at operation control. At the IR, containment could be achieved by excavating a small sump pit and surrounding the IR with hay bales, silt fence, and/or sand bags. Once contained, the drilling fluid would be collected by vehicle vacuum trucks or pumped back to the mud recycle unit for reuse or other methods. Personnel and equipment access to the IR could affect the methods used for containment and disposal. Once it is agreed upon that the IR is mitigated and controlled the HDD operation will progress. The site-specific response will follow the guidelines presented below.

4.1 Upland Location Inadvertent Return Response

- Evaluate the IR location, volume, footprint and determine if HDD operation measures and proposed containment measures will effectively mitigate IR impacts. If site conditions restrict prompt IR containment, the HDD Operator will suspend drilling operations until containment measures are in place;
- Implement the proposed mitigation measures;
- Remove the drilling fluid as needed to not overwhelm the containment structure and dispose or reuse the drilling fluids as applicable; and
- Perform final clean-up once the HDD installation is complete (see Section 5.0).

4.2 Wetland/Waterbody Location Inadvertent Return Response

The Conemaugh River HDD crosses one waterbody and one wetland. Though the crossing of waterbodies are minimal and IR impact mitigation measures are proposed, there is a potential for an IR to occur in or near wetlands or waterbodies outside of the proposed Construction ROW. In the event of an IR in a jurisdictional wetland or waterbody, Texas Eastern will notify the PADEP as well as other applicable agencies.

The following steps will be taken if an IR has the potential to impact a wetland or waterbody:

- Evaluate the IR location, volume, footprint and determine if HDD operation measures and proposed containment measures will effectively mitigate IR impacts. If site conditions restrict prompt IR containment, the HDD Operator will suspend drilling operations until containment measures are in place. If the release is within 100 feet of a wetland or waterbody or upslope at a greater distance, install silt fence and/or hay bales downslope of the IT between the IR and the wetland or waterbody.
- Implement the proposed mitigation measures. If the proposed IR containment and recovery measures have the potential to result in cumulative disturbance to the resource, alternative measures will be implemented on a case-by-case basis that minimize the overall disturbance and will include suspension of equipment use activities. An example of this would be an IR with minimal fluid release.
- Remove the drilling fluid as needed to not overwhelm the containment structure and dispose or reuse the drilling fluids as applicable.
- Perform final clean-up once the HDD installation is complete (see Section 5.0).

5.0 CLEAN-UP

Site-specific clean-up measures will be developed and implemented by the CI and HDD Superintendent for approval by the EI after HDD installation is complete. Potential secondary impacts caused by clean-up activities will be evaluated and cumulative adverse impacts will be mitigated to the extent practicable. The following measures and activities will be implemented during IR cleanup:

- Drilling fluid will be removed from the containment structures. The recovered drilling fluid would be recycled or disposed of at an approved upland location or commercial facility. No recovered drilling fluid will be disposed of in wetlands, waterbodies or storm drains;
- Containment structures and access paths will be removed and the ground surface prepared for stabilization measures. Soil stabilization will be consistent with the surrounding area. Where vegetation is present seeding and mulching will occur. If gravel or pavement is present these materials will be placed.

6.0 REFERENCES

Federal Energy Regulatory Commission (FERC). 2019. Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response, and Contingency Plans. October 2019. Available at: https://www.ferc.gov/industries/gas/enviro/guidelines/hdd-final/guidance.pdf. Accessed October 2019.

Attachment A

Drilling Fluid Additives

Table A-1. Drilling Fluid Additive Human Health Standards

Product Identifier	Product Name	Ingredient	Product Manufacturer/ Supplier	Proposed Use	NSF/ANSI CAN 60	EPA Safe Drinking Water Act	OSHA Hazard Communication Standard 29 CFR 1910.1200	OSHA Permissible Exposure Limit	ACGIH TLV	NIOSH REL	EPA Extremely Hazardous Substance (EHS)	Health Effects	Health Effects Detail
Det Force	Drilling Detergent	Amides, coco, N,N-bis (hydroxyethyl) (Coconut oil)	Right Turn Supply LLC	No Data available	No	No	Yes	NA	NA	NA	No	Warning - Suspected of causing cancer. May cause respiratory irritation, eye irritation, skin irritation (Category 2)	Acute: Detmitius of skin Chronic: Suspected carcinogen based on animal data.
Det Force	Drilling Detergent	2-Propanol	Right Turn Supply LLC	No Data available	No	No	Yes	980 mg/m^3	490 mg/m^3	NA	No	May cause respiratory irritation, eye irritation, skin irritation, headache and dizziness.	Same
HDD Lube	Soybean Oil	Soybean Oil	DCS Fluid Solutions LP	Lubricant	No	No	No	NA	NA	NA	No	None	NA
MAGMA FIBER COARSE	Spun Mineral Fiber	Spun Mineral Fiber	DCS Fluid Solutions LP	Viscosifier	No	No	No	Respirable fraction: 5 mg/m^3 Total dust: 15 mg/m^3	NA	TWA 3 fibers/cm3 (fibers with diameter < or = 3.5 µm & length > or = 10 µm.) TWA 5 mg/m3 (total)	No	May cause respiratory irritation, eye irritation, skin irritation.	Acute: Irritation to nose, throat and upper respiratory track Chronic: damage to lung tissues and raspatory problems
SLIKGEL	Sodium Bentonite Clay	Crystalline Silica	Western Clay Company	Viscosifier	Yes	No	Yes	Total Dust 15 mg/m^3 Respirable Dust 5 mg/m^3	Crystalline Quartz Respirable 0.1 mg/m^3	NA	No	Danger - May cause respiratory irritation, eye irritation, skin irritation	Acute: Irritation to nose, throat and upper respiratory track Chronic: Silicosis, scarring of lung tissues and raspatory problems
SLIKGEL	Sodium Bentonite Clay	Acrylic polymer	Western Clay Company	Viscosifier	No	No	No	NA	NA	NA	No	Unknown	NA
Soda Ash Dense	sodium carbonate	sodium carbonate	BHS Marketing, LLC.	Not Available	Yes	No	Yes	NA	NA	NA	No	Warning eye irritation (Category 2A)	Acute: Damage to eye that is fully reversible in a period of 21 days
Super Gel-X	Mixture	Trade Secret (Bentonite family)	CETCO, an MTI Company	Not Available	Yes	No	Yes	6 mg/m^3	6 mg/m^3	NA	No	May cause respiratory irritation, eye irritation, skin irritation	Skin contact is a significant route of exposure
Super Gel-X	Mixture	Calcium Carbonate	CETCO, an MTI Company	Not Available	Yes	No	NA	NA	NA	NA	No	Warning eye irritation (Category 2A)	Acute: Damage to eye that is fully reversible in a period of 21 days
Super Gel-X	Mixture	Smectite group minerals	CETCO, an MTI Company	Not Available	No	No	No	NA	NA	NA	No	None	NA

Table A-1. Drilling Fluid Additive Human Health Standards

Product Identifier	Product Name	Ingredient	Product Manufacturer/ Supplier	Proposed Use	NSF/ANSI CAN 60	EPA Safe Drinking Water Act	OSHA Hazard Communication Standard 29 CFR 1910.1200	OSHA Permissible Exposure Limit	ACGIH TLV	NIOSH REL	EPA Extremely Hazardous Substance (EHS)	Health Effects	Health Effects Detail
Super Gel-X	Mixture	Quartz (silica containing)	CETCO, an MTI Company	Not Available	No	No	Yes	Total Dust 15 mg/m^3 Respirable Dust 5 mg/m^3	Crystalline Quartz Respirable 0.1 mg/m^3	NA	No	May cause respiratory irritation, eye irritation, skin irritation	Acute: Irritation to nose, throat and upper respiratory track Chronic: Silicosis, scarring of lung tissues and raspatory problems
Super Gel-X	Mixture	Cristobalite (silica containing)	CETCO, an MTI Company	Not Available	No	No	Yes	Total Dust 15 mg/m^3 Respirable Dust 5 mg/m^3	Crystalline Quartz Respirable 0.1 mg/m^3	NA	No	May cause respiratory irritation, eye irritation, skin irritation	Acute: Irritation to nose, throat and upper respiratory track Chronic: Silicosis, scarring of lung tissues and raspatory problems

Acronym List
ACGIH = American Conference of Governmental Industrial Hygienists
ANSI= American National Standards Institute.
NIOSH = National Institute for Occupational Safety and Health
NSF = NSF International.
OECD = Organization for Economic Co-Operation and Development
OSHA = Occupational Safety and Health Administration
REL = recommended exposure limits
TLV = threshold limit value

Table A-2. Drilling Fluid Addictive Ecotoxicity and Toxicity for Relevant Biotic Receptors

Product Identifier	Product Name / Synonym	Product Manufacturer	Proposed Use	Ecotoxicity	Toxicity for Relevant Biotic Receptors	Ecotoxicity Evidence	Links
Det Force	Drilling Detergent Contains: Amides, coco, n-n-bis(hydroxyethyl) (3 - <5%) and 2-propanol (<1%)	Right Turn Supply LLC	No Data available	No data available	The product is not classified as environmentally hazardous. Estimated 93.25% volatile. Log Kow 0.05	Not expected to be harmful. AUS MSDS (first link) presents: EC50/LC50 (D-D) >100 mg/l "This product contains an ingredient that is classified, according to European regulations, as "harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment" However, at the concentration present, this preparation is not expected to present significant adverse environmental effects" Found some details on drilling mud (not sure if the same thing? – see links in right)	Another MSDS with eco info (I believe this is the same product): https://www.aplng.com.au/content/dam/aplng/compliance/msds/D-D%20SDS.pdf Ecotox of drilling fluids (not necessarily detergent): https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9101VZAX.TXT https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9100A84V.TXT
HDD Lube 1	Soybean Oil/ester blend	DCS Fluid Solutions LP	Lubricant	Not Classified	Contains no hazardous substances. Not expected to be harmful to aquatic life. Product expected to be inherently biodegradable.	"EPA regards soybean oil as practically non-toxic to non-target mammals, birds, and plants (Matthews 2010). No studies were found regarding aquatic toxicity of soybean oil, or its impact on honeybees or other pollinators." Baker - Cornell paper MSDS: Not expected to be harmful to aquatic life. Readily biodegradable	Soybean oil profile (Baker – Cornell): https://ecommons.cornell.edu/bitstream/handle/1813/56142/soybean-oil-MRP-NYSIPM.pdf?sequence=1&isAllowed=y https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3769042/
MAGMA FIBER COARSE	N/A	DCS Fluid Solutions LP	Viscosifier	Not classified	Contains no hazardous substances Not expected to be harmful to aquatic life.	"Basalt Rock fibers have no toxic reaction with air or water, are non-combustible. When in contact with other chemicals they produce no chemical reactions that may damage health or the environment. So it is ecological friendly material." Kumbhar, 2014. MSDS: No data available. Not expected to be harmful to aquatic life.	Kumbhar 2014 Paper https://s3.amazonaws.com/academia.edu.documents/46154181/BASALT_PAPER_2_AE07204511.pdf?response-content-disposition=inline%3B%20filename%3DAn_Overview_Basalt_Rock_Fibers_-New_Cons.pdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWOWYYGZ2Y53UL3A%2F20200213%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20200213T143253Z&X-Amz-Expires=3600&X-Amz-SignedHeaders=host&X-Amz-Signature=2be845f3e1c4c0f14f3c8ae57bd6449270246f6228898110df8b6e89bd1469be Additional MSDS: https://www.mineralstech.com/docs/default-source/performance-materials-documents/cetco/drilling-products/literature-downloads/drilling-products-nsf-certified/tds---magma-fiber. https://www.mineralstech.com/docs/default-source/performance-materials-documents/cetco/drilling-products/sds/sds---us/sds-us---magma-fiber-fine.pdf?sfvrsn=102c365e_2
SLIKGEL	Sodium	Western Clay	Viscosifier	Not Available	TLM96: 10000 ppm (Oncorhynchus	Not expected to be harmful.	MSDS:

Table A-2. Drilling Fluid Addictive Ecotoxicity and Toxicity for Relevant Biotic Receptors

Product Identifier	Product Name / Synonym	Product Manufacturer	Proposed Use	Ecotoxicity	Toxicity for Relevant Biotic Receptors	Ecotoxicity Evidence	Links
	Bentonite	Company			mykiss)	Fish toxicity: TLM96: 10000 ppm (Oncorhynchus mykiss)	http://www.westernclay.com/wp-content/uploads/2017/01/SAFETY-DATA-SHEET.pdf https://www.lkabminerals.com/wp-content/uploads/2019/04/Sodium-Bentonite-SDS-12-04EN19-03.pdf
Soda Ash Dense	sodium carbonate	BHS Marketing, LLC.	Not Available	LD/LC50 values 090 mg/kg (rat)	Water hazard class 1: slightly hazardous for water. May cause increase in pH in large amounts. 96 hour LC50 bluegill 320 mg/L	"Toxic to aquatic organisms." "Slightly toxic in water" (from MSDS) Fish: Bluegill/Sunfish: LC50 = 320 mg/L; 96 Hr.; Static Conditions Eco tox values: https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-carbonate#section=Ecotoxicity-Values https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-carbonate#section=Ecotoxicity-Excerpts	MSDS: https://fscimage.fishersci.com/msds/21080.htm https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-carbonate#section=Ecological-Information
Super Gel-X®	Calcium Carbonate	CETCO, an MTI Company	Not Available	Not Classified	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment. Bentonite Freshwater Toxicity Values from SDD: 72 hour EC50 algae >100 mg/L 48 hour ec%0 daphnids >100 mg/L 96 hour LC50 freshwater fish 16,000 mg/L Trade Secret Freshwater Toxicity Values from SDS: 48 hour EC50 daphnids 47 mg/L 96 hour LC50 fish 222 mg/L Log Kow = 0.35	It has a low potential to affect aquatic organisms. Acute aquatic effects: 48-hour LC50; Mosquito fish: 56,000 mg/L. (MSDS link) No evidence of acute toxicity to aquatic and terrestrial organisms. Several fish studies listed at link →	MSDS for CaCO3: https://fscimage.fishersci.com/msds/03880.htm https://echa.europa.eu/registration-dossier/-/registered-dossier/16050/6/1 http://pesticideanswers.org/Detail_Chemical.jsp?Rec_Id=PRI1812#Ecotoxicity

Attachment B

Material Safety Data Sheets (MSDS)

HDD Design Report

Revision 1

24” Line 12 Pipeline
Conemaugh River Replacement Crossing
by Horizontal Directional Drilling

May 26, 2020

Prepared for:

Enbridge
5400 Westheimer Court
Houston, TX 77056

Prepared by:

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APPENDICES

Appendix 1: Geotechnical Report

Appendix 2: HDD Design Drawings, Sheet 1 and Sheet 2

Appendix 3: Long-term Settlement

Appendix 4: Installation Loading and Stress Calculations

Appendix 5: Operating Stress Calculations

Appendix 6: Hydrofracture Evaluation

1 INTRODUCTION

The purpose of this report is to provide a summary of design considerations and engineering calculations associated with Enbridge's proposed 24-inch Line 12 Conemaugh River replacement crossing in Westmoreland and Indiana Counties, Pennsylvania. The replacement crossing is proposed for installation by horizontal directional drilling (HDD). J. D. Hair & Associates, Inc. (JDH&A) has undertaken this report in accordance with the scope of work presented in Service Release Order No: 3500024267.

2 BASE DATA

The HDD design and engineering calculations presented in this report are based on the following base data.

- Topographic, hydrographic, and site survey data provided by Enbridge
- A geotechnical report prepared by Barr Engineering Company titled "Geotechnical Data Report, Line 12 Conemaugh River HDD, Indiana and Westmoreland Counties, Pennsylvania" dated March 2020
- Pipe specification and operating parameters provided by Enbridge: 24-inch O.D., 0.500-inch Wall Thickness, API-5L X-60 steel pipe. Maximum allowable operating pressure = 1,050 psig, Maximum operating temperature = 80 °F

3 CROSSING OVERVIEW

The proposed 24-inch pipeline crossing is part of Enbridge's Line 12 project in Westmoreland and Indiana Counties, Pennsylvania. The site is roughly two miles northeast of Blairsville. The crossing involves a horizontal drilled length of 1,859 feet, and passes beneath the Conemaugh River, adjacent wetlands, and Newport Road. The purpose of the new crossing is to replace Enbridge's existing 24-inch conventionally buried pipeline due to an anomaly. Refer to Table 1 for a high-level summary of the crossing. Refer to Figures 1 and 2 for an overview of the crossing location and the position of the HDD alignment.

Table 1: Crossing Summary

Pipeline Diameter	Horizontal Length	Primary Obstacles	Subsurface Conditions	Unique Site Features	Perceived Risk
24-inches	1,859 feet	Conemaugh River, Wetland W-CMS-016, Newport Road	Shale and Sandstone	Entry/Exit elevation differential of 66 feet	Low

Figure 1: Crossing Vicinity Map

Figure 2: Detailed Crossing Map

4 GENERAL SITE DESCRIPTION

Enbridge's existing 24" Line 12 pipeline generally runs east to west at the project location, and is located in a pipeline corridor containing three other pipelines. There are existing valve sites on each side of the river. The area is rural, with the existing right-of-way (ROW) passing through agricultural land east of Newport Road, undeveloped woodlands adjacent to each side of the river, and open fields just past a valve site on the west side of the river. The topography in the area is gently rolling, but with a steep downward slope from Newport Road to the river on the east side of the crossing. The topography is flat immediately west of the river for approximately 700 feet before gradually rising upwards toward the existing valve site. The topographic relief

from the east side of the crossing to the lower flat lying area west of the river is approximately 66 feet.

The proposed HDD alignment generally runs parallel to four existing pipelines and the existing ROW. The HDD segment extends from an open field on the east side of the river, north of the existing right-of-way, to the north side of the existing ROW on the west side of the river. The surface elevation across the site descends approximately 66 feet from the entry point to the exit point.

The primary obstacles to be crossed, from east to west, include Newport Road, the Conemaugh River channel, and a wetland adjacent to the west bank. The Conemaugh River channel is approximately 175 feet wide from bank to bank and approximately 15 feet deep. The wetland, which nearly encompasses the width of the permanent ROW, extends approximately 638 feet to the west from the top of the west bank of the river.

5 SUBSURFACE CONDITIONS

According to the geotechnical data report prepared by Barr Engineering Company (BARR), published geologic mapping available through the Pennsylvania Bureau of Topographic and Geologic Survey indicates the subsurface consists of a thin layer of overburden (glacial till) underlain by sedimentary rock sequences (sandstone, shale, with possible limestone and coal) of the Conemaugh Group.

Three exploratory borings were performed as part of the site-specific geotechnical investigation conducted in December 2019 and January 2020. Test boring CRC-B-1 was performed west of the Conemaugh River on the north side of the ROW near the proposed exit point. It was drilled to a termination depth of 110 feet below the ground surface (bgs). Test boring CRC-B-3 was performed east of the Conemaugh River and south of the HDD alignment near the existing valve site. It was drilled to a termination depth 141 feet bgs. Test boring CRC-B-4 was performed east of Newport Road, approximately 330 feet west of the proposed entry point and 50 feet south of the HDD alignment. It was drilled to a depth of 175 feet.

In summary, the exploratory borings encountered subsurface conditions consistent with published geological mapping. The borings encountered glacial till consisting primarily of sandy lean clay with varying amounts of sand and gravel to gravelly clay with sand. Alternating sequences of shale, sandstone, and some siltstone were encountered immediately below the glacial till. Depth to bedrock ranged from 25 feet on the west side of the crossing to 15 to 20 feet on the east side of the crossing. Brief descriptions of the subsurface conditions encountered in each boring are provided on the next page in Table 2. Refer to the geotechnical report included in Appendix 1 for detailed subsurface descriptions and laboratory testing results.

The result of the sieve analyses on select samples taken from the glacial till indicated a gravel content of 0 to 48 percent. Standard Penetration Test values (SPT N-values) in the lean clay ranged from 7 blows per foot (bpf) to greater than 30 bpf, with typical values around 15 bpf. Hand pocket penetrometer tests of lean clay samples indicated unconfined compressive strength of about 3.5 tons per square foot (tsf). The SPT and pocket penetrometer results indicate that the cohesive soils vary in consistency from medium stiff to stiff. N-values in the gravels and sands ranged from 17 bpf to 37 bpf, indicating medium dense to dense material.

Unconfined compressive strength testing was performed on 17 intact rock specimens obtained during diamond core drilling. Results of the testing indicated weak to very strong rock. Unconfined compressive strengths ranged from 3,537 psi to 21,446 psi with an average of 8,242 psi. Rock Quality Designation (RQD) was determined in the field for each core run. The recorded RQD values ranged from 0 to 100 percent with most between 50 and 100 percent, indicating fair to excellent rock quality overall. The fractured bedrock, primarily encountered in CRC-B-3 and CRC-B-4. BARR indicates the formation is relatively permeable between 20 feet and 50 feet bgs. Moderate amounts (up to 50 gallons) of drilling fluid loss were observed while drilling the test borings. Refer to Appendix 1 for the complete geotechnical report.

Table 2: Summary of Subsurface Conditions

Boring Number	Depth (Feet)	Stratum Description
CRC-B-1	0 – 0.5 0.5 - 12 12 - 22 22 - 25 25 – 110	Topsoil (CL) Sandy Lean Clay (CL): Stiff, trace sand and gravel. Clayey Gravel with Sand (GC): Medium dense to dense with gravel below 15 feet. Sandy Lean Clay (CL): Hard with gravel. Alternating Shale, Sandstone, Siltstone: Fresh to slightly weathered, Fine-grained, horizontal, very close to wide fracture spacing.
CRC-B-3	0 - 8 8 – 20 20 - 141	Lean Clay Fill (CL): Medium stiff, trace sand and gravel. Sandy Lean Clay (CL): Stiff to hard, trace gravel. Shale: Slightly to moderately weathered, massive bedding, close to wide fracture spacing.
CRC-B-4	0 – 0.5 0.5 - 7 7 – 15.3 15.3 – 175	Topsoil (CL) Sandy Lean Clay (CL): Very stiff. Clayey Sand with Gravel (SC): Medium dense with gravel and pieces of shale. Alternating Shale, Sandstone, Siltstone: Fresh to slightly weathered, Fine-grained, horizontal, very close to wide fracture spacing, thin to massive bedding.

6 HDD DESIGN GEOMETRY

6.1 Entry and Exit Locations

The designated exit point is located on the west side of the crossing within the existing permanent ROW. It is offset 10 feet north of the existing 24-inch Line 12 pipeline, and 75 feet west of a wetland boundary. The entry point is located on the east side of the crossing in an open farm field between two parallel tree lines, north of the existing permanent ROW. Due to depth of cover, radius considerations, and the topography, it was not possible to design the proposed HDD to remain entirely within the existing ROW. Therefore, the proposed HDD entry point is located east of the pipeline PI on the east side of the river, outside of existing permanent ROW. The resulting horizontal length of the proposed HDD crossing is 1,859 feet. Refer to Appendix 2 for copies of the HDD design drawings.

Note that since the exit point elevation on the west side of the crossing is approximately 66 feet lower than the entry point elevation on the east side, we envision the HDD contractor will drill

the pilot hole and conduct reaming operations from the exit point on the west side of the crossing. The drill rig and other rig side equipment would then be moved to the east side of the crossing for pullback operations. Drilling from the low side provides benefits with respect to drilling fluid handling and results in lower annular pressure, which reduces the risk of inadvertent drilling fluid returns. Although it is not anticipated, a dual rig scenario may also be employed, where a second rig is positioned on the opposing side of the crossing, either for performing an intersect during the pilot hole, or for secondary support during reaming operations.

6.2 Entry and Exit Angles

The entry angle on the Conemaugh River Replacement Project is set at 12-degrees from the horizontal. The exit angle was held to 10-degrees to facilitate breakover support during pullback. These angles are consistent with prevailing HDD industry design guidelines.[1]

6.3 Depth of Penetration

The HDD crossing of Conemaugh River was designed to provide a vertical clearance of 103 feet beneath Newport Road, 50 feet beneath the river channel, and 73 feet beneath the eastern limits of the wetland. The designed vertical clearances are established to reduce the risk of inadvertent drilling fluid returns within the river and wetlands as well as reduce the risk of drilling fluid impact, such as heaving, to Newport Road. The clearances also provide a margin for error with regard to existing grade elevations and pilot hole calculations.[2]

6.4 Radius of Curvature

The design radius of curvature for the proposed HDD crossing is set at 2,400 feet. This is consistent with published guidelines recommending a design radius of 1,200 times the nominal outside diameter of the pipe to be installed.[3] This relationship has been developed over a period of years in the HDD industry and is based on experience with constructability as opposed to any theoretical analysis.

6.5 Minimum Allowable Radius

As mentioned previously, the HDD vertical design radius is 2,400 feet. However, since the pilot hole will generally deviate from the designed centerline during construction, a minimum allowable radius has been specified as part of the allowable pilot hole tolerances. Allowing a radius that is less than the design radius provides the contractor with flexibility for steering corrections in the event unexpected pilot hole deflection, or other problems result due to

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[1] *Manual of Practice No. 108, Pipeline Design for Installation by Horizontal Directional Drilling, Second Edition* (Reston, VA: American Society of Civil Engineers, 2014), 14.

[2] *Pipeline Geohazards: Planning, Design, Construction and Operations, Second Edition* (New York, NY: The American Society of Mechanical Engineers, 2019), 261.

[3] *Manual of Practice No. 108*, 16.

subsurface conditions. In this case, JDH&A set the minimum allowable radius to two-thirds of the design radius, or 1,600 feet. Pipe stress calculations demonstrating the acceptability of the recommended minimum radius are provided in Section 10.1 and 10.2 and in Appendix 4 and 5.

6.6 Pilot Hole Tolerances

Positional tolerances for pilot hole drilling have been specified on the drawing. The positional tolerances are set to accommodate reasonable deviations from the designed centerline. Allowing some degree of flexibility during pilot hole drilling facilitates greater production rates by avoiding re-drills, which can be particularly difficult when drilling rock. The tolerances described below are based on site-specific subsurface conditions, ROW boundaries, and what is commonly achieved during pilot hole drilling on similar crossing of this magnitude.

Positional tolerances for the proposed crossing are defined as follows:

1.) **Entry Point (east side)** – up to 5 feet forward or 10 feet back from the designed entry point; up to 3 feet right or left of the designed alignment

2.) **Exit Point (west side)** – up to 5 feet short or 10 feet long relative to the designed exit point; up to 3 feet right or left of the designed alignment

3). **Elevation** – up to 3 feet above and 15 feet below the designed profile

4.) **Alignment** –up to 10 feet right or left of the designed alignment

In addition to the positional tolerances, a minimum radius of curvature (as discussed in Section 6.5) was also specified. The curvature tolerance for the proposed crossing is defined as follows:

5.) **Curve Radius** – No less than 1,600 feet based on a 3-joint average

The curve radius is typically analyzed during pilot hole drilling over a distance of approximately 90 feet (three joints of range 2 drill pipe).

The tolerances specified above are such that the vast majority of HDD contractors should be able to execute the design within the tolerances without significant difficulty.

6.7 Workspace

6.7.1 Entry Site

Workspace for the HDD rig and support equipment is located on the east side of the crossing in an open farm field between two parallel tree lines. Temporary workspace limits have been provided with their boundaries extending north along the tree lines from the permanent ROW to the south. The working area is roughly 200 feet x 240 feet, which should provide ample space to support safe and efficient HDD operations. Refer to Appendix 2, Sheet 2 for details.

6.7.2 Exit Site

Workspace for the HDD rig and supporting equipment during pilot hole and reaming operations, as well as for pull section fabrication and pipe side operations, is located on the west side of the crossing. The pull section will be fabricated along the existing ROW as well as a short section of false ROW through an open field. Available workspace extends approximately 1,600 feet beyond the exit point. In order to avoid cutting down trees on the west boundary of the open field, the

pull section will be staged in two sections, making one tie-in (intermediate) weld necessary during pullback operations. Although it is generally desirable to conduct pullback operations without stopping, in this case the subsurface consists primarily of sedimentary rock, which is self-supporting. A reamed hole in material that is self-supporting essentially eliminates the risk of getting stuck due to soil material that settles around the pull section due to hole degradation. Refer to Appendix 2, Sheet 2 for details.

7 FEASIBLITY CONSIDERATIONS

For a pipeline to be installed by HDD, one of two conditions must be achieved downhole. Either an open hole must be excavated within the subsurface material to such an extent that installation of the product line is possible, or the properties of the subsurface material must be modified so that the soil behaves in a fluid manner allowing a pipeline to be pulled through it. The possibility of achieving either of these conditions downhole is dependent primarily upon subsurface soil conditions.

It is probable that loose, cohesionless soils will not support an open hole over a long horizontally drilled length. This does not, however, prevent the installation of a pipeline by HDD. The mechanical agitation of the tooling coupled with the injection of drilling fluid will cause the soil to experience a local decrease in shear strength. If the resulting shear strength is low enough, the soil will behave in a fluid manner allowing a pipe to be pulled through it.

If either an open hole or fluid condition can be achieved downhole and the stresses imposed on the pipe and tooling are not excessive, installation by HDD is technically feasible. Three primary parameters govern the technical feasibility of an HDD installation: 1) drilled length, 2) pipe diameter, and 3) subsurface material. These three parameters work in combination to limit what can be achieved using existing HDD tools and techniques.

7.1 Assessment of Feasibility

With a true drilled length of 1,880 feet and a product line diameter of 24 inches, the proposed Conemaugh River crossing is well within current HDD industry capabilities. Although a minor amount of coarse granular content was sampled in the glacial till overburden during the geotechnical investigation, subsurface conditions are largely amenable to installation by HDD, and it is our opinion that an open hole can be maintained over much of the crossing, particularly through the sedimentary rock present at this location. In the overburden soils, if hole instability results, we believe the shear strength of the subsurface material can be reduced to such an extent that it will not prohibit a successful installation. Numerous crossings of similar magnitude through similar subsurface conditions have been successfully completed. It is our opinion, based on the information available, the Conemaugh River crossing is technically feasible.

8 RISK IDENTIFICATION AND ASSESSMENT

For the purposes of this report, risk is defined as the possibility of experiencing serious operational problems that result in significant delays or cost overruns. For example, an HDD pull section may become stuck during pullback requiring either remedial action to recover the partially installed pipeline or abandonment of the pipeline in place. The latter instance would require a new pilot hole to be drilled and reamed with a probable doubling of drilling duration

and cost. This would be a significant delay and a potential cost overrun depending on the details of the construction contract.

Potential operational risks at the Conemaugh crossing are common to most rock crossings, including the possibility of losing roller cones while reaming and the possibility of reamed hole misalignment at the soil/rock interface. The former, if not retrieved from the reamed hole, can gouge the product line coating during pullback or otherwise damage the pipe. The latter can lead to tools binding or the product pipeline getting lodged during pullback.

One unique site-specific feature that in some cases has presented challenges for HDD installations is an elevation differential of 66 feet between the entry and exit points. An elevation differential often results in a partial "dry hole" on the high side of the crossing. This is due to drilling fluid, naturally seeking equilibrium, flowing to the lower of the two sides. Without the counterbalancing pressure provided by drilling fluid, the reamed hole is at an increased risk of internal erosion and instability. This can result in caving and collapse of the reamed hole. Because of this, excess debris may serve to obstruct reaming operations or pullback of the product line. In the case of Conemaugh crossing, the subsurface on the high side consists primarily of sedimentary rock. Sedimentary rock is generally stable and will hold an open hole without drilling fluid. Given the fact that the overburden on the east side of the crossing is shallow, with the top of rock only 15 feet below the ground surface, it is our opinion that the risk of complications associated with hole collapse is low.

Based on our site-specific assessment and experience with crossings of similar magnitude through sedimentary rock, it is our opinion the overall risk of operational problems and delays is low.

9 CONSTRUCTION IMPACT

Although construction impact associated with HDD may be less than that associated with conventional trenching, it is not without impact. The sections below detail site-specific impacts that may occur during HDD construction.

9.1 Inadvertent Returns

As is the case with all pipeline crossings to be installed by HDD, there is a chance that inadvertent drilling fluid returns, also known as "frac-outs" will occur. Although these can generally be contained and controlled with sand bags, silt fences, and hay bales, and do not typically prevent a successful installation, they can be problematic from an environmental perspective if they surface in a sensitive waterbody or wetland. In addition, drilling fluid can flow around existing underground utilities or paved roads, resulting in heaving, settlement, or other damage. In general, the area most susceptible to impact due to a drilling fluid surface release is in the vicinity of the designed HDD end point on the west side of the crossing where cover is shallow. In order to mitigate this risk, temporary surface casing can be used during pilot hole drilling to contain drilling fluid. Refer to Section 11 of this report for an assessment of the risk of inadvertent returns.

Additional contingency measures that may be implemented by the contractor to reduce the risks of inadvertent returns include, but are not limited to, sizing of the borehole frequently to keep the annular space clean and unobstructed, utilization of an annular pressure tool to verify that

downhole pressures are within reasonable limits, restricting penetration rates to avoid "outrunning" the amount of drilling fluid being pumped, and adjusting drilling fluid rheology as necessary to optimize drilling fluid flow and removal of cuttings. In addition to HDD operational practices, we recommend that the ROW and adjacent properties be routinely monitored so that any drilling fluid flow to the ground surface can be identified in a timely fashion.

9.2 Rapid Settlement and Sinkholes

There is a risk of sinkholes developing near the entry point on the east side of the crossing due to the elevation differential discussed in Section 8. As mentioned, a dry hole condition on the high side of the crossing puts the overburden soil at risk of internal erosion and instability, which may translate into a sink holes at the surface. Contingency measures that may be implemented to mitigate hole instability and settlement and/or sinkholes include setting temporary surface casing to bedrock to stabilize the overburden material. It is important to note that since the crossing will be within stable sedimentary rock when it passes beneath Newport Road, there is no appreciable risk of road settlement.

9.3 Post-Installation Ground Settlement

Post-installation ground settlement along the alignment of an HDD crossing may occur as the reamed hole progressively degrades and breaks down over time, filling the annulus surrounding the installed pipeline with soil. Volume loss from the overlying soil may translate to the surface in the form of a broad trough-shaped depression, which can damage roadways, utilities, and other structures. The risk of post-installation settlement is generally greatest in areas where the HDD segment is shallow, typically near the entry and exit points, and where the subsurface consists of loose granular soil with little arching capability. Other factors that may increase the risk of post-installation settlement include: 1.) a large elevation differential between the entry and exit points; 2.) adverse subsurface conditions; 3.) large diameter crossings that require multiple reaming passes; and 4.) groundwater or tidal fluctuations. In the case of the Conemaugh crossing, the area with the highest risk of post-installation settlement is on the east side of the crossing near the designed HDD end point where the pipeline will be installed within the overburden.

The most common method used in the HDD industry to estimate long-term ground settlement is based on research conducted by Ralph Peck (1969) for soft ground tunneling projects. Details relative to how the method can be used to estimate settlement on HDD installations are presented in a North American Society for Trenchless Technology (NASTT) publication titled *Horizontal Directional Drilling Good Practices Guidelines*[4]. Since the Conemaugh River crossing will be installed primarily through sedimentary bedrock (shale, sandstone, and siltstone) when passing beneath the primary obstacles, a post-installation settlement evaluation was not conducted for the majority of the crossing. Rock holes are generally stable over the long-term with little to no degradation or infilling that could result in surface settlement. As mentioned previously, hole collapse or degradation may occur in the overburden soils. Since much of the overburden will be

[4] *Horizontal Directional Drilling (HDD) Good Practices Guidelines, 3rd Edition*, North American Society for Trenchless Technology, 2008

excavated during the tie-in transition from the HDD segment to the conventionally buried pipeline and subsequently backfilled, we evaluated settlement at depths of 10 feet and 15 feet on each side of the crossing. The calculations are based on the assumption that the hole will be reamed to a diameter of 36 inches and that approximately 85% of the annular space will slowly be filled in with clayey soils, and the rest will be filled with a mixture of bentonite and soil cuttings. The results are provided in Table 3. Settlement curves are provided in Appendix 3.

Table 3. Long-term Settlement

Station	Depth	Settlement
0+76	10 feet	3.20 inches
1+13	15 feet	2.13 inches
17+88	15 feet	2.13 inches
18+11	10 feet	3.20 inches

10 INSTALLATION AND OPERATING STRESS ANALYSIS

During HDD installation, a pipeline segment is subjected to tension, bending, and external pressure as it is pulled through a reamed hole. The stresses in the pipe and its potential for failure are a result of the interaction of these loads.[5,6] In order to determine if a given pipe specification is adequate, HDD installation loads must first be estimated so that the stresses resulting from these loads can be calculated. A thorough design process requires examination of the stresses that result from each individual installation loading condition as well as an examination of the combined stresses that result from the interaction of these loads.

10.1 HDD Installation Stress Analysis

Calculation of the approximate tensile load required to install a pipeline by HDD is relatively complicated due to the fact that the geometry of the drilled path must be considered along with the properties of the pipe being installed and the subsurface conditions. Assumptions and simplifications are required. A method to accomplish this is presented in *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, published by the Pipeline Research Council International (PRCI).[7]

The PRCI Method involves modeling the drilled path as a series of segments to define its shape and properties during installation. The individual loads acting on each segment are then resolved to determine a resultant tensile load for each segment. The estimated force required to install the entire pull section in the reamed hole is equal to the sum of the tensile loads acting on all of the defined segments. When utilizing the PRCI Method, it is important to be aware that pulling loads are affected by numerous variables, many of which are dependent upon site-specific conditions

[5] Fowler, J.R. and C.G. Langner. "Performance Limits for Deepwater Pipelines." Presentation, OTC 6757, 23rd Annual Offshore Technology Conference, Houston, TX, May 6-9, 1991.

[6] Loh, J.T. "A Unified Design Procedure for Tubular Members." Presentation, OTC 6310, 22nd Annual Offshore Technology Conference, Houston, TX, May 7-10, 1990.

[7] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide* (Arlington, VA: Pipeline Research Council International, Inc., 2008), 26-36.

and individual contractor practices. These include reaming diameter, hole stability, removal of cuttings, soil and rock properties, drilling fluid properties, and the effectiveness of buoyancy control measures.[8] It is also important to keep in mind that the PRCI Method considers pulling tension, pipe bending, and external pressure. It does not consider point loads that may result from subsurface conditions such as a rock ledge or boulder. Indeed, we know of no way to analyze potential point loads that may develop due to subsurface conditions. Although this type of damage is relatively rare, several cases have been observed over the years where pipelines suffered damage in the form of dents or pipe deformation due to point loads encountered during HDD installation.

Pulling load calculations for the Conemaugh River Replacement Project were completed under two separate installation scenarios. The first is based on the exact design geometry shown on the plan and profile drawings. The second is based on an assumed worse case installation model in which the pilot hole is drilled 15 feet deeper and 20 feet longer than the designed path with a radius of curvature equal to two-thirds of the vertical design radius. A summary of the assumptions used in each loading scenario is provided in Table 4.

Table 4: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition
As-Designed	Length: As designed Depth: As designed Vert. Radius: 2,400’	12 ppg	Empty
Worse-Case	Length: Increased by 20’ Depth: Increased by 15’ Vert. Radius: 1,600’	12 ppg	Empty

The installation stress calculations are based on several assumptions with respect to pipe/soil interaction, conditions of the hole, and drilling fluid properties. One variable, which plays a significant role in the calculated pulling load is the fluid drag coefficient. For pulling load calculations on the Conemaugh River Project, a fluid drag coefficient of 0.025 was assumed. This value is based on research conducted by Jeffrey Puckett[9] and is referenced in the 2008 edition of the PRCI’s *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide.* Another variable that has substantial impact on the calculated pulling load is the soil friction coefficient. In this case, a value of 0.30 was assumed, which is generally considered a conservative, upper bound, but reasonable value for pipe and soil interaction in a drilling fluid filled hole. For drilling fluid density, it was assumed the reamed hole would contain

[8] *Manual of Practice No. 108*, 22.

[9] Puckett, Jeffrey S. “Analysis of Theoretical Versus Actual HDD Pulling Loads.” *Volume Two, New Pipeline Technologies, Security and Safety*, 1352. Presentation, Proceedings of the ASCE International Conference on Pipeline Engineering and Construction from The Technical Committee on Trenchless Installation of Pipelines (TIPS) of the Pipeline Division of ASCE, Baltimore, Maryland, July 13-16, 2003.

a heavy 12 pounds per gallon mixture of drilling fluid and soil cuttings during pullback and that the pull section will be installed without ballast (empty).

Our installation stress calculations indicated no violations of applicable stress criteria. As a result, it is our opinion that the proposed line pipe specifications are suitable for installation by HDD. This conclusion is based on three assumptions: 1) that the actual drilled paths will not exceed the lengths or depths of the worst-case models analyzed; 2) that the HDD contractor will not employ any improper construction procedures; and 3) that problematic subsurface conditions will not be encountered. Copies of our complete installation stress calculations are provided in the Appendix 3.

10.2 Operating Stress Analysis

As with a pipeline installed by conventional methods, a pipeline installed by HDD will be subjected to internal pressure, thermal expansion, and external pressure during normal operation. A welded pipeline installed by HDD will also be subjected to elastic bending. The operating loads imposed on a pipeline installed by HDD are addressed in Chapter 5 of *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*.[10]

With one exception, the operating stresses in a pipeline installed by HDD are not materially different from those experienced by pipelines installed by cut and cover techniques. As a result, past procedures for calculating and limiting stresses can be applied. However, unlike a cut and cover installation in which the pipe is bent to conform to the ditch, a pipeline installed by HDD will contain elastic bends. Flexural stresses associated with elastic bends were analyzed in combination with longitudinal and hoop stresses resulting from internal pressure and thermal expansion or contraction to verify that combined stresses under operating conditions do not exceed the limits specified in ASME B31.8.

Three scenarios were investigated for the Conemaugh River Replacement Project. In all three scenarios, it was assumed the pipeline would be fully restrained underground, with an initial restraint temperature of 60 °F and an operating temperature of 80 °F. Calculations were performed based on the design radius, the specified minimum radius (two-thirds of the design radius), and the lowest allowable radius based on the limits specified in ASME B31.8. A summary of the assumptions used in each loading scenario is provided in Table 5.

Table 5. Operating Stress Scenarios

Scenario	Radius (ft.)	Max. Operating Pressure	Min. Installation Temperature	Max. Operating Temperature
Design Radius	2,400 feet	1,050 psig	60 ºF	80 ºF
Specified Minimum Radius	1,600 feet	1,050 psig	60 ºF	80 ºF

[10] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, 24-26.

Lowest Radius Allowed by Code	892 feet	1,050 psig	60 ºF	80 ºF

In summary, pipe stress resulting from each of the loading scenarios is within acceptable limits as defined by B31.8. The results of the operating stress calculations are provided in Appendix 4.

11 HYDROFRACTURE EVALUATION

11.1 General Information Related to Hydrofracture

Hydrofracture, also known as hydraulic fracture, is a phenomenon that occurs when drilling fluid pressure in the annular space of the drilled hole exceeds the strength of the surrounding soil mass, resulting in deformation, cracking, and fracturing. The fractures may then serve as flow conduits for drilling fluid allowing the fluid to escape into the formation and possibly up to the ground surface. Drilling fluid that makes its way to the ground surface is known as an inadvertent drilling fluid return or, more commonly, a "frac-out."

Although hydrofracture may be one mechanism by which frac-outs occur, it is not the only one. In fact, it is thought that frac-outs due to true hydrofracture occur in only a small percentage of cases.[11] Drilling fluid flows in the path of least resistance. Ideally, the path of least resistance is through the annulus of the drilled hole and back to the fluid containment pits at the entry or exit points. However, the path of least resistance may also be through naturally occurring subsurface features such as shrinkage cracks or porous deposits of gravel. Drilling fluid may also flow to the surface alongside piers, piles, utility poles, or other structures.

11.2 Hydrofracture Evaluation Method

The risk of inadvertent drilling fluid returns due to hydrofracture at a given location can be determined by comparing the estimated subsurface confining capacity along the proposed drilled alignment to the estimated annular pressure necessary to conduct HDD operations. If the anticipated drilling fluid pressure in the annulus exceeds the confining capacity of the subsurface, there is risk that inadvertent drilling fluid returns due to hydrofracture will occur. Details relative to the methods used to calculate the confining capacity of the subsurface and the annular pressure during pilot hole drilling are provided in Section 11.2.1 and 11.2.2.

11.2.1 Subsurface Confining Capacity

The formation limit pressure for the proposed crossing was calculated using the "Delft Method," which is described in Appendix B of the Army Corps of Engineers publication (CPAR-GL-98) titled *Recommended Guidelines for Installation of Pipelines beneath Levees using Horizontal Directional Drilling*[12]. The Delft Method is applicable to unconsolidated formations and assumes uniform and homogeneous soil conditions in the soil column above the point on the drilled path

[11] Step by Step Evaluation of Hydrofracture Risks for HDD Projects, North American Society for Trenchless Technology, NoDig Conference, Grapevine, TX., Bennett, R.D., Wallin, K., (2008)

[12] *Recommended Guidelines for Installation of Pipelines beneath Levees using Horizontal Directional Drilling*, prepared for U.S. Army Corps of Engineers, Kimberlie Staheli [et al], April 1998

that is being analyzed. As such, engineering judgment is required when selecting geotechnical parameters to account for alternating strata.

Although the Delft Method is widely accepted for estimating the potential for hydrofracture on HDD installations through unconsolidated sediments, the method was not specifically developed for crossings installed through rock. A widely recognized method for calculating confining pressure of HDD operations through rock has not yet been adopted in the HDD industry. One of the reasons for this is the fact that annular pressures associated with HDD operations are very low relative to pressures typically necessary to initiate rock fracturing; therefore, hydrofracture in rock has historically been classified as a low risk occurrence in the HDD industry. Instead, it is more likely that inadvertent drilling fluid returns, should they occur, would result from flow through existing joints or fractures. For the purposes of analyzing the risk of hydrofracture during the Conemaugh River crossing, which involves passing through sedimentary rock, we used the conservative assumption that the subsurface (shale, sandstone, and siltstone) will behave similarly to hard clay when subjected to annular pressure. In our view, this assumption should underestimate the formation limit pressure and provide a conservative assessment of the risk of inadvertent drilling fluid returns due to hydraulic fracture.

In evaluating the formation limit pressure, geotechnical parameters of subsurface materials were chosen based on Standard Penetration Tests (SPT), material classifications, and recommendations provided in the Barr Engineering geotechnical report. A weighted average was used where applicable to account for alternating strata.

11.2.2 Estimated Annular Pressure

The estimated annular pressure necessary for HDD pilot hole operations is a function of the hydrostatic pressure associated with the column of drilling fluid in the annulus and the frictional pressure (pressure loss) that must be overcome for the drilling fluid to flow back to the entry point. Frictional pressure losses for HDD pilot hole operations were calculated using the Bingham Plastic Model, which is described in Chapter 4 of the Society of Petroleum Engineers' *Applied Drilling Engineering*.[13] The Bingham Plastic Model is a conservative approach and generally overestimates the friction loss component of the annular pressure in our view. However, JDH&A believes a conservative approach is valid for hydrofracture evaluations since conditions downhole that can increase annular pressure, such as partial blockage of annular flow due to excess cuttings, cannot be predicted or accounted for. Assumptions with respect to drilling fluid rheology and downhole tooling parameters used in the annular pressure calculations are provided in Table 6.

Table 6: Drilling Fluid Parameters

Drilling Fluid Parameter	Value
Effective Pilot Hole Diameter	14 inches
Drill Pipe Diameter	6.625 inches

[13] *Applied Drilling Engineering,* Society of Petroleum Engineers, Richardson, Texas, A. T. Bourgoyne, Jr. [et al], 1991

Drilling Fluid Weight	10 pounds per gallon
Pump Flow Rate	450 gallons per minute
Yield Point	29 pounds per 100 ft^2
Plastic Viscosity	15 cP
Frictional Pressure Gradient	0.020 psi/ft

11.3 Hydrofracture Risk Assessment

The subsurface confining capacity was calculated over the length of the crossing and compared to the estimated annular pressures necessary for HDD pilot hole operations to determine a relative factor of safety against hydrofracture. Because the highest annular pressures are observed during pilot hole drilling, the potential for hydrofracture during reaming operations was not evaluated. A graphical summary of the results is attached to this memo. The subsurface confining capacity is plotted as a solid blue line. It is the theoretical pressure at which plastic deformation reaches the ground surface. The estimated annular pressure is plotted in red. Any point where the two lines intersect, indicates the risk of an inadvertent drilling fluid return due to hydrofracture is elevated. In reviewing this information, it should be noted that a factor of safety has not been applied to the subsurface confining capacity. As a result, the point at which the estimated annular pressure exceeds the subsurface confining capacity (factor of safety = 1.0) is the theoretical point at which plastic yielding and cracking in the formation reaches the ground surface, indicating an elevated risk of an inadvertent drilling fluid return.

In summary, the calculations indicate that under normal drilling operations with the pilot hole drilled from west to east, the annular pressure maintains a factor of safety greater than two over most of the crossing's length, indicating a low risk of inadvertent drilling fluid returns due to hydrofracture. It is only during the first 50 feet and the last 80 feet of the crossing where cover is relatively shallow, that the risk of hydrofracture is elevated. Please note that the calculations are based on unobstructed annular flow to the entry point. Should the annulus become plugged, significantly higher annular pressures may result, increasing the risk of an inadvertent drilling fluid return.

It is important to keep in mind, however, that loss of drilling fluid circulation and inadvertent drilling fluid returns may occur due to mechanisms unrelated to hydrofracture. As discussed previously, it is possible that inadvertent drilling fluid returns will occur by flowing to the ground surface through preexisting fractures in the subsurface. Although the RQD values of rock cores indicate fair to excellent quality rock overall, there were areas with significant fractures. The risk of circulation loss into these regions is high. That being said, loss of drilling fluid circulation does not necessarily lead to an inadvertent drilling fluid return, particularly in a case like this one, where higher quality rock surrounds isolated fractured zones.

12 CONSTRUCTION DURATION

The estimated duration of HDD construction operations for the Conemaugh River crossing is 27 days. The estimate is based on 12 hour shifts and has been determined based on assumed production rates for each phase of HDD operations taking into account the crossing length, product pipe diameter, and anticipated subsurface conditions. The duration estimate covers drilling services only (pilot hole through pullback) and does not include installation of surface

casings that may be installed at the contractor's option or support operations that are typically provided by a prime contractor (i.e. site preparation & restoration, pull section fabrication, hydrostatic testing).

It should be noted that the resulting duration is based on typical working conditions and does not include contingency to account for unanticipated downtime or operational problems. Bearing in mind that unanticipated operational problems are relatively common on HDD installations, actual construction durations can be expected to exceed the estimated durations by some amount. Refer to Table 7 for details relative to the estimate.

Table 7: Construction Duration

General Data		Comments
Work Schedule, hours/shift =	12.0	Conemaugh River Crossing
days/week =	7.0	Subsurface Conditions: Sedimentary Rock (shale)
Drilled Length, feet =	1,880	
Pilot Hole		
Production Rate, feet/hour =	30	
shifts/day =	1	
Drilling Duration, hours =	62.7	
shifts =	5.2	
Trips to change tools, shifts =	1.0	
Pilot Hole Duration, days =	6.2	

Ream and Pull Back								
Pass Description =	24-inch	36-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	0.5	0.5				10.0	8.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	64.7	64.7				5.2	5.9	140.5
shifts =	5.4	5.4				0.4	0.5	11.7
Rig up, shifts =	0.5	0.5				0.5	1.0	2.5
Trips to change tools, shifts =	1.0	1.0				0.0	0.0	2.0
Pass Duration, days =	6.9	6.9				0.9	1.5	16.2

Summary	
HDD Duration at Site, days =	26.4

Site Establishment	Rig Up	Rig Down
shifts/day =	1	1
shifts =	2.0	2.0
days =	2.0	2.0

Appendix 1

Geotechnical Data Report

Geotechnical Data Report

Line 12 Conemaugh River HDD

Indiana and Westmoreland Counties, Pennsylvania

Prepared for
Enbridge Energy, Limited Partnership

March 2020

Geotechnical Data Report

Line 12 Conemaugh River HDD

Indiana and Westmoreland Counties, Pennsylvania

Prepared for
Enbridge Energy, Limited Partnership

March 2020

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Geotechnical Data Report

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March 2020

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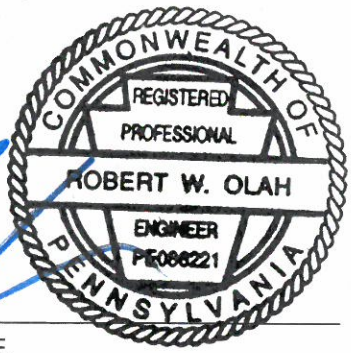
Certifications

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the Commonwealth of Pennsylvania.



Robert W. Olah, P.E.
PE #: PE086221

March 6, 2020
Date

Reviewed by:

Robert E. Stempihar, P.E. (Minnesota)

1 Introduction

Barr Engineering Company (Barr), under contract with Enbridge Energy, Limited Partnership (Enbridge), completed a geotechnical evaluation for a section of the proposed Line 12 replacement pipeline planned to be installed via horizontal directional drilling (HDD) methods beneath the Conemaugh River, located about two miles north-northwest of Blairsville, Pennsylvania (Figure 1).

This report describes the investigations and testing performed to date, presents the results of this work, and provides geotechnical analyses and conclusions to aid in the design of the pipeline alignment and prepare for pipeline construction.

1.1 Project Information

The planned replacement pipeline at this site will cross below the Conemaugh River and Newport Road near Blairsville, Pennsylvania. The pipeline is planned to be constructed along the existing multi-use utility right-of-way (ROW). The Conemaugh River pipeline crossing is to be located approximately two miles north-northwest of Blairsville, Pennsylvania in Blacklick Township in south-central Indiana County, and Derry Township in northeastern Westmoreland County. The replacement pipeline is expected to be a 24-inch diameter carbon steel pipe. In an effort to reduce the physical impacts of crossing the river, the potential for installation of the pipeline via HDD methods was evaluated.

A preliminary drawing of the proposed HDD crossing was provided to Barr by Enbridge and is provided as Figure 4. The preliminary drawing (Rev P3), dated January 27, 2020, prepared by JD Hair & Associates, Inc. (JD Hair) indicates the HDD crossing horizontal drilled length will be approximately 1,670 feet with a planned maximum installation depth of about 40 feet below the Conemaugh River. The crossing will include entry/exit pits located to the west the river and east of Newport Road. We understand that further design of the pipeline alignment for installation by HDD methods will be performed by JD Hair in consideration of the geotechnical conditions discussed in this report.

1.2 Site Geology

A review of regional geology published by the Pennsylvania Bureau of Topographic and Geologic Survey (PBTGS, 1974) indicates the underlying site conditions generally consist of a thin layer of overburden (glacial till) underlain by bedrock of the Conemaugh Group. The soils immediately adjacent to the Conemaugh River would be alluvium. The upper bedrock unit is expected to be part of the Conemaugh Group and can generally be considered to consist of sandstone, shale and smaller amounts of limestone and coal. The glacial deposits are Pre-Illinoian in age and primarily consist of clayey to silty soils and reflect the underlying bedrock. The investigation indicated the till deposits are present to about 15 to 25 feet below the ground surface. A bedrock geology map is provided in Figure 2. A geologic cross-section is also provided as Figure 43.

1.3 Surface Observations

The following observations were made during drilling in December of 2019 and January of 2020. The proposed HDD crossing site was observed to be located within an existing pipeline ROW. Test boring CRC-B-1 was performed west of the Conemaugh River on the northern side of the ROW. Test boring CRC-B-3 was performed east of the Conemaugh River and west of fenced in above-grade pipeline valves within the ROW. Test boring CRC-B-4 was performed east of Newport Road, also within the ROW. The terrain was observed to be sloping gradually down to the Conemaugh River, with the boring CRC-B-1 approximately 30 to 60 feet lower than the borings east of the river (CRC-B-3) and Newport Road (CRC-B-4), respectively.

2 Geotechnical Investigation Methods

2.1 Geotechnical Investigation

The geotechnical investigation was performed in December of 2019 and January of 2020 and consisted of performing three standard penetration test (SPT) borings with NQ rock coring proximal to the Line 12 pipeline alignment for the Conemaugh River crossing. Boring CRC-B-1 was advanced using mud rotary drilling methods to a depth of 25 feet, then continued with NQ rock coring to the termination depth of 110 feet. Boring CRC-B-3 was advanced using mud rotary drilling methods to a depth of 20 feet, then continued with NQ rock coring to the termination depth of 141 feet. Boring CRC-B-4 was advanced using mud rotary drilling methods to a depth of 20 feet, then continued with NQ rock coring to the termination depth of 175 feet. A planned fourth boring (CRC-B-2) was planned east of the Conemaugh River, however, this location was under water during the time of the investigation and was therefore not completed. The boring locations were selected by Enbridge and are indicated on Figure 1. The coordinates and elevations for the boring locations are shown in Table 2-1 These coordinates and elevations were obtained using a hand-held GPS.

Table 2-1 Borehole Locations

Borehole ID	Northing (ft)	Easting (ft)	Elevation (ft)
CRC-B-1	412627.7	1536995.8	932.7
CRC-B-3	413051.7	1538108.5	965.5
CRC-B-4	413308.6	1538426.7	993.1

Elevation reference NAD83

The SPT borings were performed under subcontract to Barr by Aquifer Drilling Company, A Cascade Company (ADT) of Mineola, New York. Test borings were performed with a CME-55 track-mounted drill rig using mud-rotary drilling techniques with a tricone roller bit diameter of 3 inches. The drill rig was equipped with an automatic drop hammer for collection of split spoon samples. After competent bedrock was encountered at each boring, 6-inch casing was installed to the bedrock depth and the hole advanced using NQ3 diamond rock coring methods.

To document the relative density of the soils and collect samples for laboratory testing, soil sampling with a standard split-spoon sampler was performed at 5-foot intervals. SPT borings were performed in general accordance with ASTM D1586 “Standard Methods for Penetration Test and Split-Barrel Sampling of Soils”.

The rock coring samples were collected continuously in 10-foot core runs. Rock coring was performed in general accordance with ASTM D2113 Practice for Rock Core Drilling and Sampling of Rock for Site Exploration.

All boreholes were backfilled with neat cement grout upon completion of drilling. Samples were reviewed by Barr field staff during collection and soil samples were then sealed and labeled in glass jars or plastic bags, and rock cores were placed in core boxes. The samples were again reviewed by a Barr geotechnical engineer in Duluth, and then delivered to Twin Ports Testing (TPT) of Superior, Wisconsin for laboratory testing. Soil boring logs can be found in Appendix A.

2.2 Soil Testing

Laboratory testing was performed to aid in documenting soil properties for the Conemaugh River crossing site. Soil samples that were not submitted to TPT have been retained to allow the HDD contractor(s) to perform additional testing as they require. Soil testing results, in combination with boring logs and site observations, will help the HDD contractor select the appropriate drill rig and equipment, drilling mud type, drilling mud density, and appropriate drill tooling and machinery. The soil samples will be stored for 12 months after the issuance of this report until they are discarded, unless written direction is otherwise provided.

Laboratory test results are provided in Appendix B.

- Moisture content was determined in accordance with ASTM D2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass."
- The soil particle size distribution was determined in accordance with ASTM D422, "Standard Test Method for Particle Size Analysis of Soils."
- Visual soil classification in accordance with ASTM D-2488, "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."
- Unconfined compressive strength was determined in accordance with ASTM D 2938, "Standard Test Method for Unconfined Compressive Strength of Intact Rock Core Specimens".
- Soil soluble chloride and sulfate content in accordance with EPA Method 9056A, "Determination of Inorganic Anions by Ion Chromatography."
- Atterberg Limit was determined in accordance with ASTM D 4318, "Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils".

The results of moisture content, Atterberg Limits, grain size distribution tests, and unconfined compressive strength of the soils and rock cores, are included on the test boring logs adjacent to the tested sample. Table 2.2 provides a summary of the laboratory test results for the site.

Table 2-2 Laboratory Summary

Boring ID	Top of Sample Depth (ft)	USCS Soil Type	N Value	Atterberg Limits			Moisture Content (%)	Grain Size Analyses			Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Chloride (mg/kg)	Sulfate (mg/kg)
				Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)		Gravel Content (%)	Sand Content (%)	% Passing #200 Sieve				
CRC-B-1	5	CL-ML	14	23	16	7	12.9	-	-	-	-	-	-	-
	10	CL	14	-	-	-	21.3	0.0	34.6	65.4		-	-	-
	15	GC	18	-	-	-	13.5	40.5	37.3	22.2	-	-	-	-
	20	GC	37	-	-	-	10.1	47.7	36.6	15.7	-	-	-	-
	25	CL	37	22	13	9	7.2	-	-	-	-	-	-	-
CRC-B-3	10	-		-	-	-	17.0	-	-	-	-	-	ND	21.2
	15	CL	39	-	-	-	15.8	8.8	34.5	56.7	-	-	-	-
	23	-		-	-	-	-	-	-	-	161.3	14,927	-	-
	37	-		-	-	-	-	-	-	-	162.7	3,537	-	-
	49	-		-	-	-	-	-	-	-	162.0	5,070	-	-
	53	-		-	-	-	-	-	-	-	169.4	6,583	-	-
	58	-		-	-	-	-	-	-	-	166.4	10,693	-	-
	72	-		-	-	-	-	-	-	-	158.2	10,380	-	-
	93	-		-	-	-	-	-	-	-	162.4	11,680	-	-
	99	-		-	-	-	-	-	-	-	166.3	5,710	-	-
	106	-		-	-	-	-	-	-	-	165.0	6,523	-	-
	112	-		-	-	-	-	-	-	-	169.4	5,088	-	-
	115	-		-	-	-	-	-	-	-	168.4	7,189	-	-
	130	-		-	-	-	-	-	-	-	165.7	4,003	-	-
CRC-B-4	5	CL	22	-	-	-	19.1	0.0	35.1	64.9	-	-	-	-
	10	SC	17	-	-	-	10.5	21.9	55.5	22.6	-	-	-	-
	15	-		-	-	-	12.5	-	-	-	-	-	ND	ND
	23	-		-	-	-	-	-	-	-	167.7	12,680	-	-
	33	-		-	-	-	-	-	-	-	160.6	52,770	-	-
	40	-		-	-	-	-	-	-	-	158.3	21,130	-	-
	55	-		-	-	-	-	-	-	-	161.1	12,470	-	-
	63	-		-	-	-	-	-	-	-	167.5	20,640	-	-

3 Results

3.1 Soil Lithology

The results of the geotechnical soil borings and laboratory tests were compiled to obtain an understanding of the lithology of the study area. As determined from field and laboratory data, the existing soil conditions at the project site generally consist of topsoil and occasional fill over glacial till to a depth of 15 to 25 feet below ground surface (bgs), underlain by shale and sandstone bedrock to the termination depths of the borings.

Detailed information for soil strata and groundwater conditions are contained in the following sections. Complete laboratory testing results for samples from the recently performed test borings are provided in Appendix B.

3.1.1 Topsoil/Organics

Topsoil was encountered in CRC-B-1 and CRC-B-4 at this site at the ground surface and extending to depths of approximately 6 inches bgs. The topsoil is primarily composed of lean clay with organics. Boring CRC-B-3 has crushed rock at the surface and fill (likely associated with existing valve or pipeline construction) to a depth of approximately 7 feet bgs. Topsoil (and fill) thickness should be expected to vary across the site with differing vegetation cover, topography, and depositional environment.

3.1.2 Glacial Till Deposits

Glacial till soils were encountered below the surficial organics/fill extending to depths ranging from 25 feet bgs (elevation 907.7) on the west side of the site of the site to 15 to 20 feet bgs (elevation 977.8 to 945.5, respectively) on the east side of the site. The glacial till is comprised of sandy lean clay with varying amounts of sand and gravel to gravely clay with sand.

A total of 6 grain size distribution analyses were completed on samples of the glacial till. The result of the laboratory testing on the soils indicated a gravel content of none to 47.7 percent, a sand content of 34.5 to 55.5 percent, and percent fines (passing the #200 sieve) of 15.7 to 65.4 percent. Laboratory testing on the sands indicated a water content of 7.2 to 21.3 percent.

Atterberg limit testing was performed on two samples of the glacial till. Results of the testing indicated a liquid limit of 22 to 23 percent, a plastic limit of 13 to 16 percent, resulting in a plasticity index of 7 to 9 percent.

N-values in the lean clay ranged from 7 blow per foot (bpf) to greater than 30 bpf, with typical values around 15 bpf. Hand pocket penetrometer results of the lean clay indicated unconfined compressive strength of about 3.5 tons per square foot (tsf). The SPT and pocket penetrometer results indicate that the cohesive soils vary in consistency from medium stiff to stiff. N-values in the gravels and sands ranged from 17 bpf to 37 bpf, indicating a relative density in medium dense to dense.

3.1.3 Bedrock

Bedrock was encountered at 15.3 to 25 feet bgs in each of the borings. Based on publically available published data by the U.S. Geologic Survey (USGS), the bedrock at the site consists of sandstone, shale, and limestone of the Conemaugh Group. The shale encountered in the borings was generally observed to be gray, horizontally bedded, with light to heavy mostly horizontal fracturing, and with thin layers of siltstone, mudstone, and residual clays. Unconfined compressive strength testing was performed on 17 intact bedrock specimens obtained during diamond core drilling. Results of the testing indicated uniaxial unconfined compressive strengths ranging widely from 3,537 to 52,770 pounds per square inch (psi). These strengths correlate to highly variable strengths from "weak" to "very strong". Dry densities of the bedrock ranged from 158 to 169 pounds per cubic foot (pcf).

Rock Quality Designation (RQD) was determined in the field for each core run. The recorded RQD values ranged widely from 0 to 100 percent with most between 55 and 70 percent. RQD, compressive strength and dry density are included on the test boring logs adjacent to the tested sample.

3.2 Soil Corrosivity

Soil electrical resistivity, pH, and soluble sulfates and chlorides are some of the primary factors in evaluating the rate and amount of corrosion of buried structures. Chloride was not detected in both of the soil samples submitted. Sulfate content ranged from not detected above reporting limits to 21 mg/kg. It should be noted that soil corrosivity is also influenced by other variables including the amount of moisture, drainage, and soil particle size/oxygen content. Soil resistivity testing was not completed; however, it is expected the shale bedrock would have electrical resistivity values ranging from 2,000 to 20,000 ohm-cm (Keller and Frischknecht, 1996).

3.3 Groundwater Conditions

Groundwater was not directly observed in the test borings at the time of the investigation. Many factors such as heavy rainfall events, dry periods, and differences in soil permeability contribute to water level fluctuations. Groundwater levels should be expected to fluctuate over time but would generally be expected to be near the level of the Conemaugh River. However, the Conemaugh River at this site is controlled by a downstream dam. During our fieldwork, fluctuations of the river level was observed to vary by multiple feet over subsequent days.

4 Analysis and Recommendations

Results of the field and laboratory investigation have been presented in Section 3. Based on these results, Section 4 provides design and construction considerations for the project.

4.1 Pipeline Entry, Exit, and Stringing/Staging Areas

The drill crews reported relatively easy access to the three boring locations during drilling in December of 2019 and January of 2020 with the use of timber matting on the western side of the river. Access to a planned boring (CRC-B-2) was not attempted as the water level of the Conemaugh River was above the ground surface elevation and near surface soils appeared soft. Considering the presence of organic soils within 2 feet of the ground surface in the vicinity of the borings, construction traffic and equipment will likely have difficulty accessing the work areas during wet weather conditions or during non-frozen times of the year. Considerations should be made for soft ground surface conditions in entry, exit, and stringing areas, particularly after heavy rain and during the spring thawing period. If construction is to occur during the winter months, differential ground surface movement due to frost heave should also be taken into account.

4.2 Soil Parameters

The soil parameters presented in Table 4-1, Table 4-2, and Table 4-3 can be considered for design of the HDD alignment and necessary drill entry and exit and mud pits, as well as other contractor-designed excavations. Layers of granular soil or weathered shale were encountered in some of the geotechnical borings included in the assessment. The shear strength of these soils was estimated based on correlations to SPT results collected at 5-foot intervals during sampling in the boreholes. These parameters are applicable to undisturbed soils.

Table 4-1 Estimated Unit Weight and Strength Parameters

Soil Type	N-Value Range *	Moist Unit Weight [pcf]	Submerged Unit Weight [pcf]	Angle of Internal Friction, Undrained ** [degrees]	Cohesion, Undrained [psf]
Sandy Lean Clays	7-22	110-120	47-57	0	1,500-3,500
Clayey Sand/Clayey Gravel with Sand	17-50+	120-130	58-68	36	0
Bedrock	N/A	160	98	0	500,000+

Note(s):
*N-Values not likely influenced by the presence of cobbles and boulders
**Each SPT value was correlated to the soil friction angle (Das, 2007[1]). For this analysis, a maximum shear strength value of 40 degrees was assigned to the sandy soils.

Table 4-2 Estimated Poisson's Ratio and Modulus of Elasticity Parameters

Soil Type	N-Value Range	Poisson's Ratio, ν*		Modulus of Elasticity, E_s * [psi]
		Drained**	Undrained**	
Sandy Lean Clays	7-22	0.15-0.25	0.5	500-2,000
Clayey Sand/Clayey Gravel with Sand	17-50+	0.3-0.45		3,000-5,000
Shale	N/A	0.23		>3,000,000

Note(s):
* Estimate from Das (1997) and (1998)
** Undrained applies to short term, construction conditions and drained applies to long term conditions.

Table 4-3 Lateral Earth Pressure Coefficients

Soil Type	N-Value Range	Coefficients of Lateral Earth Pressure*		
		Active [Ka]	At Rest [Ko]	Passive [Kp]
Sandy Lean Clays	7-22	1	1	1
Clayey Sand/Clayey Gravel with Sand	17-50+	0.33	0.5	3.00
Shale	N/A	>1	>1	>1

Note(s):
* Ultimate Values
***N-values not available for layer. Parameters are conservative estimates based on experience with similar soils

4.3 Permeability and Dewatering

Although field measurements of surface soil permeability were not completed at the time of field investigation, general relationships between soil type, density, and permeability exist. The sandy lean clay materials are considered to have low permeability. The clayey sand and clayey gravel with sand could be considered relatively permeable. Excavations for entry/exit pits will likely extend into the relatively permeable sand materials and fractured/weathered shale. Considerable groundwater inflow through the permeable sand soils and unstable excavations should be anticipated, which may require higher dewatering pumping rates and/or shoring. Side sloping and shoring of excavations should meet OSHA guidelines.

4.4 Potential Construction Risks

The HDD designer and contractor should carefully consider the risks associated with the subsurface conditions at the site. Potential construction risks based on the results of the subsurface investigation are discussed below.

4.4.1 Loss of Drilling Mud/Water

The fractured bedrock between 20 and 50 feet depth is considered relatively permeable. Moderate amounts (up to 50 gallons) of drilling mud loss was encountered while drilling the test borings. Most of the core water was lost in the bedrock formation for borings CRC-B-1 and CRC-B-3.

Some loss of drilling mud should be expected if the HDD alignment is through highly fractured bedrock. Adjustments to drilling mud mixture, pressures, and volumes may be needed to prevent loss of drilling fluids in these conditions.

5 Limitations

The recommendations provided in this report are based on the results of fieldwork, which focused on investigation of the area near the proposed HDD alignment. Barr's evaluation, analyses, and recommendations were developed from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from borings continuously with depth, and therefore strata boundaries and thicknesses must be inferred to some extent. Strata boundaries may also be gradual transitions, and can be expected to vary in depth, elevation, and thickness away from the boring locations. Boulders and cobbles also cannot be recovered with typical geotechnical drilling equipment.

Variations in subsurface conditions present among borings or test pits may not be revealed until additional exploration work is completed, or construction commences. If any such variations are revealed, our recommendations should be re-evaluated. Such variations could increase construction costs, and a contingency should be provided to accommodate them.

The analysis and conclusions provided are based on the results of fieldwork from recent investigations. Using generally accepted engineering methods and practices, the investigations performed have made every reasonable effort to characterize the site. However, the likelihood that conditions may vary from any specific location tested is still possible, and careful attention to soil conditions should be undertaken during the time of construction by qualified personnel.

6 Standard of Care

This report is for the exclusive use of the parties to which it has been addressed. Without written approval, Barr assumes no responsibility to other parties regarding this report. The evaluation, analyses, and recommendations may not be appropriate for other parties or projects.

Barr Engineering Company's services for this project were performed in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

7 References

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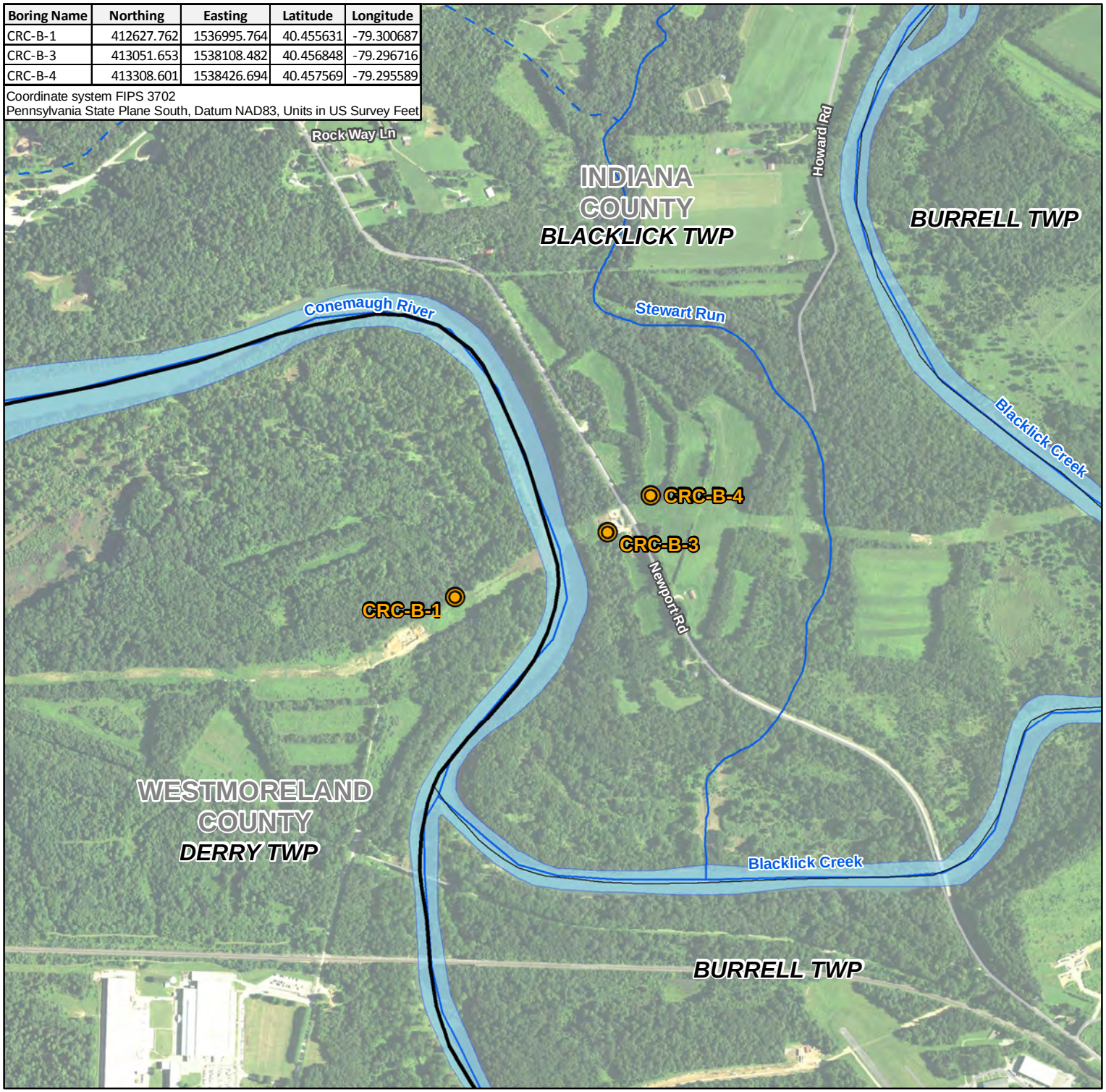
9. Roberge, P.R. (2006). Corrosion Basics: An Introduction, 2nd Edition. NACE Press Book.

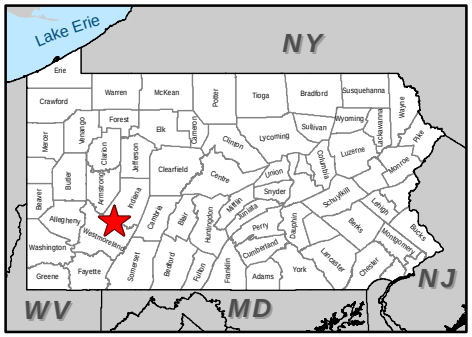
Figures

Figure 1 Site Location

Boring Name	Northing	Easting	Latitude	Longitude
CRC-B-1	412627.762	1536995.764	40.455631	-79.300687
CRC-B-3	413051.653	1538108.482	40.456848	-79.296716
CRC-B-4	413308.601	1538426.694	40.457569	-79.295589

Coordinate system FIPS 3702
Pennsylvania State Plane South, Datum NAD83, Units in US Survey Feet





Completed Boring Location
Waterbody/River
Perennial Stream
Intermittent Stream

N

0 1,000 2,000

Feet

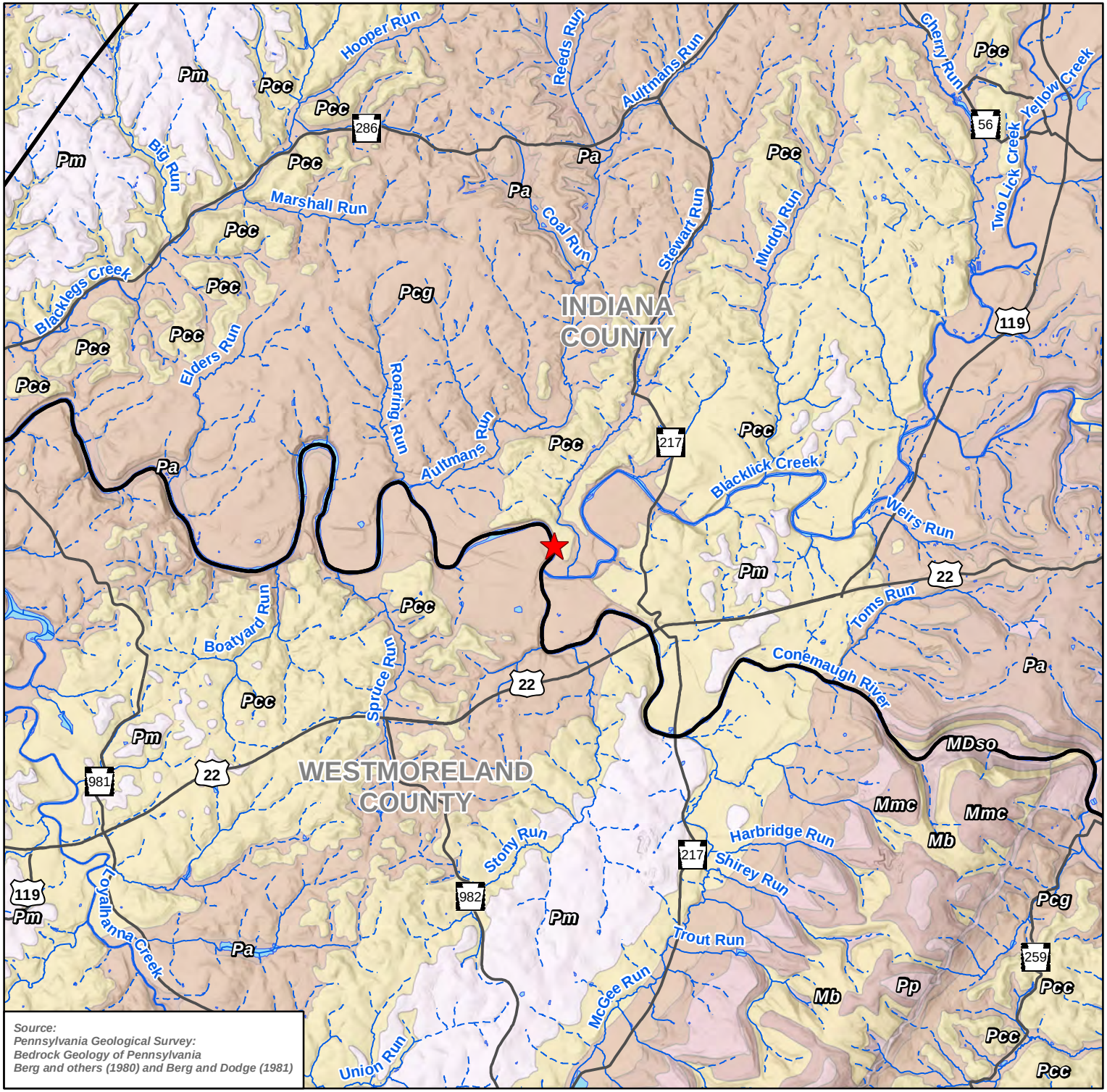
1 Inch = 1,000 feet

USDA NAIP Imagery Circa 2017

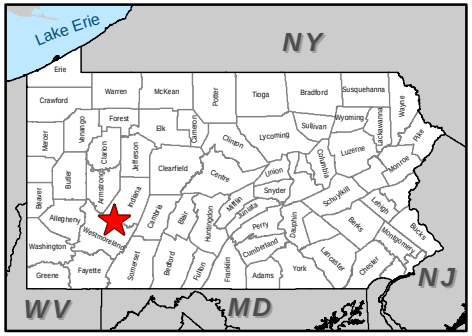
Figure 1
SITE LOCATION
Conemaugh River Crossing
Line 12
Indiana & Westmoreland Counties, PA

ENBRIDGE

Figure 2 Bedrock Geology



Source:
Pennsylvania Geological Survey:
Bedrock Geology of Pennsylvania
Berg and others (1980) and Berg and Dodge (1981)



Site Location

Waterbody/River

Perennial Stream

Intermittent Stream

Bedrock Geology

MDso -	Burgoon Sandstone
Mb -	Shenango Formation through Oswayo Formation, undivided
Mmc -	Mauch Chunk Formation
Pa -	Allegheny Formation
Pcc -	Casselman Formation
Pcg -	Glenshaw Formation
Pm -	Monongahela Group
Pp -	Pottsville Formation

N

0 2 4

Miles

1 Inch = 2 miles

Figure 2
BEDROCK GEOLOGY
Conemaugh River Crossing
Line 12
Indiana & Westmoreland Counties, PA

ENBRIDGE

Barr Footer: ArcGIS 10.7.1, 2020-03-06 13:46 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\38321002\Work_Orders\SafeWorkPlan\Maps\HDD\Figure 2 Conemaugh River Bedrock Geology.mxd User: MAC2

Figure 3 Cross Section

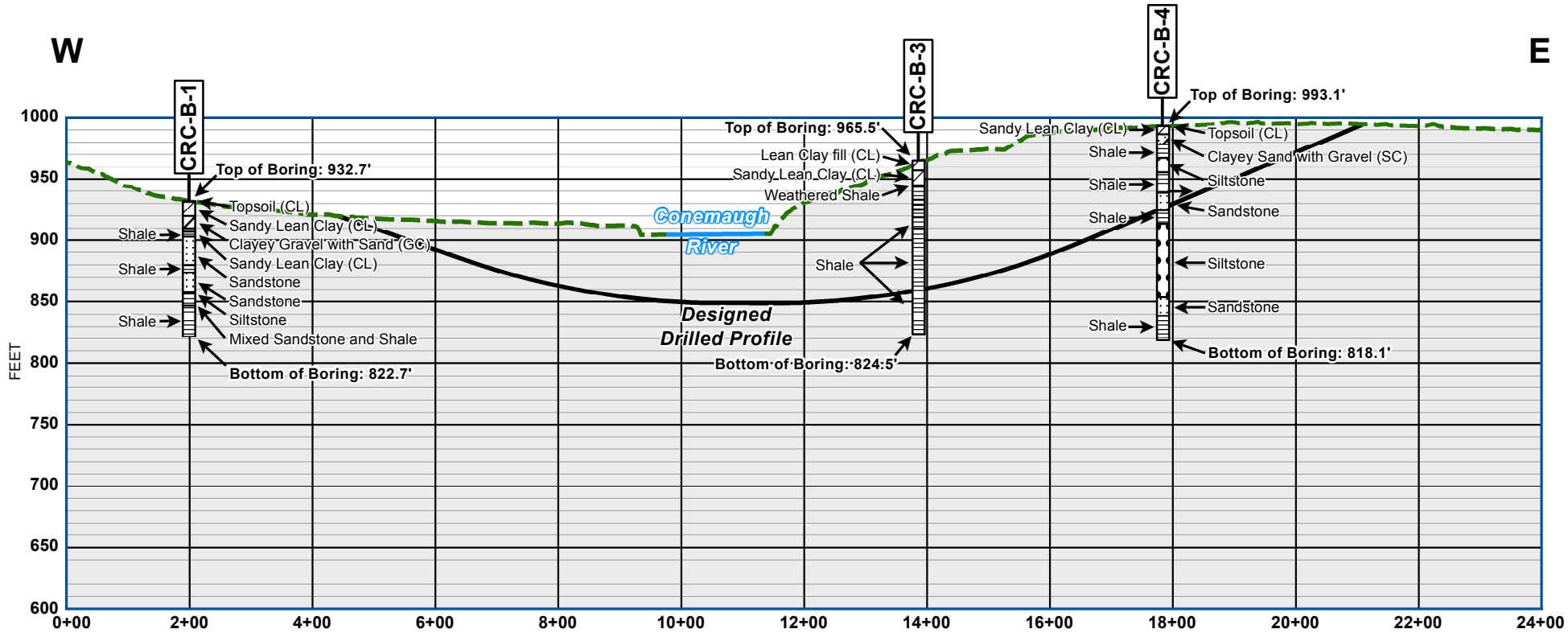


Figure 3
CROSS SECTION
Conemaugh River Crossing
Line 12
Indiana & Westmoreland Counties, PA

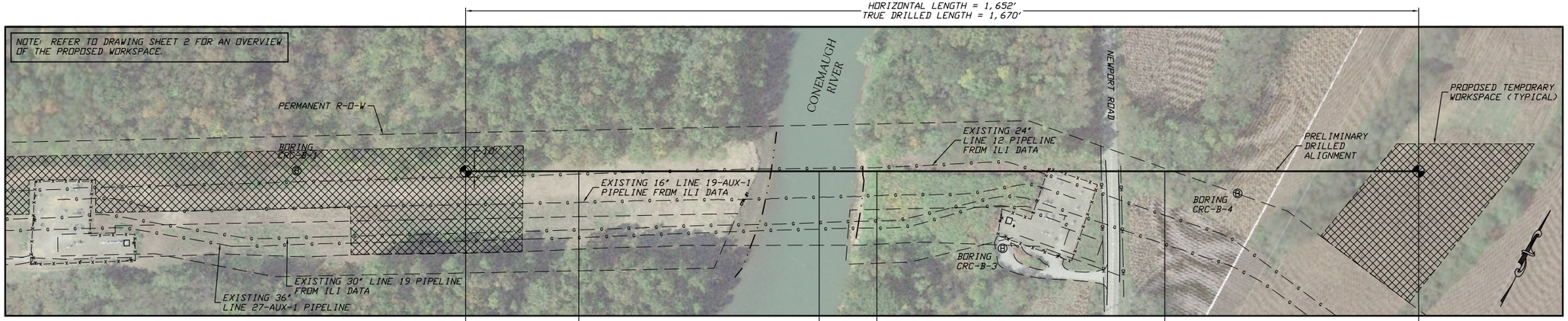
50 SCALE IN FEET 100
2x Vertical Exaggeration

ENBRIDGE

NOTE:
Topographic information depicted based on PAMAP Program LiDAR elevation data.

Barr Footer: ArcGIS 10.7.1, 2020-02-21 14:25 File: I:\Client\Enbridge_Energy\Work_Orders\Mainline_Permitting\38321002\Work_Orders\SafeWorkPlan\Maps\HDD\Figure 3 Conemaugh River Cross Section.mxd User: MAC2

Figure 4 Preliminary HDD Design



PLAN

SCALE: 1"=100'

EXIT POINT @ 10°
16+51.74, 920.00
N 412743.52, E 1537228.57

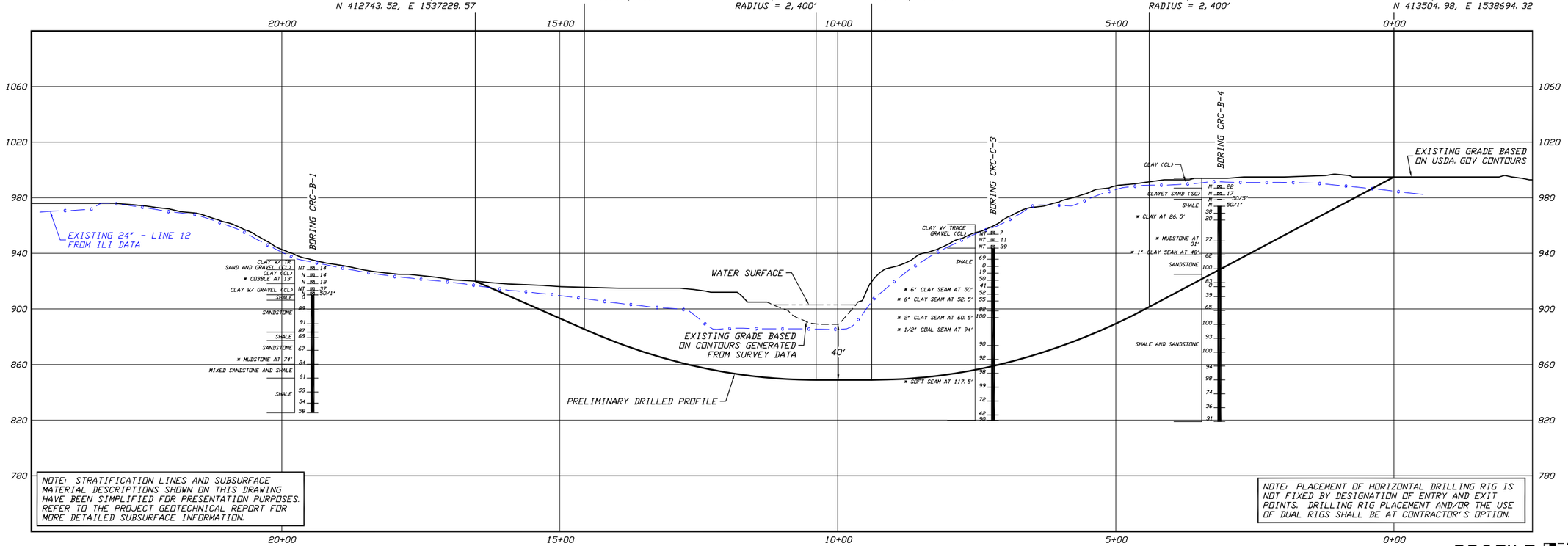
P.T. 10° SAG BEND
14+55.88, 885.46

P.C. 10° SAG BEND
10+39.13, 849.00
RADIUS = 2,400'

P.T. 12° SAG BEND
9+39.13, 849.00

P.C. 12° SAG BEND
4+40.14, 901.45
RADIUS = 2,400'

ENTRY POINT @ 12°
0+00.00, 995.00
N 413504.98, E 1538694.32



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: PLACEMENT OF HORIZONTAL DRILLING RIG IS NOT FIXED BY DESIGNATION OF ENTRY AND EXIT POINTS. DRILLING RIG PLACEMENT AND/OR THE USE OF DUAL RIGS SHALL BE AT CONTRACTOR'S OPTION.

PROFILE

SCALE: 1"=100' HORIZONTAL
1"= 40' VERTICAL

40 20 0
200 100 50 0

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

GEOTECHNICAL LEGEND

BORING LOCATION

SPLIT SPOON SAMPLE

53 23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
— PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

CORE BARREL SAMPLE

UCS 6,250 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 — MOHS HARDNESS
— ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY BARR ENGINEERING, DULUTH, MINNESOTA. REFER TO THE DRAFT GEOTECHNICAL LOG DATED 1/16/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
2. THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

TOPOGRAPHIC SURVEY NOTES

1. TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, HOUSTON, TEXAS AND FROM CONTOURS OBTAINED FROM USDA. GOV.
2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO PENNSYLVANIA STATE PLANE COORDINATES, SOUTH ZONE, NAD 83.
3. ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: AS STAKED BY COMPANY
2. EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
3. ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
4. ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
5. CURVE RADIUS: NO LESS THAN 1,600 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

PROTECTION OF EXISTING FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY

CONEMAUGH RIVER ANOMALY PROJECT

PLAN AND PROFILE
24-INCH PIPELINE CROSSING OF CONEMAUGH RIVER BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: WESTMORELAND & INDIANA COUNTIES, PA

DRAWN	DATE	CHECKED	APPROVED	SCALE	DRAWING LABEL	REVISION
DMP	09/24/19	DLB	--	SHOWN FOR D-SIZED PLOT	CONEMAUGH RIVER	P3

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APP.
3	01/27/20	UPDATED DESIGN BASED ON NEW PULLBACK LAYOUT	CDS	KWW	JMS
2	01/21/20	ADD DRAFT GEOTECHNICAL LOG	CDS	KWW	JMS
1	11/15/19	REVISE BORING DEPTHS, ADD WATER BORING	CDS	JMS	JMS

J.D.Hair&Associates,Inc.
Consulting Engineers
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge/1935

SHEET NO.
1

Figure 4

Appendices

Appendix A

Soil Boring Logs

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

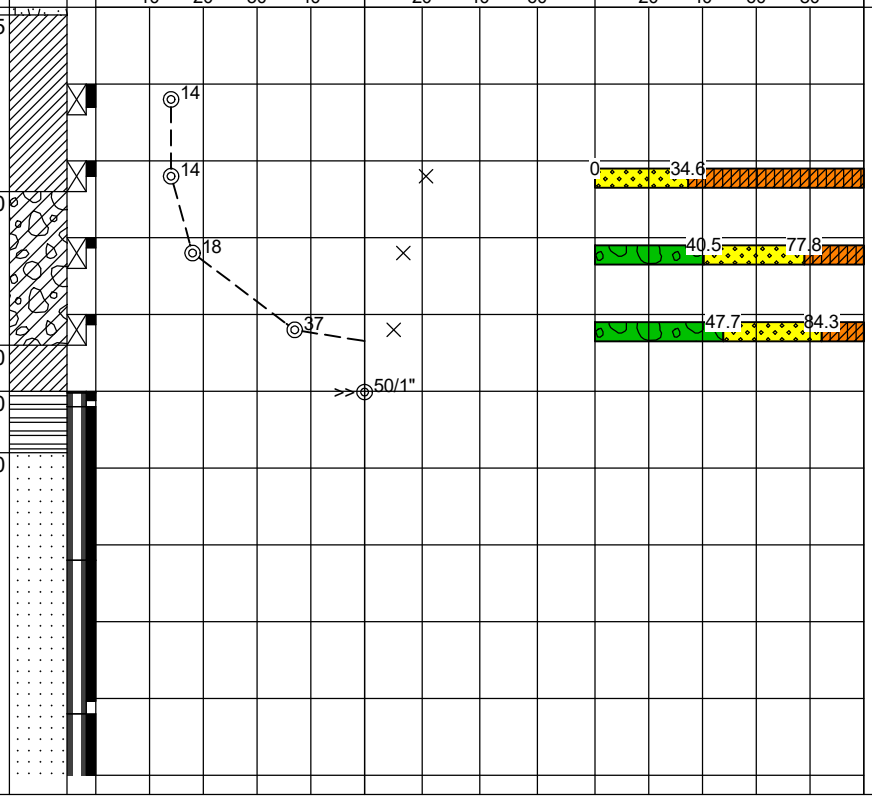
LOG OF BORING CRC-B-1

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Surface Elev.: 932.7 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Depth
932.2	0	TOPSOIL (CL).	0.5
		SANDY LEAN CLAY (CL): brown; wet; stiff; trace sand and gravel' trace roots and fibers.	
920.7		CLAYEY GRAVEL WITH SAND (GC): brown; wet; medium dense to dense; with silt; trace gravel. With gravel below 15 feet.	12.0
910.7		SANDY LEAN CLAY (CL): brown; wet; hard; with gravel.	22.0
907.7		SHALE; grey; slightly weathered; fine-grained; bedded; horizontal; very close fracture spacing.	25.0
903.7		SANDSTONE; grey; slightly weathered; fine-grained; wide fracture spacing.	29.0



Physical Properties						
WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
21.3						
13.5						
10.1						
						0
						89
						91
						87

Continued Next Page

Completion Depth:	110.0
Date Boring Started:	1/9/20
Date Boring Completed:	1/11/20
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	932.7
Coordinates:	N 412,627.8 ft E 1,536,995.8 ft
Datum:	

Remarks: Boring was advanced from 0-25 ft with mud rotary methods, and from 25-110 ft with NQ3 core. 6" diameter casing was advanced to 25 feet prior to rock coring. Boring was abandoned with bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling; Dry

LEGEND

MC	Moisture Content	Q_u	Unconfined Compression
γ	Dry Unit Weight	Q_p	Hand Penetrometer UC
ϕ	Friction Angle	Gs	Specific Gravity
		RQD	Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-1

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	STANDARD PENETRATION TEST DATA (N in blows/ft)	WATER CONTENT % (PL – LL)	SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES)	Physical Properties: WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
	50	880.7												
880		SHALE; grey; slightly weathered; fine-grained; bedded; horizontal; medium fracture spacing. 52.0												69
	55	874.7 56 - 58 feet: mud rotarty.												
875		SANDSTONE; grey; fresh; fine-grained; bedded; horizontal; wide fracture spacing. 58.0												
	60													67
870														
	65													
865														
	70													84
860		858.7												
	75	857.7 SILTSTONE; grey; fresh; fine-grained; bedded; horizontal; medium fracture spacing. 74.0 75.0												
855		MIXED SANDSTONE AND SHALE. Grey to dark grey; fine-grained; bedded; horizontal; very close fracture spacing.												
	80													61
850		847.7												
	85	SHALE; grey; fresh; fine-grained; bedded; horizontal; very close fracture spacing; 85 feet: clay seam. 85.0												
845														
	90													53
840														
	95	95 feet: core barrel plugging.												
835														
	100													54

Continued Next Page

Completion Depth:	110.0
Date Boring Started:	1/9/20
Date Boring Completed:	1/11/20
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	932.7
Coordinates:	N 412,627.8 ft E 1,536,995.8 ft
Datum:	

Remarks: Boring was advanced from 0-25 ft with mud rotary methods, and from 25-110 ft with NQ3 core. 6" diameter casing was advanced to 25 feet prior to rock coring. Boring was abandoned with bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling — Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-1

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	STANDARD PENETRATION TEST DATA (N in blows/ft)	WATER CONTENT % (PL–LL)	SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES)	Physical Properties: WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
830	100	SHALE; grey; fresh; fine-grained; bedded; horizontal; very close fracture spacing; 85 feet: clay seam. *(Continued)*												
825	105													58
	110	822.7 Bottom of Boring at 110.0 feet 110.0												
	115													
	120													
	125													
	130													
	135													
	140													
	145													
	150													

Completion Depth:	110.0
Date Boring Started:	1/9/20
Date Boring Completed:	1/11/20
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	932.7
Coordinates:	N 412,627.8 ft E 1,536,995.8 ft
Datum:	

Remarks: Boring was advanced from 0-25 ft with mud rotary methods, and from 25-110 ft with NQ3 core. 6" diameter casing was advanced to 25 feet prior to rock coring. Boring was abandoned with bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling; Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

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Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-3

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Surface Elev.: 965.5 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Sample Type & Rec.	N in blows/ft	WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
965	0	LEAN CLAY FILL (CL): brown; moist; medium stiff; trace sand and gravel; dark brown mottling.									
960	5			7							
957.5	8.0	SANDY LEAN CLAY (CL): brown; moist; stiff to hard; trace gravel; dark brown mottling.									
955	10			11	17				3.5		
950	15			39	15.8				3.5		
945.5	20			50/0"							
945.0	20.0	WEATHERED SHALE.									
940	20.5	SHALE; grey; slightly weathered; fine-grained; massive bedded; horizontal; medium fracture spacing.				161.3		1075			69
935	25										58
933.5	30										0
930	32.0	SHALE; dark grey; slightly weathered; fine-grained; massive bedded; horizontal; close fracture spacing; highly fractured.									19
929.5	35										
925	36.0	SHALE; grey; slightly weathered; fine-grained; massive bedded; horizontal; medium fracture spacing.				162.7		255			50
925.5	40										
920	40.0	SHALE; grey; moderately weathered; fine-grained; massive bedded; horizontal; close fracture spacing; highly fractured.									41
919.5	45										
	46.0	44.5 ft: lost water.				162		365			52
	50										

Continued Next Page

Graphic Log

STANDARD PENETRATION TEST DATA: N in blows/ft (10, 20, 30, 40)

WATER CONTENT %: PL — LL (20, 40, 60)

SIEVE ANALYSIS: GRAVEL, SAND, SILT, CLAY, FINES (20, 40, 60, 80); 8.8, 43.3

Physical Properties

Completion Depth:	141.0
Date Boring Started:	12/12/19
Date Boring Completed:	12/15/19
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	965.52
Coordinates:	N 413,051.7 ft E 1,538,108.5 ft
Datum:	

Remarks: Boring was advanced from 0-20 ft with mud rotary methods, and from 20-141 ft with NQ3 core. 6" diameter casing was advanced to 20 feet prior to rock coring. Boring was abandoned with 130 gallons of bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling — Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-3

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
915	50	SHALE; dark grey; slightly weathered; fine-grained; massive bedded; horizontal; medium fracture spacing. *(Continued)*		169.4		474			55
910.5	55	50 ft: 6" clay seam. 52.5 ft: 6" clay seam.		166.4		770			82
905	60	SHALE; dark grey to grey; slightly weathered; fine-grained; massive bedded; horizontal; wide fracture spacing. 60.5 ft: 2" clay seam.							100
900	65								
895	70			158.2		747			95
890	75								
885	80								90
880	85								
875	90			162.4		841			92
870	95	94 ft: 0.5" coal seam.							
	100			166.3		411			

55.0

Continued Next Page

Graphic Log | Sample Type & Rec. | STANDARD PENETRATION TEST DATA (N in blows/ft: 10, 20, 30, 40) | WATER CONTENT % (PL, LL; 20, 40, 60) | SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES; 20, 40, 60, 80)

Completion Depth:	141.0
Date Boring Started:	12/12/19
Date Boring Completed:	12/15/19
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	965.52
Coordinates:	N 413,051.7 ft E 1,538,108.5 ft
Datum:	

Remarks: Boring was advanced from 0-20 ft with mud rotary methods, and from 20-141 ft with NQ3 core. 6" diameter casing was advanced to 20 feet prior to rock coring. Boring was abandoned with 130 gallons of bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling; Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

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O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-3

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
865	100	SHALE; dark grey to grey; slightly weathered; fine-grained; massive bedded; horizontal; wide fracture spacing. *(Continued)*							98
860	105			165		470			
855	110			169.4		366			99
850	115			168.4		518			
845	120								72
840	125								
835	130	130 ft: core barrel plugged. 127-137 ft: highly fractured.		165.7		288			42
830	135								
825	140	824.5 140 ft: 2" clay seam. 141.0 Bottom of Boring at 141.0 feet							90
	145								
	150								

Graphic Log | Sample Type & Rec. | STANDARD PENETRATION TEST DATA (N in blows/ft: 10, 20, 30, 40) | WATER CONTENT % (PL, LL; 20, 40, 60) | SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES; 20, 40, 60, 80)

Completion Depth:	141.0
Date Boring Started:	12/12/19
Date Boring Completed:	12/15/19
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	965.52
Coordinates:	N 413,051.7 ft E 1,538,108.5 ft
Datum:	

Remarks: Boring was advanced from 0-20 ft with mud rotary methods, and from 20-141 ft with NQ3 core. 6" diameter casing was advanced to 20 feet prior to rock coring. Boring was abandoned with 130 gallons of bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling; Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-4

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

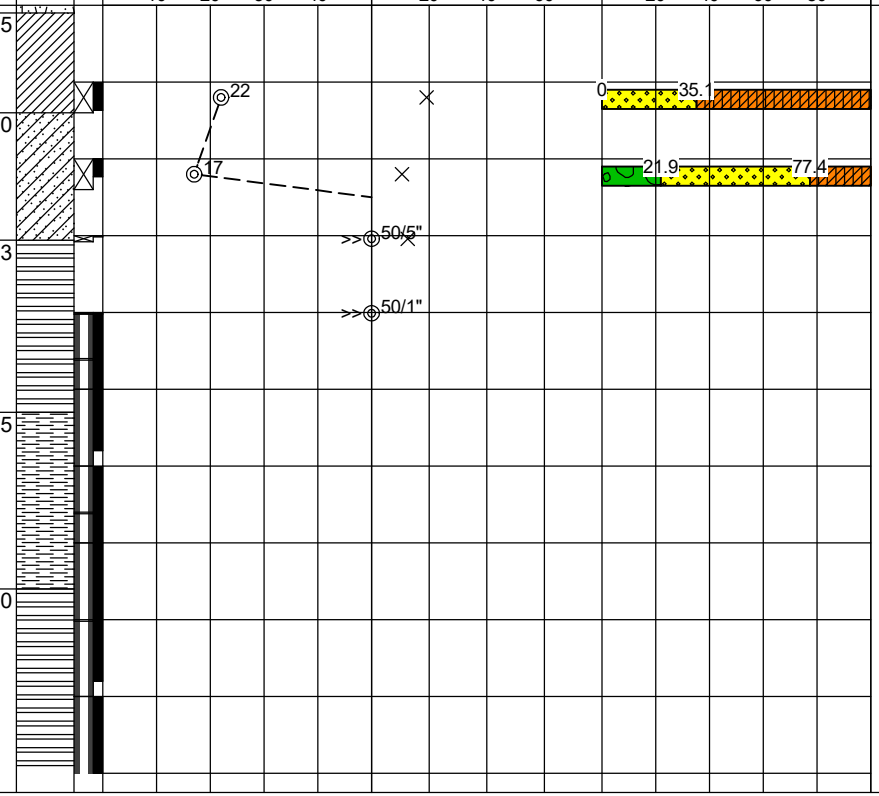
Barr Project Number: 38321002

Surface Elev.: 993.1 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Depth
992.6	0	TOPSOIL (CL).	0.5
		SANDY LEAN CLAY (CL): brown; wet; very stiff; dark brown mottling.	
986.1	5	CLAYEY SAND WITH GRAVEL (SC): brown; wet; medium dense; with gravel and pieces of shale. Seams of silty sand.	7.0
977.8	15	SHALE; dark grey; slightly weathered; fine-grained; massive bedded; horizontal; very close fracture spacing; silty.	15.3
966.6	25	SILTSTONE; grey; slightly weathered; fine-grained; massive bedded; horizontal; very close fracture spacing; clay/transitional.	26.5
955.1	35	SHALE; light grey; fresh; fine-grained; massive bedded; horizontal; medium to wide fracture spacing.	38.0
	45	48 feet: 1" clay seam.	

Continued Next Page

Graphic Log | Sample Type & Rec. | STANDARD PENETRATION TEST DATA (N in blows/ft) | WATER CONTENT % (PL, LL) | SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES)



Physical Properties	WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
	19.1						
	10.5						
	12.5						
		167.7		913			38
							20
		160.6		3799			0
		158.3		1521			77

Completion Depth:	175.0
Date Boring Started:	12/16/19
Date Boring Completed:	1/8/20
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	993.114
Coordinates:	N 413,308.6 ft E 1,538,426.7 ft
Datum:	

Remarks: Boring was advanced from 0-15 ft with mud rotary methods, and from 15.3-175 ft with NQ3 core. 6" diameter casing was advanced to 20 feet prior to rock coring. Boring was abandoned with bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling — Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-4

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	STANDARD PENETRATION TEST DATA (N in blows/ft)	WATER CONTENT % (PL–LL)	SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES)	WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
	50	SHALE; light grey; fresh; fine-grained; massive bedded; horizontal; medium to wide fracture spacing. *(Continued)*												62
940	55	938.1 SANDSTONE; grey; fresh; fine-grained; massive bedded; horizontal; wide fracture spacing. 55.0							161.1		898			
935	60													100
930	65								167.5		1486			
925		924.1												
	70	SHALE; light grey; fresh; fine-grained; massive bedded; horizontal; wide fracture spacing. 69.0												83
920	75													
915		913.1												0
	80	SILTSTONE; moderate; grey to dark grey; fresh; fine-grained; thinly bedded; horizontal; close to wide fracture spacing; increased fracturing 85-90 feet. 80.0												39
910	85													
905	90													65
900	95													
895	100													

Continued Next Page

Completion Depth:	175.0
Date Boring Started:	12/16/19
Date Boring Completed:	1/8/20
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	993.114
Coordinates:	N 413,308.6 ft E 1,538,426.7 ft
Datum:	

Remarks: Boring was advanced from 0-15 ft with mud rotary methods, and from 15.3-175 ft with NQ3 core. 6" diameter casing was advanced to 20 feet prior to rock coring. Boring was abandoned with bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling; Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-4

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	STANDARD PENETRATION TEST DATA (N in blows/ft)	WATER CONTENT % (PL–LL)	SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES)	Physical Properties: WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
	100	SILTSTONE; moderate; grey to dark grey; fresh; fine-grained; thinly bedded; horizontal; close to wide fracture spacing; increased fracturing 85-90 feet. *(Continued)*												100
890	105													
885	110													93
880	115													
875	120													100
870	125													
865	130													94
860	135													
855	140	853.1 SANDSTONE; grey; fresh; fine-grained; massive bedded; horizontal; medium fracture spacing. 140.0												98
850	145													
845	150	*Continued Next Page*												

Completion Depth:	175.0
Date Boring Started:	12/16/19
Date Boring Completed:	1/8/20
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	993.114
Coordinates:	N 413,308.6 ft E 1,538,426.7 ft
Datum:	

Remarks: Boring was advanced from 0-15 ft with mud rotary methods, and from 15.3-175 ft with NQ3 core. 6" diameter casing was advanced to 20 feet prior to rock coring. Boring was abandoned with bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling — Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Barr Engineering Company
325 South Lake Avenue, Suite 700
Duluth, MN 55802
Telephone: 218-529-8200

LOG OF BORING CRC-B-4

Project: Conemaugh River HDD | Location: Blairsville, PA | Client: Enbridge

Barr Project Number: 38321002

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION (ASTM D2488)	Graphic Log	Sample Type & Rec.	STANDARD PENETRATION TEST DATA (N in blows/ft)	WATER CONTENT % (PL–LL)	SIEVE ANALYSIS (GRAVEL, SAND, SILT, CLAY, FINES)	Physical Properties: WC %	γ_d pcf	ϕ °	Q_u tsf	Q_p tsf	Gs	RQD %
	150	SANDSTONE; grey; fresh; fine-grained; massive bedded; horizontal; medium fracture spacing. *(Continued)*												74
840														
	155	838.1 SHALE; grey; fresh; fine-grained; massive bedded; horizontal; very close fracture spacing. 155.0												
835														
	160													36
830														
	165													
825														
	170													31
820														
	175	818.1 Bottom of Boring at 175.0 feet 175.0												
	180													
	185													
	190													
	195													
	200													

Completion Depth:	175.0
Date Boring Started:	12/16/19
Date Boring Completed:	1/8/20
Logged By:	MLH2
Drilling Contractor:	ADT
Drilling Method:	MR/ NQ3 Core
Ground Surface Elevation:	993.114
Coordinates:	N 413,308.6 ft E 1,538,426.7 ft
Datum:	

Remarks: Boring was advanced from 0-15 ft with mud rotary methods, and from 15.3-175 ft with NQ3 core. 6" diameter casing was advanced to 20 feet prior to rock coring. Boring was abandoned with bentonite cement grout.

SAMPLE TYPES: SPLIT SPOON; ROCK CORE

WATER LEVELS (ft): At Time of Drilling; Dry

LEGEND: MC Moisture Content; γ Dry Unit Weight; ϕ Friction Angle; Q_u Unconfined Compression; Q_p Hand Penetrometer UC; Gs Specific Gravity; RQD Rock Quality Designation

The stratification lines represent approximate boundaries. The transition may be gradual.

O:\GINT\PROJECTS\38321002 CONEMAUGH RIVER HDD\38321002 CONEMAUGH RIVER HDD.GPJ BARRLIBRARY.GLB HORIZONTAL LOG REPORT BARR GEOTECH TEMPLATE.GDT

Appendix B

Laboratory Results

Twin Ports Testing, Inc.
1301 North 3rd Street
Superior, WI 54880
p: 715-392-7114
p: 800-373-2562
f: 715-392-7163
www.twinportstesting.com

Material Test Report

Report No: MAT:W320-0026-S1
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S1'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID:	W320-0026-S1
Field Sample:	26-1
Date Sampled:	1/22/2020
Source:	CRC-B-1 10'-12'
Material:	(ML) Sandy Silt
Specification:	Informational
Sampling Method:	Split Spoon

Sample Description:

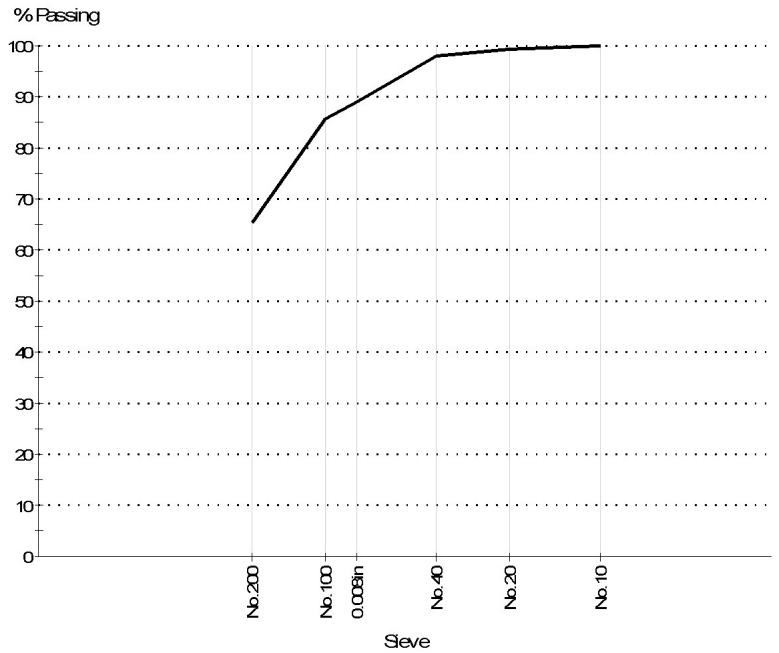
(ML) Sandy Silt

Grading: ASTM D 422 - 07

Drying by: Oven

Sieve Size	% Passing
No.10	100
No.20	99
No.40	98
0.008in	89
No.100	86
No.200	65

Particle Size Distribution



FINES (65.4%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (32.5%)	Medium (2.1%)	Coarse (0.0%)	Fine (0.0%)	Coarse (0.0%)	(0.0%)

D85: 0.1468 D60: 0.0623 D50: 0.0442
D30: 0.0222 D15: 0.0133 D10: 0.0112

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Material Test Report

Report No: MAT:W320-0026-S1
Issue No: 1
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Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID:	W320-0026-S1
Field Sample:	26-1
Date Sampled:	1/22/2020
Source:	CRC-B-1 10'-12'
Material:	(ML) Sandy Silt
Specification:	Informational
Sampling Method:	Split Spoon

Other Test Results

Description	Method	Result
Moisture content (%)	ASTM D 2216 - 05	21.3
Method		Method B

Comments

N/A

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Material Test Report

Report No: MAT:W320-0026-S2
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S2'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

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Sample Details

Sample ID:	W320-0026-S2
Field Sample:	26-2
Date Sampled:	1/22/2020
Source:	CRC-B-1 15'-17'
Material:	(SM) Silty Sand with Gravel
Specification:	Informational
Sampling Method:	Split Spoon

Sample Description:

(SM) Silty Sand with Gravel

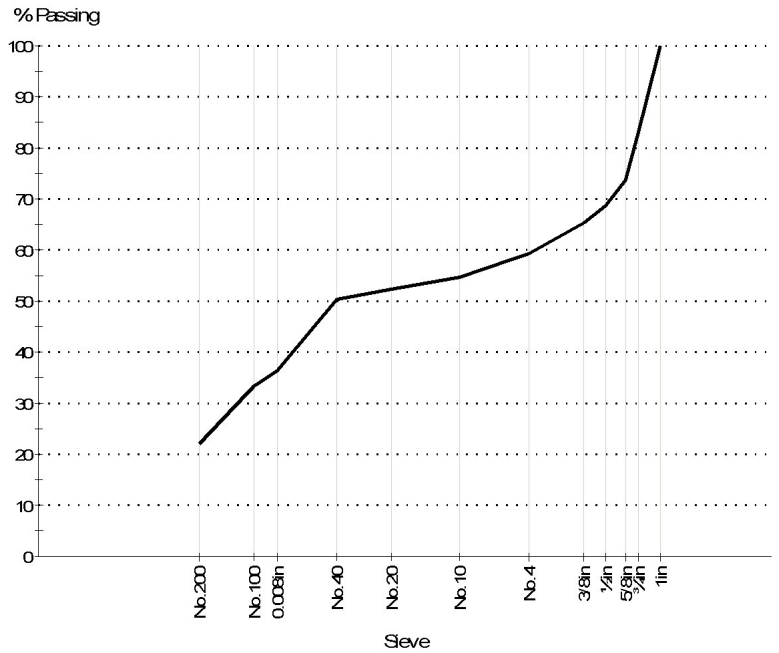
Grading: ASTM D 422 - 07

Drying by: Oven

Sieve Size	% Passing
1in	100
¾in	83
5/8in	74
½in	69
3/8in	65
No.4	59
No.10	55
No.20	52
No.40	50
0.008in	36
No.100	33
No.200	22

D85: 19.5212 D60: 5.0503 D50: 0.4188
D30: 0.1225 D15: 0.0479 D10: 0.0350

Particle Size Distribution



FINES (22.2%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (28.1%)	Medium (4.5%)	Coarse (4.7%)	Fine (23.9%)	Coarse (16.6%)	(0.0%)

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Material Test Report

Report No: MAT:W320-0026-S2
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S2'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

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Sample Details

Sample ID:	W320-0026-S2
Field Sample:	26-2
Date Sampled:	1/22/2020
Source:	CRC-B-1 15'-17'
Material:	(SM) Silty Sand with Gravel
Specification:	Informational
Sampling Method:	Split Spoon

Other Test Results

Description	Method	Result
Moisture content (%)	ASTM D 2216 - 05	13.5
Method		Method B

Comments

N/A

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Material Test Report

Report No: MAT:W320-0026-S3
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S3'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project:

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Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

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Sample Details

Sample ID:	W320-0026-S3
Field Sample:	26-3
Date Sampled:	1/22/2020
Source:	CRC-B-1 20'-22'
Material:	(SM) Silty Sand with Gravel
Specification:	Informational
Sampling Method:	Split Spoon

Sample Description:

(SM) Silty Sand with Gravel

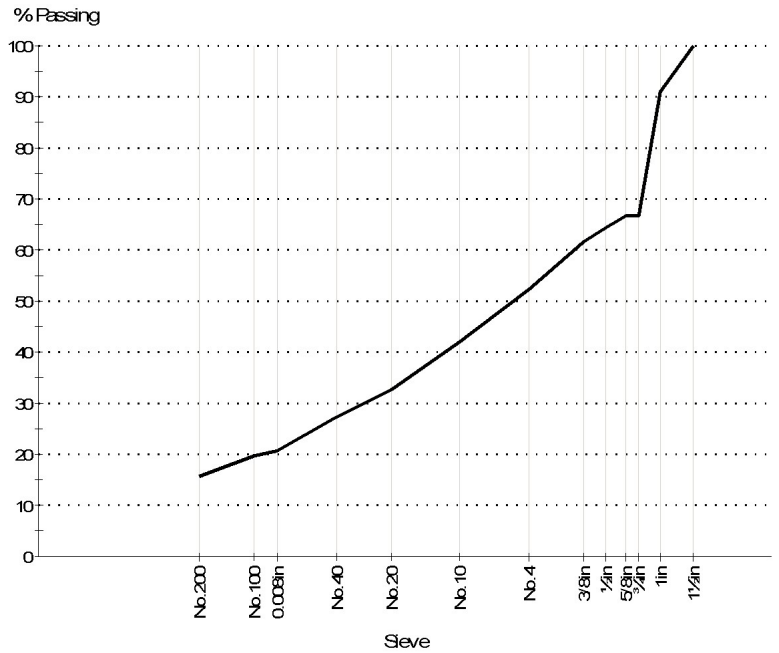
Grading: ASTM D 422 - 07

Drying by: Oven

Sieve Size	% Passing
1½in	100
1in	91
¾in	67
5/8in	67
½in	64
3/8in	62
No.4	52
No.10	42
No.20	33
No.40	27
0.008in	21
No.100	20
No.200	16

D85: 23.3385 D60: 8.3412 D50: 3.9016
D30: 0.5952 D15: 0.0667 D10: 0.0281

Particle Size Distribution



FINES (15.7%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (11.8%)	Medium (14.7%)	Coarse (10.2%)	Fine (14.3%)	Coarse (33.4%)	(0.0%)

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Material Test Report

Report No: MAT:W320-0026-S3
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S3'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project:

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Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

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Sample Details

Sample ID:	W320-0026-S3
Field Sample:	26-3
Date Sampled:	1/22/2020
Source:	CRC-B-1 20'-22'
Material:	(SM) Silty Sand with Gravel
Specification:	Informational
Sampling Method:	Split Spoon

Other Test Results

Description	Method	Result
Moisture content (%)	ASTM D 2216 - 05	10.1
Method		Method B

Comments

N/A

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Material Test Report

Report No: MAT:W320-0026-S4
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S4'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID:	W320-0026-S4
Field Sample:	26-4
Date Sampled:	12/12/2019
Source:	CRC-B-3 15'-17'
Material:	(ML) Sandy Silt
Specification:	Informational
Sampling Method:	Split Spoon

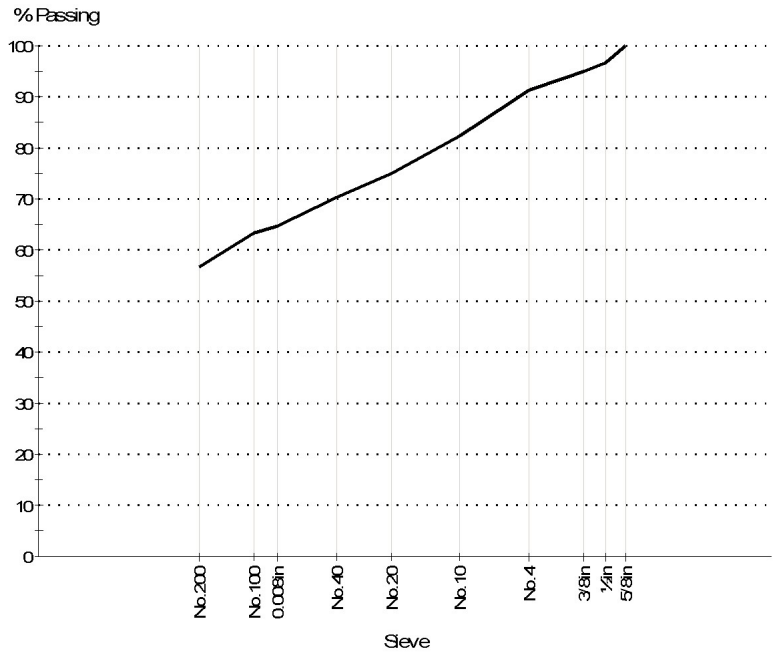
Sample Description:

(ML) Sandy Silt

Grading: ASTM D 422 - 07

Drying by: Oven

Particle Size Distribution



Sieve Size	% Passing
5/8in	100
½in	97
3/8in	95
No.4	91
No.10	82
No.20	75
No.40	70
0.008in	65
No.100	63
No.200	57

FINES (56.7%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (13.5%)	Medium (12.1%)	Coarse (8.9%)	Fine (8.8%)	Coarse (0.0%)	(0.0%)

D85: 2.5967 D60: 0.1056 D50: 0.0370
D30: 0.0046 D15: 0.0009 D10: 0.0006

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Material Test Report

Report No: MAT:W320-0026-S4
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S4'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID:	W320-0026-S4
Field Sample:	26-4
Date Sampled:	12/12/2019
Source:	CRC-B-3 15'-17'
Material:	(ML) Sandy Silt
Specification:	Informational
Sampling Method:	Split Spoon

Other Test Results

Description	Method	Result
Moisture content (%)	ASTM D 2216 - 05	15.8
Method		Method B

Comments

N/A

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Material Test Report

Report No: MAT:W320-0026-S5
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S5'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

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Sample Details

Sample ID:	W320-0026-S5
Field Sample:	26-5
Date Sampled:	12/16/2019
Source:	CRC-B-4 5'-7'
Material:	(ML) Sandy Silt
Specification:	Informational
Sampling Method:	Split Spoon

Sample Description:

(ML) Sandy Silt

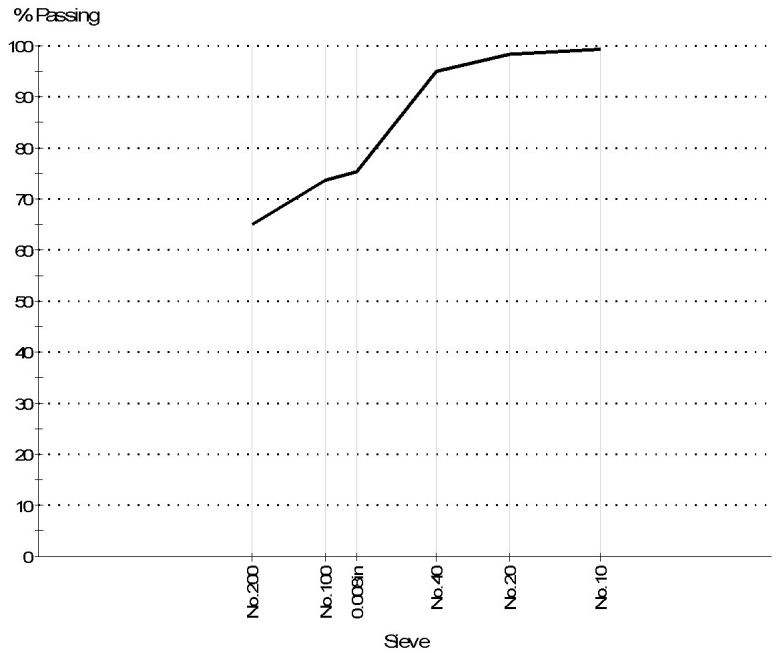
Grading: ASTM D 422 - 07

Drying by: Oven

Sieve Size	% Passing
No.10	99
No.20	98
No.40	95
0.008in	75
No.100	74
No.200	65

D85: 0.2897 D60: 0.0509 D50: 0.0233
D30: 0.0049 D15: 0.0015 D10: 0.0010

Particle Size Distribution



FINES (64.9%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (29.9%)	Medium (4.5%)	Coarse (0.6%)	Fine (0.0%)	Coarse (0.0%)	(0.0%)

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Material Test Report

Report No: MAT:W320-0026-S5
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S5'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID:	W320-0026-S5
Field Sample:	26-5
Date Sampled:	12/16/2019
Source:	CRC-B-4 5'-7'
Material:	(ML) Sandy Silt
Specification:	Informational
Sampling Method:	Split Spoon

Other Test Results

Description	Method	Result
Moisture content (%)	ASTM D 2216 - 05	19.1
Method		Method B

Comments

N/A

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Material Test Report

Report No: MAT:W320-0026-S6
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S6'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID:	W320-0026-S6
Field Sample:	26-6
Date Sampled:	12/16/2019
Source:	CRC-B-4 10'-12'
Material:	(SM) Silty Sand with Gravel
Specification:	Informational
Sampling Method:	Split Spoon

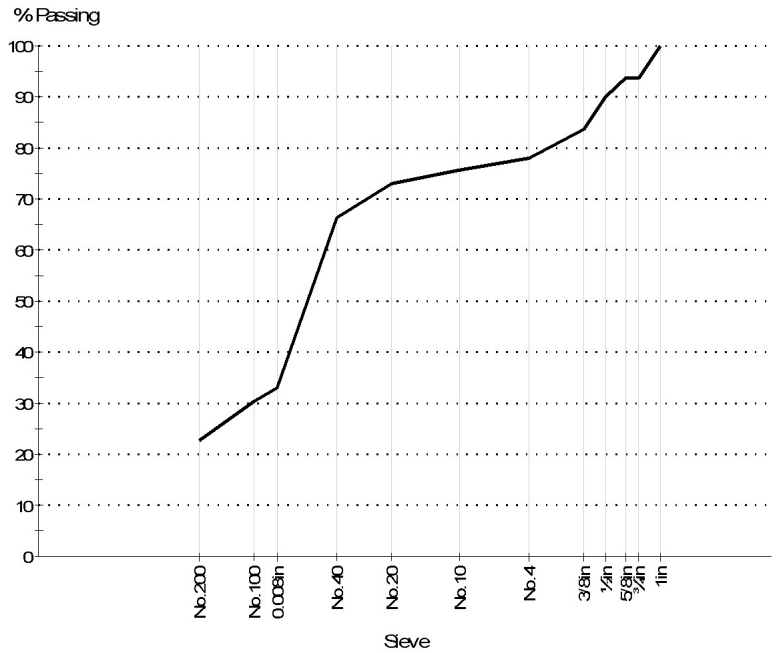
Sample Description:

(SM) Silty Sand with Gravel

Grading: ASTM D 422 - 07

Drying by: Oven

Particle Size Distribution



Sieve Size	% Passing
1in	100
¾in	94
5/8in	94
½in	90
3/8in	84
No.4	78
No.10	76
No.20	73
No.40	66
0.008in	33
No.100	30
No.200	23

FINES (22.6%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (43.6%)	Medium (9.4%)	Coarse (2.4%)	Fine (15.5%)	Coarse (6.4%)	(0.0%)

D85: 10.0773 D60: 0.3689 D50: 0.2942
D30: 0.1465 D15: 0.0375 D10: 0.0238

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Material Test Report

Report No: MAT:W320-0026-S6
Issue No: 1
This report replaces all previous issues of report no 'MAT:W320-0026-S6'.

Client: Barr Engineering Company
325 South Lake Avenue
Duluth MN 55802

Project: 20M8545 Conemaugh River HDD

This laboratory is accredited in accordance with AASHTO.

Approved Signatory: Joe Berger (Laboratory Supervisor)
Date of Issue: 1/27/2020

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID:	W320-0026-S6
Field Sample:	26-6
Date Sampled:	12/16/2019
Source:	CRC-B-4 10'-12'
Material:	(SM) Silty Sand with Gravel
Specification:	Informational
Sampling Method:	Split Spoon

Other Test Results

Description	Method	Result
Moisture content (%)	ASTM D 2216 - 05	10.5
Method		Method B

Comments

N/A

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ROCK CORE UNCONFINED COMPRESSIVE STRENGTH

Project:	Conemaugh River	**TPT Job #**	20M8545
Client:	Barr Engineering	**Report Date:**	1/15/2020
Contact:	Rob Olah	**Date Cored:**	December 9-13, 2019
Client Project #	38321001.00	**Cores Taken By:**	Cascade Drilling
Copies To:	Rob Olah	**Cores Tested By:**	JB

Boring #	Depth (ft)	Average Length (in)	Average Diameter (in)	End Area (in²)	Mass	Unit Weight (pcf)	Force (lbs)	Comp. Strength (psi)	Average Comp Strength (psi)
B-3	23	4.25	1.98	3.08	554.0	161.3	45,960	14,927	8,242
B-3	37	3.96	1.98	3.08	520.9	162.7	10,890	3,537	
B-3	49	4.23	1.98	3.08	553.7	162.0	15,610	5,070	
B-3	53	4.18	1.98	3.08	572.2	169.4	20,270	6,583	
B-3	58	4.24	1.77	2.46	455.8	166.4	26,310	10,693	
B-3	72	4.25	1.77	2.46	434.2	158.2	25,540	10,380	
B-3	93	4.26	1.77	2.46	446.9	162.4	28,740	11,680	
B-3	99	4.22	1.77	2.46	453.3	166.3	14,050	5,710	
B-3	106	3.99	1.77	2.46	425.3	165.0	16,050	6,523	
B-3	112	4.23	1.77	2.46	462.9	169.4	12,520	5,088	
B-3	115	4.12	1.77	2.46	448.2	168.4	17,690	7,189	
B-3	130	4.07	1.77	2.46	435.6	165.7	9,850	4,003	
B-4	23	3.55	1.77	2.46	377.7	164.7	12,680	5,153	
B-4	33	4.22	1.77	2.46	437.7	160.6	52,770	21,446	
B-4	55	4.23	1.77	2.46	440.1	161.1	12,470	5,068	
B-4	63	1.69	1.76	2.43	180.8	167.5	20,640	8,484	
B-4	74	0.93	1.76	2.43	99.8	168.0	NA	NA	
B-4	40	4.13	1.77	2.46	422.3	158.3	21,130	8,587	

Remarks: Red length and diameter indicate L/D ratio of less than 2.

Joe Berger

Twin Ports Testing, Inc., CMT Laboratory Supervisor
jberger@twinportstesting.com
Office 715-718-3738 Cell 218-391-9463

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B-3 23'

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B-3 37’

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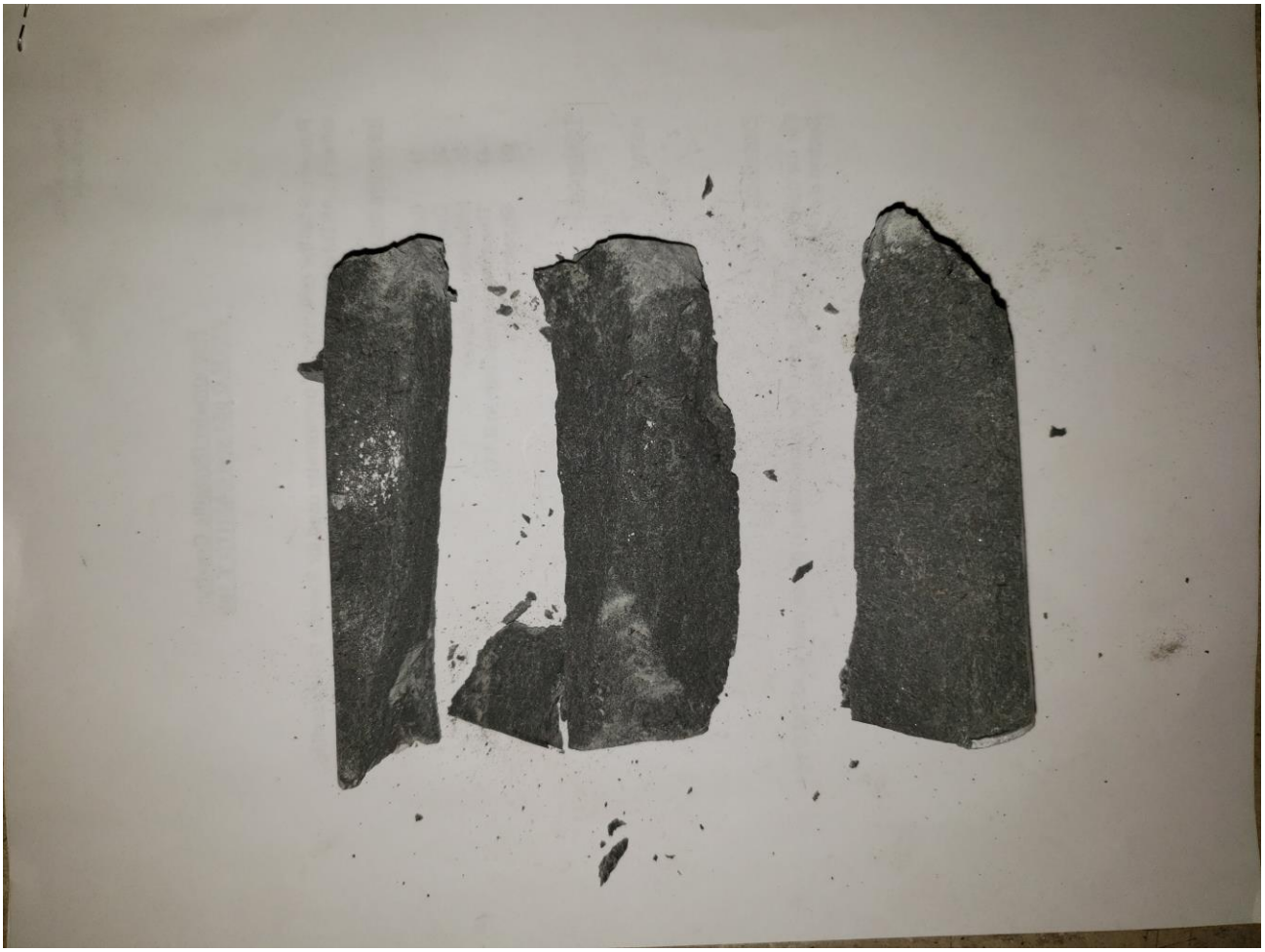
B-3 49'



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B-3 53'

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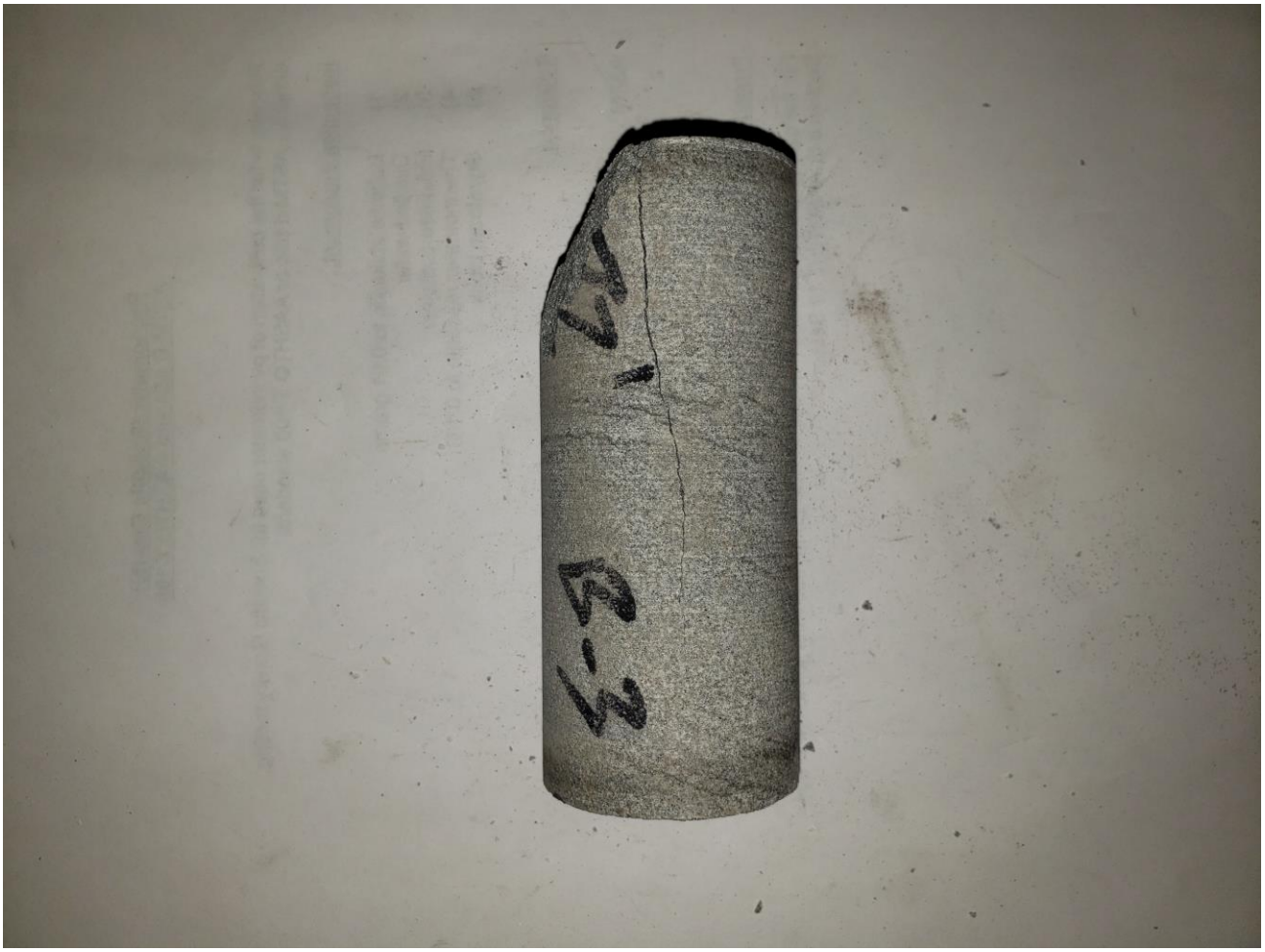
B-3 58’



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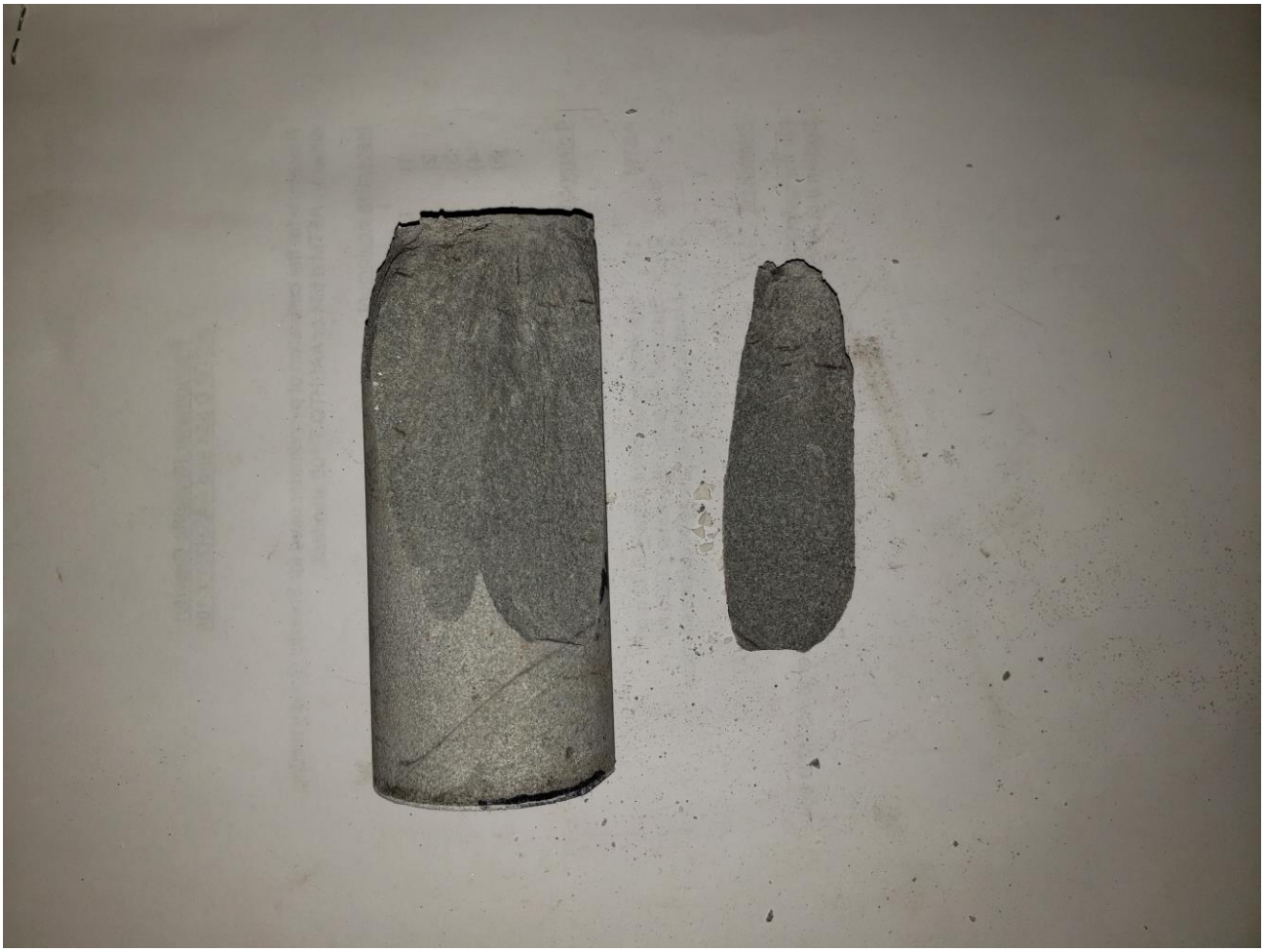
B-3 72’



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B-3 93’

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B-3 99'

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B-3 106'

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B-3 112’

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B-3 115’

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B-3 130’

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B-4 23’

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B-4 33’

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B-4 40’

TwinPortsTesting
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B-4 55'

TwinPortsTesting
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B-4 63’

Twin Ports Testing
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B-4 74'

Pace Analytical Services, LLC
315 Chestnut Street
Virginia, MN 55792
(218) 742-1042

February 05, 2020

Joe Berger
Twin Ports Testing
1301 N 3rd St
Superior, WI 54880

RE: Project: 38321002.00
Pace Project No.: 12140487

Dear Joe Berger:
Enclosed are the analytical results for sample(s) received by the laboratory on January 24, 2020. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Laura Flood
laura.flood@pacelabs.com
(218) 727-6380
Project Manager

Enclosures

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(218) 742-1042

CERTIFICATIONS

Project: 38321002.00
Pace Project No.: 12140487

Pace Analytical Services Virginia Minnesota
315 Chestnut Street, Virginia, MN 55792
Montana Certificate #CERT0103
Alaska Certification UST-107
Minnesota Dept of Health Certification #: 027-137-445
North Dakota Certification: # R-203
Wisconsin DNR Certification # : 998027470
WA Department of Ecology Lab ID# C1007

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SAMPLE SUMMARY

Project: 38321002.00
Pace Project No.: 12140487

Lab ID	Sample ID	Matrix	Date Collected	Date Received
12140487001	**CRC-B-3 (10'-12')**	Solid	01/07/20 00:00	01/24/20 14:40
12140487002	**CRC-B-4 (15'-17')**	Solid	01/07/20 00:00	01/24/20 14:40

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SAMPLE ANALYTE COUNT

Project: 38321002.00
Pace Project No.: 12140487

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
12140487001	**CRC-B-3 (10'-12')**	ASTM D 2974-13 (2013)	RC	1	PASI-V
		EPA 9056A	ZJT	2	PASI-V
12140487002	**CRC-B-4 (15'-17')**	ASTM D 2974-13 (2013)	RC	1	PASI-V
		EPA 9056A	ZJT	2	PASI-V

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ANALYTICAL RESULTS

Project: 38321002.00
Pace Project No.: 12140487

Sample: CRC-B-3 (10'-12') **Lab ID: 12140487001** Collected: 01/07/20 00:00 Received: 01/24/20 14:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Dry Weight	Analytical Method: ASTM D 2974-13 (2013)							
Percent Moisture	**17.0**	%	0.10	1		02/04/20 12:50		
9056 IC Anions	Analytical Method: EPA 9056A Preparation Method: EPA 300.0							
Chloride	ND	mg/kg	9.8	1	01/31/20 14:00	01/31/20 16:04	16887-00-6	
Sulfate	**21.2**	mg/kg	19.5	1	01/31/20 14:00	01/31/20 16:04	14808-79-8	

Sample: CRC-B-4 (15'-17') **Lab ID: 12140487002** Collected: 01/07/20 00:00 Received: 01/24/20 14:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Dry Weight	Analytical Method: ASTM D 2974-13 (2013)							
Percent Moisture	**12.5**	%	0.10	1		02/04/20 12:50		
9056 IC Anions	Analytical Method: EPA 9056A Preparation Method: EPA 300.0							
Chloride	ND	mg/kg	9.8	1	01/31/20 14:00	01/31/20 17:07	16887-00-6	
Sulfate	ND	mg/kg	19.6	1	01/31/20 14:00	01/31/20 17:07	14808-79-8	

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QUALITY CONTROL DATA

Project: 38321002.00
Pace Project No.: 12140487

QC Batch: 183364
QC Batch Method: ASTM D 2974-13 (2013)
Analysis Method: ASTM D 2974-13 (2013)
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 12140487001, 12140487002

SAMPLE DUPLICATE: 724001

Parameter	Units	12140487002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.5	12.8	2	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 38321002.00
Pace Project No.: 12140487

QC Batch: 183274 | Analysis Method: EPA 9056A
QC Batch Method: EPA 300.0 | Analysis Description: 9056 IC Anions, Soil
Associated Lab Samples: 12140487001, 12140487002

METHOD BLANK: 723693 | Matrix: Solid
Associated Lab Samples: 12140487001, 12140487002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/kg	ND	9.9	01/31/20 15:43	
Sulfate	mg/kg	ND	19.7	01/31/20 15:43	

LABORATORY CONTROL SAMPLE: 723692

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/kg	489	501	103	80-120	
Sulfate	mg/kg	489	506	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 723694 723695

Parameter	Units	12140487001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	ND	500	497	521	520	103	104	80-120	0	20	
Sulfate	mg/kg	21.2	500	497	566	567	109	110	80-120	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 723696 723697

Parameter	Units	10506398009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/kg	20800	487	495	19300	19400	-300	-282	80-120	0	20	P6
Sulfate	mg/kg	1290	487	495	1380	1440	18	30	80-120	4	20	M1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 38321002.00
Pace Project No.: 12140487

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-V	Pace Analytical Services - Virginia

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 38321002.00
Pace Project No.: 12140487

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
12140487001	**CRC-B-3 (10'-12')**	ASTM D 2974-13 (2013)	183364		
12140487002	**CRC-B-4 (15'-17')**	ASTM D 2974-13 (2013)	183364		
12140487001	**CRC-B-3 (10'-12')**	EPA 300.0	183274	EPA 9056A	183314
12140487002	**CRC-B-4 (15'-17')**	EPA 300.0	183274	EPA 9056A	183314

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CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical®

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workord

ALL SHADED

WO#: 12140487

PM: LMF Due Date: 02/04/20

CLIENT: TWIN PORTS

Company: Barr Engineering Co.	Billing Information:
Address: 325 S. Lake Ave, Suite 700 Duluth, MN 55811	
Report To: Rob Olah	Email To: rolah@barr.com + Jbergen@TwinPorts Testing.com
Copy To:	Site Collection Info/Address:
Customer Project Name/Number: 38321002.00	State: PA County/City: Conemaugh Time Zone Collected:
Phone: 218-529-7165 Email:	Site/Facility ID #: Conemaugh River HDD Geo
Collected By (print):	Purchase Order # :38321002.00 Quote #:
Collected By (signature):	Turnaround Date Required:
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: ____ [ ] Hold: ____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Compliance Monitoring? [ ] Yes [X] No

DW PWS ID #:

DW Location Code:

Immediately Packed on Ice: [ ] Yes [x] No

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis:

Container Preservative Type **

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____

Analyses

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips: ____	
Sample pH Acceptable	Y N NA
pH Strips: ____	
Sulfide Present	Y N NA
Lead Acetate Strips: ____	

LAB USE ONLY:
Lab Sample # / Comments:

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Soluble chloride and sulfate (EPA Method 9056A)
CRC-B-3 (10'-12')	Soil	G	1/7						X
CRC-B-4 (15'-17')	Soil	G	1/7						X

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours) : Y N N/A

Lab Tracking #:

Samples received via: FEDEX UPS Client Courier Pace Courier

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: ____
Cooler 1 Temp Upon Receipt: __oC
Cooler 1 Therm Corr. Factor: __oC
Cooler 1 Corrected Temp: ____oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Robert Olah Barr	1/23/20	Joe Beyer TPT	1/23/20
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
[illegible]	1/23/20 2:35	S Udacich / Pace	1/23/20 14:25
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: ____ of: ____

Pace Analytical	Document Name: Sample Condition Upon Receipt Form	Document Revised: 17June2019 Page 1 of 1
	Document No.: F-DUL-C-001-rev.07	Issuing Authority: Pace Duluth Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: BARR ENGINEERING / TWIN PORTS TESTING

Project #: **WO#: 12140487**

PM: LMF **Due Date: 02/04/20**

CLIENT: TWIN PORTS

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ SpeeDee ☐ Pace ☐ Other:_____

Tracking Number: _____

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☐ No

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other:_____

Type of Ice: ☐ Wet ☐ Blue ☑ None ☐ Samples on ice, cooling process has begun

Is there evidence of ice formation in samples? ☐ Yes ☑ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ NA

Temp Blank? ☐ Yes ☑ No **Thermometer Used:** ☐ 01339252/1710 ☐ 122639816 **Correction Factor °C:** N/A

Temp should be above freezing to 6 °C **Cooler Temp Read °C:** AMB **Cooler Temp Corrected °C:** AMB

Date and Initials of Person Examining Contents: 01/24/2020

				Comments:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and Signature on COC?	☐ Yes	☑ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5. If Fecal: ☐ <8 hours ☐ >8, <24 hours ☐ >24 hours
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☐ Yes	☑ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11. Note if sediment is visible in the dissolved containers:
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: SL	☐ Yes	☑ No	☐ N/A	12. * SEE NOTES BELOW IN COMMENTS SECTION 01/24/2020
All containers needing acid/base preservation properly preserved?	☐ Yes	☐ No	☑ N/A	13. Note samples needing adjustment:
Headspace in Methyl Mercury Container	☐ Yes	☐ No	☑ N/A	14.
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	16.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased): _____				

CLIENT NOTIFICATION/RESOLUTION: **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: COC SAMPLE ID DATE COLLECTED 1/7 DOES NOT MATCH SAMPLE BOTTLES DATE COLLECTED. NO TIME COLLECTED ON COC OR SAMPLE CONTAINER ID'S.
CUSTOMER SAMPLE ID CRC-B-3 (10'-12') CONTAINER DATE COLLECTED 12/12/19.
CUSTOMER SAMPLE ID CRC-B-4 (15'-17') CONTAINER DATE COLLECTED 12/16/19
USE COC DATE COLLECTED FOR LOG-IN AND COMP TIME 1/24/2020

FECAL WAIVER ON FILE: Y N TEMPERATURE WAIVER ON FILE: Y N

Project Manager Review: [signature] **Date:** 01/27/20

315 Chestnut St. PO Box 1212
Virginia, MN 55792
(218) 735-6700

SAMPLE ACKNOWLEDGMENT

Samples Submitted By: Twin Ports Testing
Client Project ID: 38321002.00
Client PO#: 38321002.00

Pace Project Manager: Laura Flood
Phone (218) 727-6380
laura.flood@pacelabs.com
Pace Analytical Project ID: 12140487
Samples Received: January 24, 2020 02:40 PM
Estimated Completion: February 04, 2020

CC: Joe Berger

Customer Sample ID	Pace Analytical Lab ID	Matrix	Date/Time Collected	Method
CRC-B-3 (10'-12')	12140487001	Solid	01/07/20 00:00	9056 IC Anions Dry Weight
CRC-B-4 (15'-17')	12140487002	Solid	01/07/20 00:00	9056 IC Anions Dry Weight

Please contact your project manager if you recognize any discrepancy in this form or have any questions about your project.

Confidentiality Statement: The Parties agree that they will take all reasonable precautions to prevent the unauthorized disclosure of any proprietary or confidential information of each other and that they will not disclose such information except to those employees, subcontractors, or agents who have expressly agreed to maintain confidentiality.

Thank you for choosing Pace Analytical Services, LLC.

315 Chestnut St. PO Box 1212
Virginia, MN 55792
(218) 735-6700

SAMPLE ACKNOWLEDGMENT

Analyte List

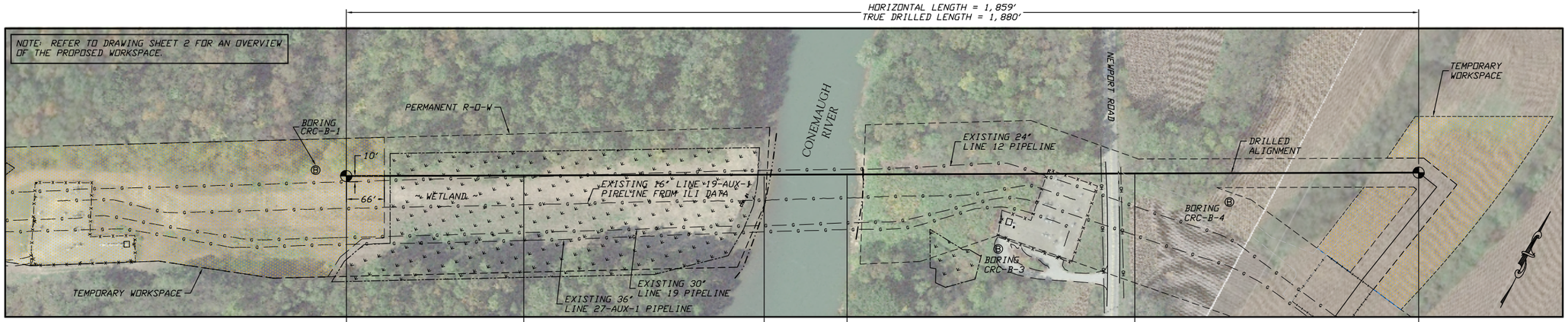
Customer Sample ID	Method	Compound	Reporting Limit	Units
CRC-B-3 (10'-12')	9056 IC Anions	Chloride	10	mg/kg
		Sulfate	20	mg/kg
	Dry Weight	Percent Moisture	0.1	%
CRC-B-4 (15'-17')	9056 IC Anions	Chloride	10	mg/kg
		Sulfate	20	mg/kg
	Dry Weight	Percent Moisture	0.1	%

Please contact your project manager if you recognize any discrepancy in this form or have any questions about your project.

Thank you for choosing Pace Analytical Services, LLC.

Appendix 2

HDD Design Drawings



PLAN

SCALE: 1"=100'

EXIT POINT @ 10°
0+00.00, 928.66
N 412642.79, E 1537047.46

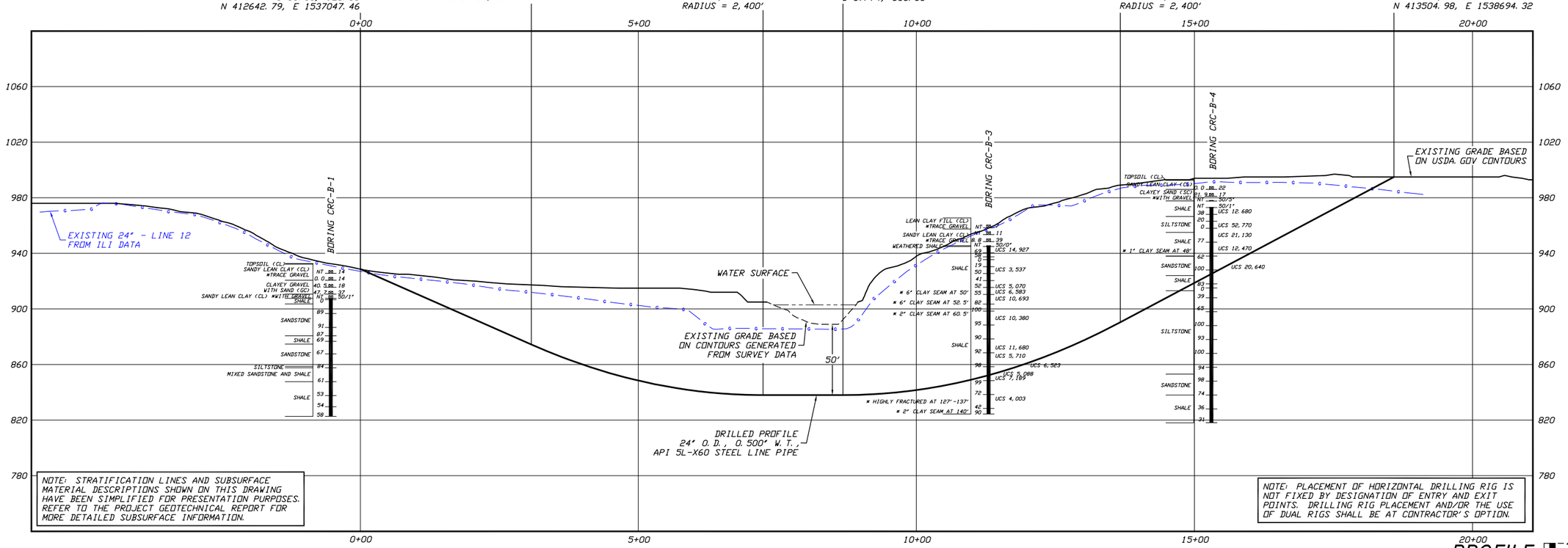
P.T. 10° SAG BEND
3+07.39, 874.46

P.C. 10° SAG BEND
7+24.15, 838.00
RADIUS = 2,400'

P.T. 12° SAG BEND
8+67.74, 838.00

P.C. 12° SAG BEND
13+66.73, 890.45
RADIUS = 2,400'

ENTRY POINT @ 12°
18+58.62, 995.00
N 413504.98, E 1538694.32



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: PLACEMENT OF HORIZONTAL DRILLING RIG IS NOT FIXED BY DESIGNATION OF ENTRY AND EXIT POINTS. DRILLING RIG PLACEMENT AND/OR THE USE OF DUAL RIGS SHALL BE AT CONTRACTOR'S OPTION.

PROFILE

SCALE: 1"=100' HORIZONTAL
1"= 40' VERTICAL

200 100 50 0 — 40 20 0

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

GEOTECHNICAL LEGEND

BORING LOCATION

SPLIT SPOON SAMPLE

53 23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

CORE BARREL SAMPLE

UCS 6,250 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 — MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY BARR ENGINEERING, DULUTH, MINNESOTA. REFER TO THE GEOTECHNICAL DATA REPORT DATED MARCH 2020 FOR MORE DETAILED SUBSURFACE INFORMATION.
2. THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

TOPOGRAPHIC SURVEY NOTES

1. TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, HOUSTON, TEXAS AND FROM CONTOURS OBTAINED FROM USDA. GOV.
2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO PENNSYLVANIA STATE PLANE COORDINATES, SOUTH ZONE, NAD 83.
3. ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT (EAST): UP TO 5 FEET SHORT OR 10 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
2. EXIT POINT (WEST): UP TO 5 FEET SHORT OR 10 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
3. ELEVATION: UP TO 3 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE
4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
5. CURVE RADIUS: NO LESS THAN 1,600 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

PROTECTION OF EXISTING FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

CONEMAUGH RIVER ANOMALY PROJECT

PLAN AND PROFILE
24-INCH PIPELINE CROSSING OF CONEMAUGH RIVER BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: WESTMORELAND & INDIANA COUNTIES, PA.

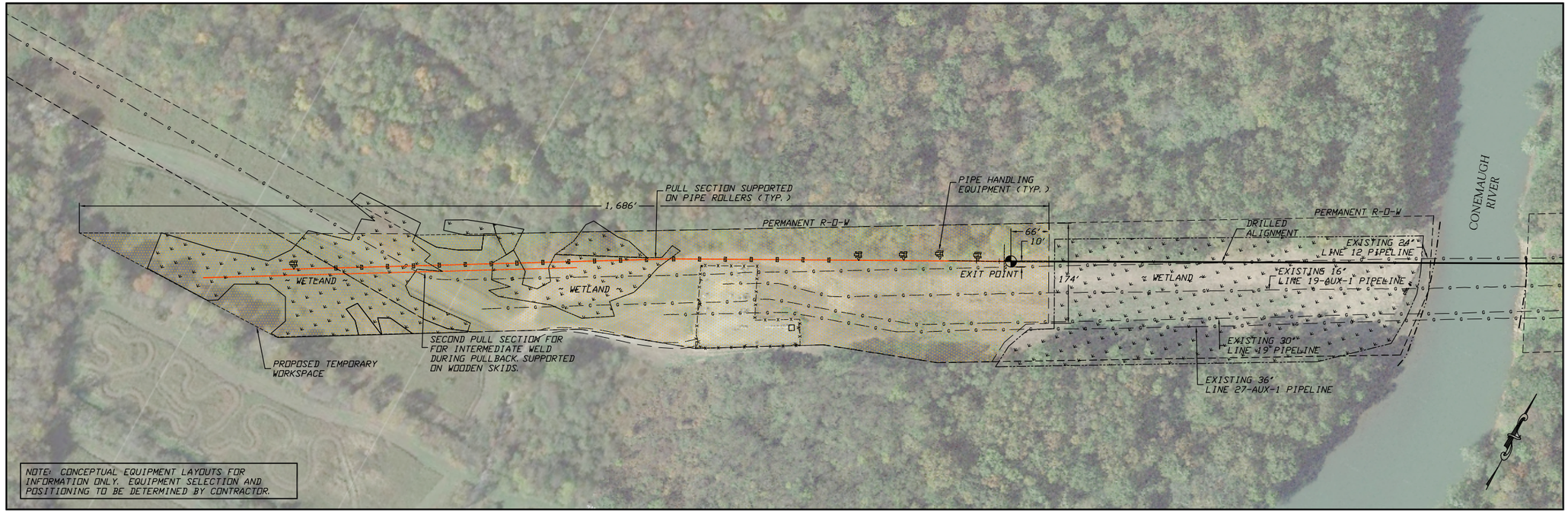
DRAWN	DATE	CHECKED	APPROVED	SCALE	DRAWING LABEL	REVISION
DMP	09/24/19	DLB	JMS	SHOWN FOR D-SIZED PLOT	CONEMAUGH RIVER	P5

NO.	DATE	REVISION DESCRIPTION	BY	CHKD	APP.
5	04/14/20	ADD GEOTECHNICAL TEST DATA, UPDATE WORKSPACE	CDS	JMS	JMS
4	02/17/20	SHIFT ENTRY POINT WEST	JMS	JMS	JMS
3	01/27/20	UPDATED DESIGN BASED ON NEW PULLBACK LAYOUT	CDS	KWW	JMS
2	01/21/20	ADD DRAFT GEOTECHNICAL LOG	CDS	KWW	JMS
1	11/15/19	REVISE BORING DEPTHS, ADD WATER BORING	CDS	JMS	JMS

J.D.Hair&Associates,Inc.
Consulting Engineers
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge/1935

SHEET NO.
1



WORKSPACE DETAIL: WEST SIDE

SCALE

SCALE: 1"=100'

200 100 50 0

WORKSPACE DETAIL: EAST SIDE

SCALE

SCALE: 1"=100'

200 100 50 0

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TEMPORARY WORKSPACE

CONEMAUGH RIVER ANOMALY PROJECT

WORKSPACE DETAIL
24-INCH PIPELINE CROSSING OF CONEMAUGH RIVER
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: WESTMORELAND & INDIANA COUNTIES, PA

DRAWN	DATE	CHECKED	APPROVED	SCALE	DRAWING LABEL	REVISION
JMS	09/24/19	DMP	JMS	SHOWN FOR D-SIZED PLOT	CONEMAUGH RIVER	P3

NO.	DATE	REVISION DESCRIPTION	BY	CHKD	APP.
P3	05/14/20	UPDATED WORKSPACE LIMITS	JMS	JMS	JMS
P2	02/17/20	REVISED WEST EXIT POINT, ADDED EQUIPMENT LAYOUTS	JMS	JMS	JMS
P1	01/27/20	UPDATED WORKSPACE LIMITS	DMP	JMS	JMS

J.D.Hair&Associates,Inc.
Consulting Engineers
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge/1935

SHEET NO.
2

Appendix 3

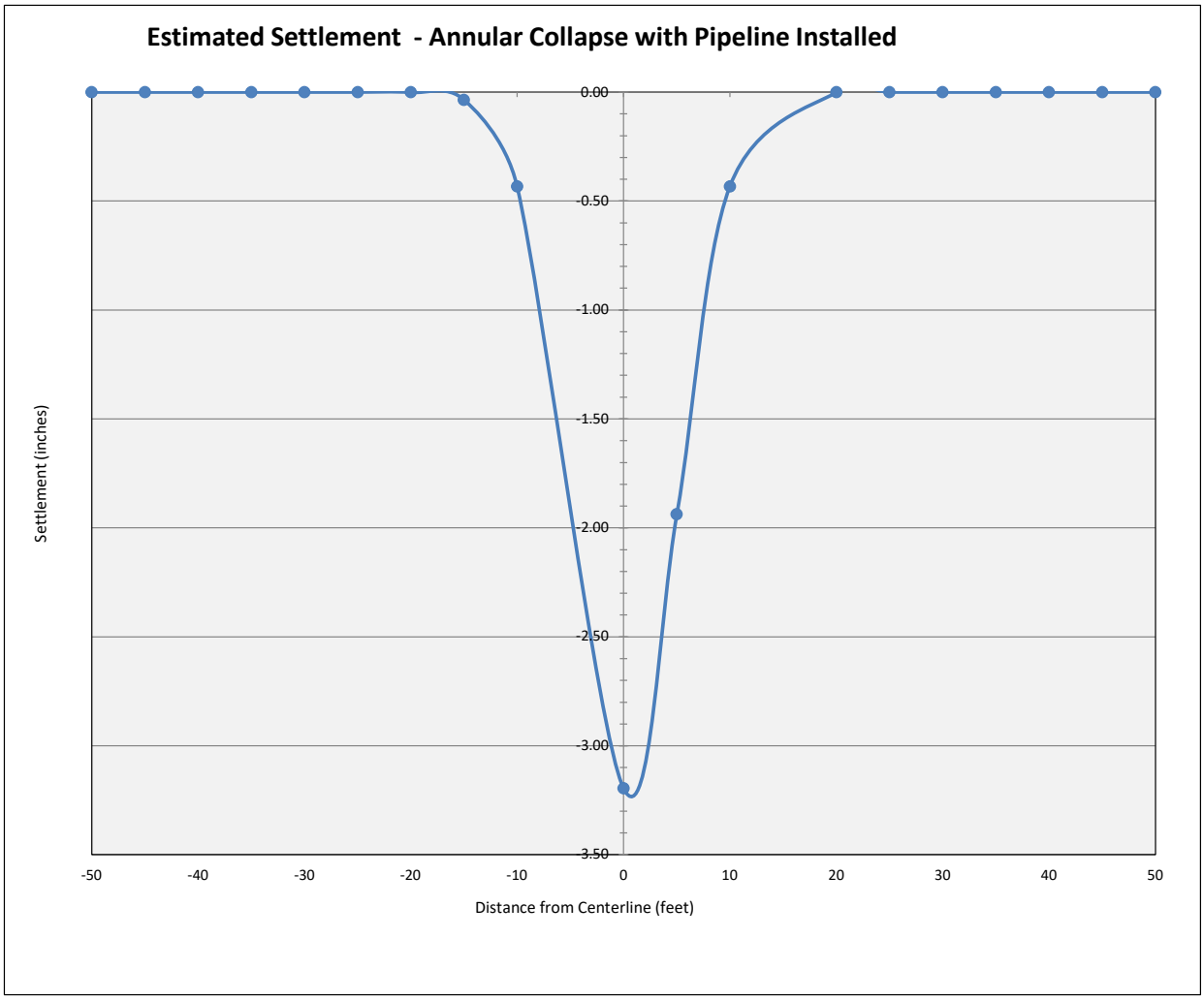
Long-term Settlement

SETTLEMENT ANALYSIS

Based on Peck Method. Calculates settlement extending from centerline to a distance of 50 feet perpendicular to the drilled path. Assumes annular collapse with product line installed.

HDD Stations 0+76 and 18+11

Product Pipeline Diameter (inches)	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
Reamed Hole Diameter (inches)	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Volume Reamed Hole (sq. inches)	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88
Volume Annulus (sq. inches)	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49
Percent of Annulus Filled with Surrounding Soil	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%
Volume of Available Annulus to Fill (cubic inches)	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66
Depth to Centerline of Drilled Hole (feet)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
K (constant based on soil type) Sand = .35, Clay = 0.5	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Horizontal Distance from Borehole (Feet)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
Settlement (Inches)	3.20	1.94	0.43	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

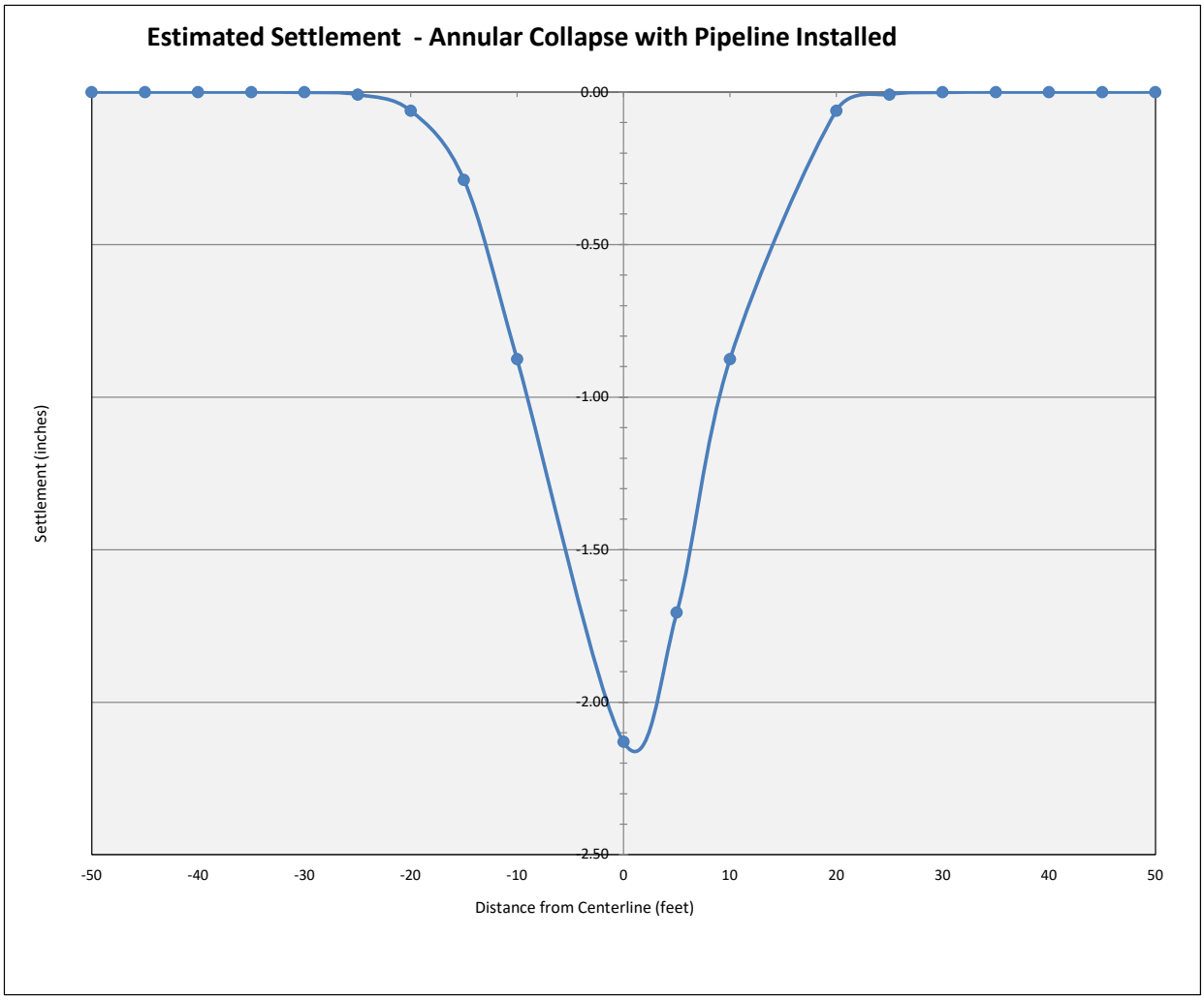


SETTLEMENT ANALYSIS

Based on Peck Method. Calculates settlement extending from centerline to a distance of 50 feet perpendicular to the drilled path. Assumes annular collapse with product line installed.

HDD Stations 1+13 and 17+88

Product Pipeline Diameter (inches)	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
Reamed Hole Diameter (inches)	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Volume Reamed Hole (sq. inches)	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88	1017.88
Volume Annulus (sq. inches)	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49	565.49
Percent of Annulus Filled with Surrounding Soil	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%
Volume of Available Annulus to Fill (cubic inches)	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66	480.66
Depth to Centerline of Drilled Hole (feet)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
K (constant based on soil type) Sand = .35, Clay = 0.5	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Horizontal Distance from Borehole (Feet)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
Settlement (Inches)	2.13	1.71	0.88	0.29	0.06	0.01	0.00	0.00	0.00	0.00	0.00



Appendix 4

Installation Loading and Stress Calculations

J.D.Hair&Associates,Inc.
Consulting Engineers

HDD Pulling Load and Pipe Stress Analysis

Project Information			
Project :	Enbridge	User :	JMS
Crossing :	1935 - Conemaugh River Crossing	Date :	14-May-20
Comments :	Installation model based on as-designed drilled profile (Revision P5). Assumes 12 ppg drilling fluid. Not Ballasted.		

Line Pipe Properties			
Pipe Outside Diameter =	24.000	in	
Wall Thickness =	0.500	in	
Specified Minimum Yield Strength =	60,000	psi	
Young's Modulus =	2.9E+07	psi	
Moment of Inertia =	2548.20	in^4	
Pipe Face Surface Area =	36.91	in^2	
Diameter to Wall Thickness Ratio, D/t =	48		
Poisson's Ratio =	0.3		
Coefficient of Thermal Expansion =	6.4E-06	in/in/°F	
Pipe Weight in Air =	125.49	lb/ft	
Pipe Interior Volume =	2.89	ft^3/ft	
Pipe Exterior Volume =	3.14	ft^3/ft	

HDD Installation Parameters			
Drilling Mud Density =	12.0	ppg	
=	89.8	lb/ft^3	
Ballast Density =	62.4	lb/ft^3	
Coefficient of Soil Friction =	0.30		
Fluid Drag Coefficient =	0.025	psi	
Ballast Weight =	180.04	lb/ft	
Displaced Mud Weight =	281.99	lb/ft	
Buoyant Force w/o Ballast (negative indicates uplift) =	-156.50	lb/ft	

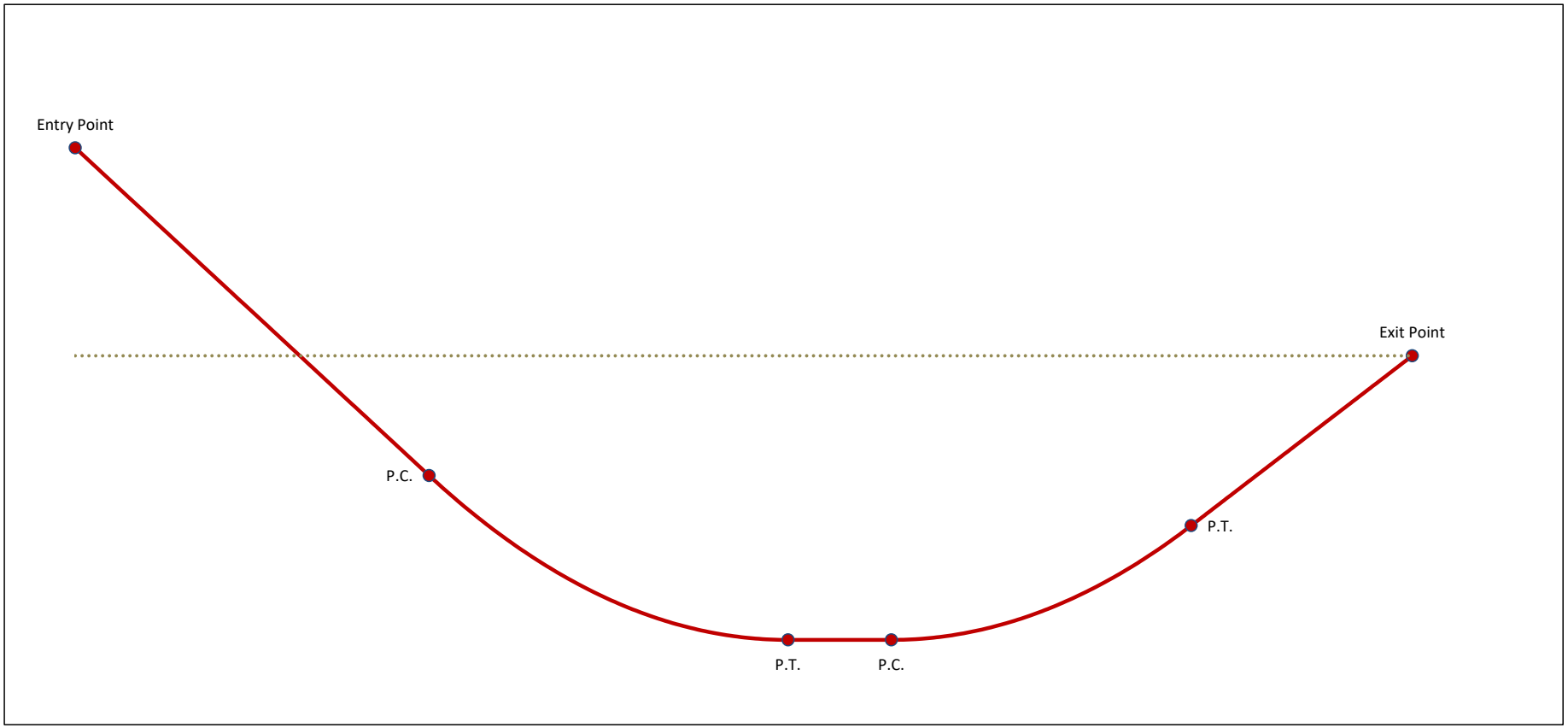
Installation Stress Limits			
Tensile Stress Limit, 90% of SMYS, F_t =	54,000	psi	
For D/t <= 1,500,000/SMYS, F_b =	45,000	psi	No
For D/t > 1,500,000/SMYS and <= 3,000,000/SMYS, F_b =	40,103	psi	Yes
For D/t > 3,000,000/SMYS and <= 300, F_b =	39,768	psi	No
Allowable Bending Stress, F_b =	40,103	psi	
Elastic Hoop Buckling Stress, F_{he} =	11,153	psi	
For F_{he} <= 0.55*SMYS, Critical Hoop Buckling Stress, F_{hc} =	11,153	psi	Yes
For F_{he} > 0.55*SMYS and <= 1.6*SMYS, F_{hc} =	29,008	psi	No
For F_{he} > 1.6*SMYS and <= 6.2*SMYS, F_{hc} =	12,037	psi	No
For F_{he} > 6.2*SMYS, F_{hc} =	60,000	psi	No
Critical Hoop Buckling Stress, F_{hc} =	11,153	psi	
Allowable Hoop Buckling Stress, F_{hc}/1.5 =	7,435	psi	

Line Pipe, Installation Parameters, and Stress Limits

		Station (ft)	Elevation (ft)	Angle	Radius (ft)	Length (ft)	Average Tension (lb)	Total Pull (lb)
Entry Point		0.00	995.00	12.00				155,720
Entry Tangent						502.88		
Entry Sag Bend	PC	491.89	890.45					124,082
	PI	738.63	838.00	12.00	2400	502.65	104,092	
	PT	990.88	838.00				0	84,102
Bottom Tangent				0.00		143.61		
Exit Sag Bend	PC	1134.49	838.00					74,111
	PI	1344.46	838.00	10.00	2400	418.88	52,042	
	PT	1551.24	874.46				0	29,973
Exit Tangent						312.12		
Exit Point		1858.62	928.66	10.00	Above Ground Load			
Drilling Mud			928.66	(Graph =)				
Ballast				(Graph =)				

No.	Station	Elevation	
1			Grade Elevation Points
2			
3			
4			
5			
6			
7			
8			
9			
10			
1			Control Point

	= Cover at Control Point



Installation Geometry

Pipe and Installation Properties

Pipe Diameter, D =	24.000	in	Fluid Drag Coefficient, C_d =	0.025	psi	
PIpe Weight, W =	125.5	lb/ft	Ballast Weight / ft Pipe, W_b =	180.0	lb	(If Ballasted)
Coefficient of Soil Friction, μ =	0.30		Drilling Mud Displaced / ft Pipe, W_m =	282.0	lb	(If Submerged)
			Above Ground Load =	0	lb	

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L =	312.1	ft	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft
Exit Angle, θ =	10.0	º			

Frictional Drag = W_e L μ cosθ =	14,431	lb
Fluidic Drag = 12 π D L C_d =	7,060	lb
Axial Segment Weight = W_e L sinθ =	8,482	lb
Pulling Load on Exit Tangent =	**29,973**	**lb**

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L =	418.9	ft	Average Tension, T =	52,042	lb
Segment Angle with Horizontal, θ =	-10.0	º	Radius of Curvature, R =	2,400	ft
Deflection Angle, α =	-5.0	º	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft

h = R [1 - cos(α/2)] =	9.13	ft	j = $[(E\ I) / T]^{1/2}$ =	1,196	
Y = $[18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ =	2.1E+06		X = (3 L) - [(j / 2) tanh(U/2)] =	676.37	
U = (12 L) / j =	4.20		N = [(T h) - W_e cosθ (Y/144)] / (X / 12) =	48,249	lb
Bending Frictional Drag = 2 μ N =	28,949	lb			
Fluidic Drag = 12 π D L C_d =	9,475	lb			
Axial Segment Weight = W_e L sinθ =	5,713	lb			
Pulling Load on Exit Sag Bend =	**44,137**	**lb**			
Total Pulling Load =	**74,111**	**lb**			

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L =	143.6	ft	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft

Frictional Drag = W_e L μ =	6,743	lb
Fluidic Drag = 12 π D L C_d =	3,248	lb
Axial Segment Weight = W_e L sinθ =	0	lb
Pulling Load on Bottom Tangent =	**9,991**	**lb**
Total Pulling Load =	**84,102**	**lb**

Summary of Load and Stresses

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L =	502.7	ft	Average Tension, T =	104,092	lb
Segment Angle with Horizontal, θ =	12.0	°	Radius of Curvature, R =	2,400	ft
Deflection Angle, α =	6.0	°	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft

$h = R [1 - \cos(\alpha/2)]$ =	13.15	ft	$j = [(E I) / T]^{1/2}$ =	845	
$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ =	3.9E+06		$X = (3 L) - [(j / 2) \tanh(U/2)]$ =	1085.90	
$U = (12 L) / j$ =	7.13		$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ =	61,388	lb
Bending Frictional Drag = $2 \mu N$ =	36,833	lb			
Fluidic Drag = $12 \pi D L C_d$ =	11,370	lb			
Axial Segment Weight = $W_e L \sin\theta$ =	-8,223	lb	Negative value indicates axial weight applied in direction of installation		
Pulling Load on Entry Sag Bend =	**39,980**	**lb**			
Total Pulling Load =	**124,082**	**lb**			

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L =	502.9	ft	Effective Weight, $W_e = W + W_b - W_m$ =	125.5	lb/ft
Entry Angle, θ =	12.0	°			

Frictional Drag = $W_e L \mu \cos\theta$ =	18,518	lb	
Fluidic Drag = $12 \pi D L C_d$ =	0	lb	Fluidic drag is calculated as zero unless entire segment is submerged in drilling fluid. Please reference Step 2, Drilled Path Input
Axial Segment Weight = $W_e L \sin\theta$ =	13,121	lb	
Pulling Load on Entry Tangent =	**31,639**	**lb**	
Total Pulling Load =	**155,720**	**lb**	

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress (psi)		Bending Stress (psi)		External Hoop Stress (psi)		Combined Tensile & Bending (Unity Check)		Combined Tensile, Bending & Ext. Hoop (Unity Check)	
Entry Point	4,218	ok	0	ok	0	ok	0.08	ok	0.01	ok
	3,361	ok	0	ok	0	ok	0.06	ok	0.00	ok
PC										
	3,361	ok	12,167	ok	0	ok	0.37	ok	0.10	ok
	2,278	ok	12,167	ok	1356	ok	0.35	ok	0.15	ok
PT										
	2,278	ok	0	ok	1356	ok	0.04	ok	0.04	ok
	2,008	ok	0	ok	1356	ok	0.04	ok	0.04	ok
PC										
	2,008	ok	12,167	ok	1356	ok	0.34	ok	0.14	ok
	812	ok	12,167	ok	811	ok	0.32	ok	0.10	ok
PT										
	812	ok	0	ok	811	ok	0.02	ok	0.01	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Summary of Load and Stresses

J.D.Hair&Associates,Inc.
Consulting Engineers

HDD Pulling Load and Pipe Stress Analysis

Project Information			
Project :	Enbridge	User :	JMS
Crossing :	1935 - Conemaugh River Crossing	Date :	26-May-20
Comments :	Installation model based on worst case drilled profile (Revision P5). Assumes 12 ppg drilling fluid, 20 feet longer, 15 feet deeper, 1,600' radius, not ballasted.		

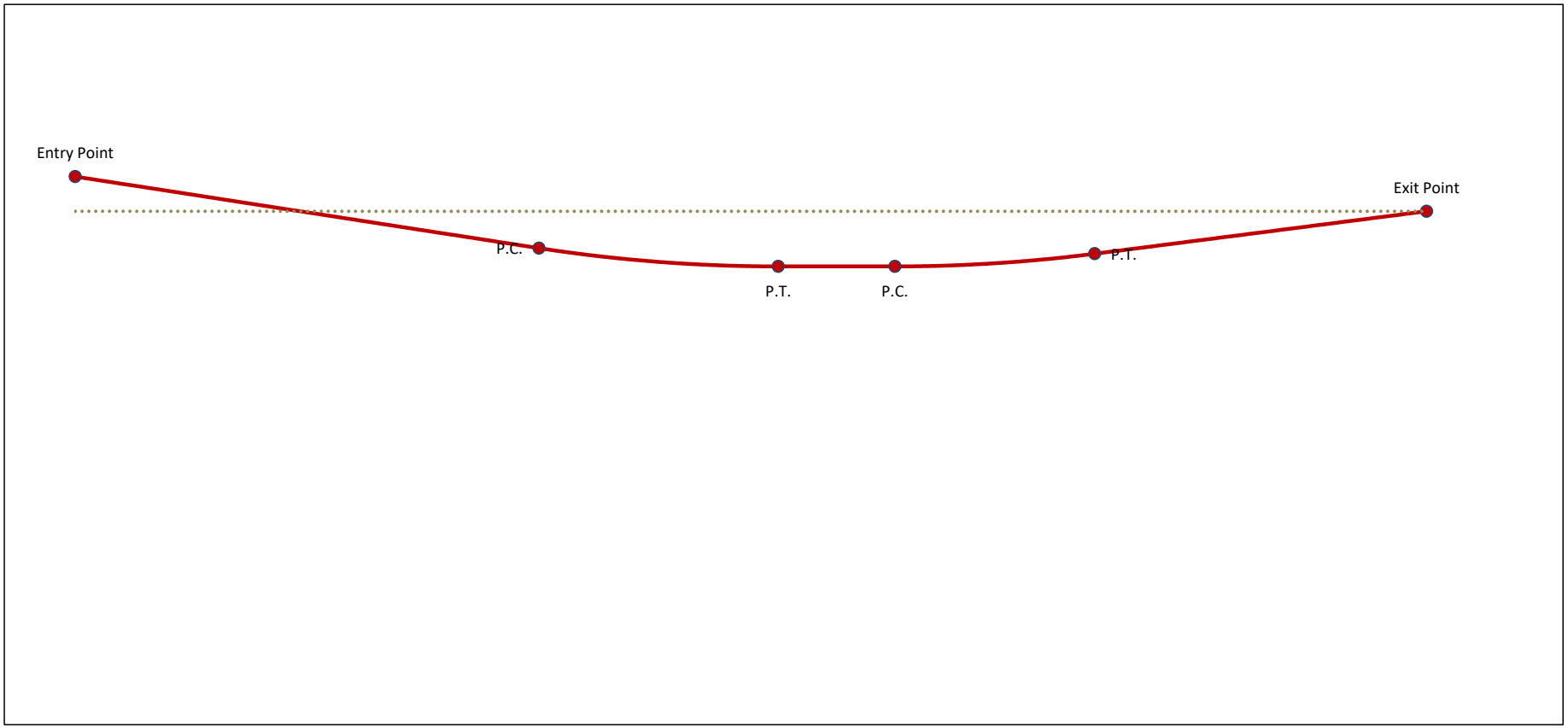
Line Pipe Properties			
Pipe Outside Diameter =	24.000	in	
Wall Thickness =	0.500	in	
Specified Minimum Yield Strength =	60,000	psi	
Young's Modulus =	2.9E+07	psi	
Moment of Inertia =	2548.20	in^4	
Pipe Face Surface Area =	36.91	in^2	
Diameter to Wall Thickness Ratio, D/t =	48		
Poisson's Ratio =	0.3		
Coefficient of Thermal Expansion =	6.4E-06	in/in/°F	
Pipe Weight in Air =	125.49	lb/ft	
Pipe Interior Volume =	2.89	ft^3/ft	
Pipe Exterior Volume =	3.14	ft^3/ft	
HDD Installation Parameters			
Drilling Mud Density =	12.0	ppg	
=	89.8	lb/ft^3	
Ballast Density =	62.4	lb/ft^3	
Coefficient of Soil Friction =	0.30		
Fluid Drag Coefficient =	0.025	psi	
Ballast Weight =	180.04	lb/ft	
Displaced Mud Weight =	281.99	lb/ft	
Buoyant Force w/o Ballast (negative indicates uplift) =	-156.50	lb/ft	
Installation Stress Limits			
Tensile Stress Limit, 90% of SMYS, F_t =	54,000	psi	
For D/t <= 1,500,000/SMYS, F_b =	45,000	psi	No
For D/t > 1,500,000/SMYS and <= 3,000,000/SMYS, F_b =	40,103	psi	Yes
For D/t > 3,000,000/SMYS and <= 300, F_b =	39,768	psi	No
Allowable Bending Stress, F_b =	40,103	psi	
Elastic Hoop Buckling Stress, F_{he} =	11,153	psi	
For F_{he} <= 0.55*SMYS, Critical Hoop Buckling Stress, F_{hc} =	11,153	psi	Yes
For F_{he} > 0.55*SMYS and <= 1.6*SMYS, F_{hc} =	29,008	psi	No
For F_{he} > 1.6*SMYS and <= 6.2*SMYS, F_{hc} =	12,037	psi	No
For F_{he} > 6.2*SMYS, F_{hc} =	60,000	psi	No
Critical Hoop Buckling Stress, F_{hc} =	11,153	psi	
Allowable Hoop Buckling Stress, F_{hc}/1.5 =	7,435	psi	

Line Pipe, Installation Parameters, and Stress Limits

		Station (ft)	Elevation (ft)	Angle	Radius (ft)	Length (ft)	Average Tension (lb)	Total Pull (lb)
Entry Point		0.00	995.00	12.00				146,624
Entry Tangent						659.11		
Entry Sag Bend	PC	644.70	857.96					122,893
	PI	809.20	823.00	12.00	1600	335.10	106,699	
	PT	977.36	823.00				0	90,506
Bottom Tangent				0.00		162.05		
Exit Sag Bend	PC	1139.41	823.00					79,233
	PI	1279.39	823.00	10.00	1600	279.25	62,111	
	PT	1417.25	847.31				0	44,990
Exit Tangent						468.49		
Exit Point		1878.62	928.66	10.00	Above Ground Load			
Drilling Mud			928.66	(Graph =)				
Ballast				(Graph =)				

No.	Station	Elevation	
1			Grade Elevation Points
2			
3			
4			
5			
6			
7			
8			
9			
10			
1			Control Point

	= Cover at Control Point



Installation Geometry

Pipe and Installation Properties

Pipe Diameter, D =	24.000	in	Fluid Drag Coefficient, C_d =	0.025	psi	
PIpe Weight, W =	125.5	lb/ft	Ballast Weight / ft Pipe, W_b =	180.0	lb	(If Ballasted)
Coefficient of Soil Friction, μ =	0.30		Drilling Mud Displaced / ft Pipe, W_m =	282.0	lb	(If Submerged)
			Above Ground Load =	0	lb	

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L =	468.5	ft	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft
Exit Angle, θ =	10.0	º			

Frictional Drag = W_e L μ cosθ =	21,661	lb
Fluidic Drag = 12 π D L C_d =	10,597	lb
Axial Segment Weight = W_e L sinθ =	12,732	lb
Pulling Load on Exit Tangent =	**44,990**	**lb**

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L =	279.3	ft	Average Tension, T =	62,111	lb
Segment Angle with Horizontal, θ =	-10.0	º	Radius of Curvature, R =	1,600	ft
Deflection Angle, α =	-5.0	º	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft

h = R [1 - cos(α/2)] =	6.09	ft	j = $[(E\ I) / T]^{1/2}$ =	1,095	
Y = $[18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ =	7.0E+05		X = (3 L) - [(j / 2) tanh(U/2)] =	339.44	
U = (12 L) / j =	3.06		N = [(T h) - W_e cosθ (Y/144)] / (X / 12) =	40,196	lb
Bending Frictional Drag = 2 μ N =	24,117	lb			
Fluidic Drag = 12 π D L C_d =	6,317	lb			
Axial Segment Weight = W_e L sinθ =	3,809	lb			
Pulling Load on Exit Sag Bend =	**34,243**	**lb**			
Total Pulling Load =	**79,233**	**lb**			

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L =	162.0	ft	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft

Frictional Drag = W_e L μ =	7,608	lb
Fluidic Drag = 12 π D L C_d =	3,665	lb
Axial Segment Weight = W_e L sinθ =	0	lb
Pulling Load on Bottom Tangent =	**11,274**	**lb**
Total Pulling Load =	**90,506**	**lb**

Summary of Load and Stresses

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L =	335.1	ft	Average Tension, T =	106,699	lb
Segment Angle with Horizontal, θ =	12.0	°	Radius of Curvature, R =	1,600	ft
Deflection Angle, α =	6.0	°	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft

$h = R [1 - \cos(\alpha/2)]$ =	8.76	ft	$j = [(E I) / T]^{1/2}$ =	835	
$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ =	1.4E+06		$X = (3 L) - [(j / 2) \tanh(U/2)]$ =	594.48	
$U = (12 L) / j$ =	4.82		$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ =	50,480	lb
Bending Frictional Drag = $2 \mu N$ =	30,288	lb			
Fluidic Drag = $12 \pi D L C_d$ =	7,580	lb			
Axial Segment Weight = $W_e L \sin\theta$ =	-5,482	lb	Negative value indicates axial weight applied in direction of installation		
Pulling Load on Entry Sag Bend =	**32,386**	**lb**			
Total Pulling Load =	**122,893**	**lb**			

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L =	659.1	ft	Effective Weight, $W_e = W + W_b - W_m$ =	-156.5	lb/ft
Entry Angle, θ =	12.0	°			

Frictional Drag = $W_e L \mu \cos\theta$ =	30,269	lb
Fluidic Drag = $12 \pi D L C_d$ =	14,909	lb
Axial Segment Weight = $W_e L \sin\theta$ =	-21,446	lb
Pulling Load on Entry Tangent =	**23,731**	**lb**
Total Pulling Load =	**146,624**	**lb**

Negative value indicates axial weight applied in direction of installation

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress (psi)		Bending Stress (psi)		External Hoop Stress (psi)		Combined Tensile & Bending (Unity Check)		Combined Tensile, Bending & Ext. Hoop (Unity Check)	
Entry Point	3,972	ok	0	ok	0	ok	0.07	ok	0.01	ok
	3,329	ok	0	ok	1058	ok	0.06	ok	0.03	ok
PC										
	3,329	ok	18,250	ok	1058	ok	0.52	ok	0.25	ok
	2,452	ok	18,250	ok	1581	ok	0.50	ok	0.27	ok
PT										
	2,452	ok	0	ok	1581	ok	0.05	ok	0.05	ok
	2,146	ok	0	ok	1581	ok	0.04	ok	0.05	ok
PC										
	2,146	ok	18,250	ok	1581	ok	0.49	ok	0.26	ok
	1,219	ok	18,250	ok	1217	ok	0.48	ok	0.22	ok
PT										
	1,219	ok	0	ok	1217	ok	0.02	ok	0.03	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Summary of Load and Stresses

Appendix 5

Operating Stress Calculations

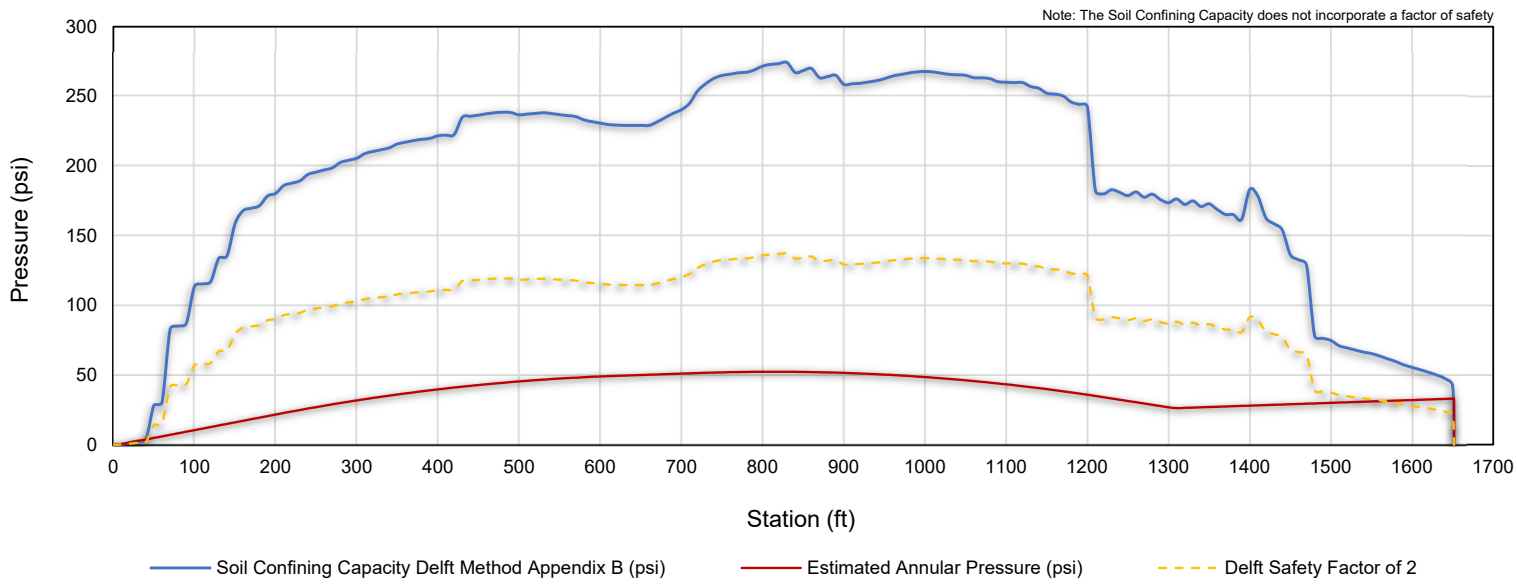
Operating Stress Analysis

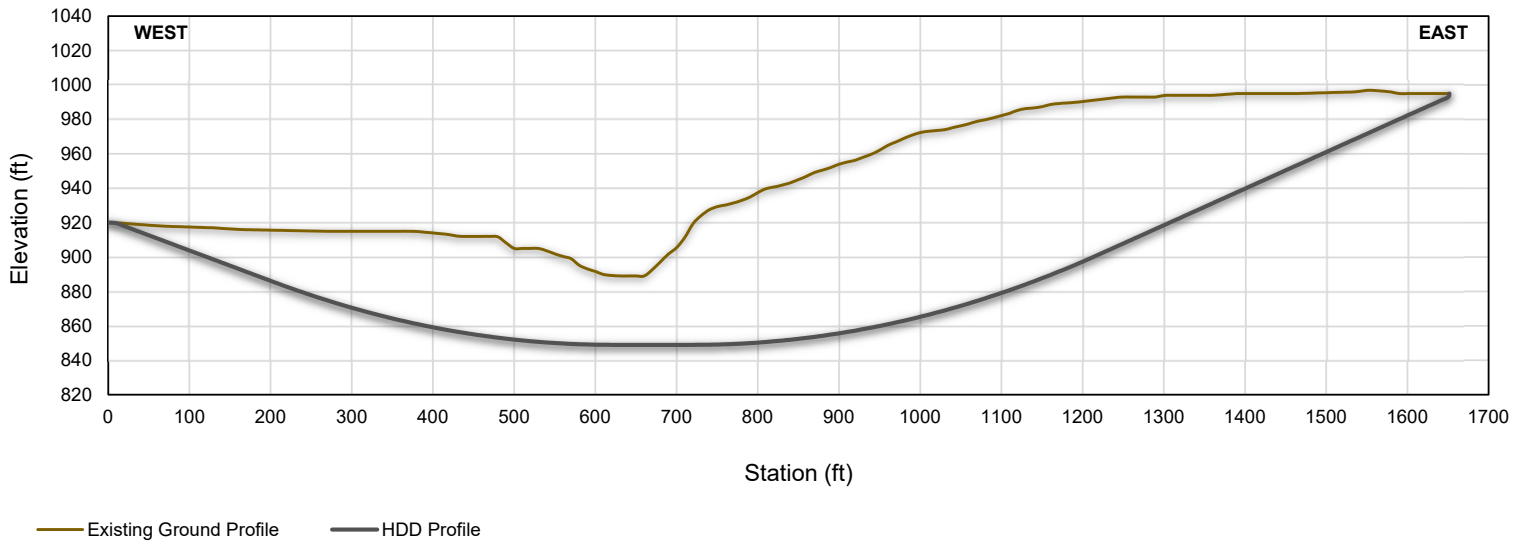
PROJECT: 1935 - Enbridge Conemaugh River Crossing

Pipe Properties	As-Designed	Minimum Radius	Absolute Minimum Radius
	Scenario 1	Scenario 2	Scenario 3
Pipe Outside Diameter =	24.000 in	24.000 in	24.000 in
Wall Thickness =	0.500 in	0.500 in	0.500 in
Specified Minimum Yield Strength =	60,000 psi	60,000 psi	60,000 psi
Young's Modulus =	2.9E+07 psi	2.9E+07 psi	2.9E+07 psi
Moment of Inertia =	2548.20 in^4	2548.20 in^4	2548.20 in^4
Pipe Face Surface Area =	36.91 in^2	36.91 in^2	36.91 in^2
Diameter to Wall Thickness Ratio, D/t =	48	48	48
Poisson's Ratio =	0.3	0.3	0.3
Coefficient of Thermal Expansion =	6.5E-06 in/in/°F	6.5E-06 in/in/°F	6.5E-06 in/in/°F
Pipe Weight in Air =	125.49 lb/ft	125.49 lb/ft	125.49 lb/ft
Pipe Interior Volume =	2.89 ft^3/ft	2.89 ft^3/ft	2.89 ft^3/ft
Pipe Exterior Volume =	3.14 ft^3/ft	3.14 ft^3/ft	3.14 ft^3/ft
Operating Parameters			
Maximum Allowable Operating Pressure =	1,050 psig	1,050 psig	1,050 psig
Radius of Curvature =	2,400 ft	1,600 ft	892 ft
Installation Temperature =	60 °F	60 °F	60 °F
Operating Temperature =	80 °F	80 °F	80 °F
Groundwater Table Head =	ft	ft	ft
Operating Stress Check			
Hoop Stress =	25,200 psi	25,200 psi	25,200 psi
% SMYS =	42%	42%	42%
Longitudinal Stress from Internal Pressure =	7,560 psi	7,560 psi	7,560 psi
% SMYS =	13%	13%	13%
Longitudinal Stress from Temperature Change =	-3,770 psi	-3,770 psi	-3,770 psi
% SMYS =	6%	6%	6%
Longitudinal Stress from Bending =	12,083 psi	18,125 psi	32,511 psi
% SMYS =	20%	30%	54%
Net Longitudinal Stress (taking bending in tension) =	15,873 psi	21,915 psi	36,301 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	26% ok	37% ok	61% ok
Net Longitudinal Stress (taking bending in compression) =	-8,293 psi	-14,335 psi	-28,721 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	14% ok	24% ok	48% ok
Combined Stress (NLS w/bending in tension) - Max. Shear Stress Theory =	9,327 psi	3,285 psi	11,101 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	16% ok	5% ok	19% ok
Combined Stress (NLS w/bending in compression) - Max. Shear Stress Theory =	33,493 psi	39,535 psi	53,921 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	56% ok	66% ok	90% ok
Combined Stress (NLS w/bending in tension) - Max. Distortion Energy Theory =	22,068 psi	23,729 psi	32,218 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	37% ok	40% ok	54% ok
Combined Stress (NLS w/bending in compression) - Max. Distortion Energy Theory =	30,213 psi	34,667 psi	46,730 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	50% ok	58% ok	78% ok

Appendix 6

Hydrofracture Evaluation





J.D.Hair&Associates,Inc.
Consulting Engineers

HYDROFRACTURE EVALUATION
SOIL CONFINING CAPACITY VS. ESTIMATED ANNULAR PRESSURE
CONEMAUGH RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

Date: 5/14/2020 Revision: R2

Table A-1. Drilling Fluid Additive Human Health Standards

Product Identifier	Product Name	Ingredient	Product Manufacturer/ Supplier	Proposed Use	NSF/ANSI CAN 60	EPA Safe Drinking Water Act	OSHA Hazard Communication Standard 29 CFR 1910.1200	OSHA Permissible Exposure Limit	ACGIH TLV	NIOSH REL	EPA Extremely Hazardous Substance (EHS)	Health Effects	Health Effects Detail
Super Gel-X	Mixture	Quartz (silica containing)	CETCO, an MTI Company	Not Available	No	No	Yes	Total Dust 15 mg/m^3 Respirable Dust 5 mg/m^3	Crystalline Quartz Respirable 0.1 mg/m^3	NA	No	May cause respiratory irritation, eye irritation, skin irritation	Acute: Irritation to nose, throat and upper respiratory track Chronic: Silicosis, scarring of lung tissues and raspatory problems
Super Gel-X	Mixture	Cristobalite (silica containing)	CETCO, an MTI Company	Not Available	No	No	Yes	Total Dust 15 mg/m^3 Respirable Dust 5 mg/m^3	Crystalline Quartz Respirable 0.1 mg/m^3	NA	No	May cause respiratory irritation, eye irritation, skin irritation	Acute: Irritation to nose, throat and upper respiratory track Chronic: Silicosis, scarring of lung tissues and raspatory problems

Acronym List
ACGIH = American Conference of Governmental Industrial Hygienists
ANSI= American National Standards Institute.
NIOSH = National Institute for Occupational Safety and Health
NSF = NSF International.
OECD = Organization for Economic Co-Operation and Development
OSHA = Occupational Safety and Health Administration
REL = recommended exposure limits
TLV = threshold limit value

Table A-2. Drilling Fluid Addictive Ecotoxicity and Toxicity for Relevant Biotic Receptors

Product Identifier	Product Name / Synonym	Product Manufacturer	Proposed Use	Ecotoxicity	Toxicity for Relevant Biotic Receptors	Ecotoxicity Evidence	Links
Det Force	Drilling Detergent Contains: Amides, coco, n-n-bis(hydroxyethyl) (3 - <5%) and 2-propanol (<1%)	Right Turn Supply LLC	No Data available	No data available	The product is not classified as environmentally hazardous. Estimated 93.25% volatile. Log Kow 0.05	Not expected to be harmful. AUS MSDS (first link) presents: EC50/LC50 (D-D) >100 mg/l "This product contains an ingredient that is classified, according to European regulations, as "harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment" However, at the concentration present, this preparation is not expected to present significant adverse environmental effects" Found some details on drilling mud (not sure if the same thing? – see links in right)	Another MSDS with eco info (I believe this is the same product): https://www.aplng.com.au/content/dam/aplng/compliance/msds/D-D%20SDS.pdf Ecotox of drilling fluids (not necessarily detergent): https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9101VZAX.TXT https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9100A84V.TXT
HDD Lube 1	Soybean Oil/ester blend	DCS Fluid Solutions LP	Lubricant	Not Classified	Contains no hazardous substances. Not expected to be harmful to aquatic life. Product expected to be inherently biodegradable.	"EPA regards soybean oil as practically non-toxic to non-target mammals, birds, and plants (Matthews 2010). No studies were found regarding aquatic toxicity of soybean oil, or its impact on honeybees or other pollinators." Baker - Cornell paper MSDS: Not expected to be harmful to aquatic life. Readily biodegradable	Soybean oil profile (Baker – Cornell): https://ecommons.cornell.edu/bitstream/handle/1813/56142/soybean-oil-MRP-NYSIPM.pdf?sequence=1&isAllowed=y https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3769042/
MAGMA FIBER COARSE	N/A	DCS Fluid Solutions LP	Viscosifier	Not classified	Contains no hazardous substances Not expected to be harmful to aquatic life.	"Basalt Rock fibers have no toxic reaction with air or water, are non-combustible. When in contact with other chemicals they produce no chemical reactions that may damage health or the environment. So it is ecological friendly material." Kumbhar, 2014. MSDS: No data available. Not expected to be harmful to aquatic life.	Kumbhar 2014 Paper https://s3.amazonaws.com/academia.edu.documents/46154181/BASALT_PAPER_2_AE07204511.pdf?response-content-disposition=inline%3B%20filename%3DAn_Overview_Basalt_Rock_Fibers_-New_Cons.pdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWOWYYGZ2Y53UL3A%2F20200213%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20200213T143253Z&X-Amz-Expires=3600&X-Amz-SignedHeaders=host&X-Amz-Signature=2be845f3e1c4c0f14f3c8ae57bd6449270246f6228898110df8b6e89bd1469be Additional MSDS: https://www.mineralstech.com/docs/default-source/performance-materials-documents/cetco/drilling-products/literature-downloads/drilling-products-nsf-certified/tds---magma-fiber. https://www.mineralstech.com/docs/default-source/performance-materials-documents/cetco/drilling-products/sds/sds---us/sds-us---magma-fiber-fine.pdf?sfvrsn=102c365e_2
SLIKGEL	Sodium	Western Clay	Viscosifier	Not Available	TLM96: 10000 ppm (Oncorhynchus	Not expected to be harmful.	MSDS:

Table A-2. Drilling Fluid Addictive Ecotoxicity and Toxicity for Relevant Biotic Receptors

Product Identifier	Product Name / Synonym	Product Manufacturer	Proposed Use	Ecotoxicity	Toxicity for Relevant Biotic Receptors	Ecotoxicity Evidence	Links
	Bentonite	Company			mykiss)	Fish toxicity: TLM96: 10000 ppm (Oncorhynchus mykiss)	http://www.westernclay.com/wp-content/uploads/2017/01/SAFETY-DATA-SHEET.pdf https://www.lkabminerals.com/wp-content/uploads/2019/04/Sodium-Bentonite-SDS-12-04EN19-03.pdf
Soda Ash Dense	sodium carbonate	BHS Marketing, LLC.	Not Available	LD/LC50 values 090 mg/kg (rat)	Water hazard class 1: slightly hazardous for water. May cause increase in pH in large amounts. 96 hour LC50 bluegill 320 mg/L	"Toxic to aquatic organisms." "Slightly toxic in water" (from MSDS) Fish: Bluegill/Sunfish: LC50 = 320 mg/L; 96 Hr.; Static Conditions Eco tox values: https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-carbonate#section=Ecotoxicity-Values https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-carbonate#section=Ecotoxicity-Excerpts	MSDS: https://fscimage.fishersci.com/msds/21080.htm https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-carbonate#section=Ecological-Information
Super Gel-X®	Calcium Carbonate	CETCO, an MTI Company	Not Available	Not Classified	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment. Bentonite Freshwater Toxicity Values from SDD: 72 hour EC50 algae >100 mg/L 48 hour ec%0 daphnids >100 mg/L 96 hour LC50 freshwater fish 16,000 mg/L Trade Secret Freshwater Toxicity Values from SDS: 48 hour EC50 daphnids 47 mg/L 96 hour LC50 fish 222 mg/L Log Kow = 0.35	It has a low potential to affect aquatic organisms. Acute aquatic effects: 48-hour LC50; Mosquito fish: 56,000 mg/L. (MSDS link) No evidence of acute toxicity to aquatic and terrestrial organisms. Several fish studies listed at link →	MSDS for CaCO3: https://fscimage.fishersci.com/msds/03880.htm https://echa.europa.eu/registration-dossier/-/registered-dossier/16050/6/1 http://pesticideanswers.org/Detail_Chemical.jsp?Rec_Id=PRI1812#Ecotoxicity

Attachment B

Material Safety Data Sheets (MSDS)

Spill Prevention Control and Countermeasure (SPCC) Plan &

Preparedness, Prevention, and Contingency (PPC) Plan for Construction Projects

—

Project:

Revised October 2017

—

Environmental Construction Permitting
5400 Westheimer Court
Houston, Texas 77056-5310

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ABBREVIATIONS AND DEFINITIONS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CI	Chief Inspector (Company employee or Contractor Employee performing the duties of the onsite Construction Manager or Engineer)
Company	Enbridge, Inc.
Company SC	Company Spill Coordinator (The Environmental Inspector or the Chief Inspector)
Contractor	Third party service provider performing construction activities for the Company on property owned or under the control of the Company. This role may be filled by the Company on small projects constructed by Company personnel and equipment.
Contractor SC	Contractor Spill Coordinator
CWA	Clean Water Act
DOT	U. S. Department of Transportation
E&C	Engineering & Construction
ECP	Environmental Construction Permitting
EHS, EH&S	Environmental Health and Safety
EI	Environmental Inspector (Company employee or Contractor Employee performing the duties of onsite environmental specialist overseeing Contractor compliance with environmental permit conditions, laws and regulations)
E&SCP	Erosion & Sedimentation Control Plan
FERC	Federal Energy Regulatory Commission
FWPC	Federal Water Pollution Control Act
HDD	Horizontal Directional Drill
JSA	Job Safety Analysis
MSDS	Material Safety Data Sheets
ppm	Parts per Million
Environmental Lead	Environmental Construction Permitting Specialist assigned to the project
OPA	Oil Pollution Act
RCRA	Resource Conservation and Recovery Act
SPCC Plan or Plan	Spill Prevention, Control and Countermeasure Plan
TSCA	Toxic Substances Control Act

1.0 PURPOSE/PLAN OBJECTIVE

Enbridge, Inc. ("Company") has prepared this Spill Prevention, Control and Countermeasure ("SPCC") Plan ("Plan") for construction projects in the United States. The purpose of this Plan is to reduce the probability and risk of a potential spill or release of oil or hazardous materials by the Company or Contractor during construction-related activities, by providing training to the Company and Contractor and expediting spill response and cleanup. This plan is not intended to meet the requirements of existing facility operations.

The Plan's specific objectives are to identify and address:

- The type and quantity of material handled, stored, or used on site during construction;
- The measures to be taken for spill preparedness and prevention;
- Emergency response procedures;
- Spill incident reporting/notification procedures; and
- Local emergency response team arrangements.

This plan has been prepared to meet the requirements of the Federal Energy Regulatory Commission's ("FERC's") *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), the Oil Pollution Act ("OPA"), the Federal Water Pollution Control Act ("FWPC"), the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") of 1980, the Resource Conservation and Recovery Act ("RCRA"), the Toxic Substances Control Act ("TSCA") and the Clean Water Act ("CWA").

The Company Environmental Construction Permitting ("ECP") group is responsible for the development and maintenance of this Plan. The Plan will be distributed to the Company Engineering & Construction ("E&C") Department's teams and associated Company personnel and will be included in the construction contract. It is the responsibility of the E&C teams to distribute to any necessary Contractors for implementation.

This Plan outlines both Company and Contractor responsibilities by topic. The Contractor is responsible for implementation of the Plan. In the absence of a Contractor, the Company will be responsible for both Company and Contractor responsibilities as they are laid out in this Plan.

A copy of the Plan must be on site during active construction and should also be maintained at the closest construction field office.

2.0 TRAINING

The Company requires all Contractor and Company personnel engaged in any construction activity to receive training in the implementation of the Plan prior to the commencement of on-site construction related activities.

Site visitors are to be given a brief review of the Plan as part of their orientation on safety and emergency procedures prior to the start of any on-site activities.

Contractor Responsibility

The Contractor will be responsible for the following:

- Keep training records
- Perform training briefings through ongoing meetings like tailgates and the daily project Job Safety Analysis ("JSA") that include:
  - Precautionary measures to prevent spills;
  - Potential sources of spills, including equipment failure or malfunction;
  - Standard operating procedures in the event of a spill;
  - Applicable notification requirements;
  - Equipment, materials and supplies available for clean-up of a spill;
  - Hazardous waste identification procedures;
  - Generation and proper handling of all non-hazardous waste, hazardous waste, and other toxic substances;
  - Proper storage, labeling, transportation and disposal of non hazardous and hazardous waste; and
  - Sample collection procedures.

Company Responsibility

The Company Chief Inspector ("CI"), Environmental Inspector ("EI"), or their designate will perform the following:

- Teach awareness-level training at the initial project environmental training session;
- Ensure further training is available for other new project personnel; and
- Audit training records kept by the Contractor as necessary.

3.0 PRE-PLANNING - MATERIAL INVENTORY AND DOCUMENTATION

Contractor Responsibility

The Contractor will be responsible for the following **prior** to the start of construction:

- Develop an inventory of all oil/hazardous material stored or used during construction;
- Complete Tables I, II, IV, V and VI (see Appendix A);
- Obtain material safety data sheets ("MSDS") (Appendix B) for all hazardous and non-hazardous substances listed in Table I (see Appendix A);
- Prepare a basic facility diagram or sketch for any storage areas, including pipe yards and temporary storage areas. The diagram should include locations of oil-filled containers, direction of run-off, emergency evacuation routes and assembly areas (see Appendix E); and
- Submit the required Tables, MSDS, and signature pages to the ECP's Environmental Lead for review and approval.

Company Responsibility

- Complete Tables III (see Appendix A);
- Review the Tables, MSDS, and signature pages submitted by the Contractor for approval; and
- Distribute approved Tables, MSDS, and signature pages to include in Plan as Appendices A, B and D.
- Fill out any signature pages or forms (see Appendix D)
    - Management Approval and Cleanup Commitment
    - Certificate of Determination of Substantial Harm Criteria

4.0 SPILL AND LEAK PREPAREDNESS AND PREVENTION

4.1 Prevention and Preparedness

Contractor Responsibility

- Complete Appendix A, Table I, Material and Waste Storage Inventory, and Table VI, Areas for Potential Leaks and Spills, prior to construction;
- Provide spill prevention, containment, and clean up equipment, and keep it available on-site;
- Perform daily inspections of all equipment, storage tanks, and/or container storage areas;
- Repair all leaking equipment, machinery or tools immediately. If items cannot be repaired, remove them immediately from the project site;
- Maintain a minimal spill kit (absorbent diapers, plastic bags, gloves, etc.) for each piece of hydraulically operated equipment and personnel vehicles within the project area;
- Store materials as indicated in the storage facility diagram or sketch provided by the Contractor in Appendix E;
- Submit a secondary containment plan for any hazardous material storage within the project area to the Company for approval **prior** to storage; and
- Obtain written approval from the project CI or EI for hazardous material storage within 100 feet of a wetland or waterbody.

Company Responsibility

- Review any secondary containment or storage plans submitted by the Contractor for approval.

4.1.1 Secondary Containment

Contractor Responsibility

- PCB (50 parts per million ("ppm") or greater) storage tanks shall be double-walled or have secondary containment that will hold 200 percent of the tank capacity;
- All containers with a storage capacity greater than 55 gallons shall have temporary containment (see Appendix A, Table I for type of temporary containment); and
- Pumps and other portable fuel burning equipment used within 100 feet of a jurisdictional wetland or waterbody will be placed and operated within appropriate secondary containment systems to prevent spills. Secondary containment will hold at least 110% of the tank capacity of the largest tank inside the containment area.

4.1.2 Storage/Inspection (Tanks/Containers)

Contractor Responsibility

- Operate only those tanks for fuel and material storage that meet the approval of the Company;
- Elevate tanks a maximum of two feet above grade;
- Inspect vehicle-mounted tanks to ensure all are equipped with flame/spark arrestors on all vents to prevent self-ignition;
- Locate tank storage in areas that are at least 100 feet from all waterbodies, wetlands, and designated municipal watershed areas, with certain exceptions as approved by ECP and listed in Appendix A, Table IV;
- Complete Appendix A, Table IV, Tank and Container Storage Exception Areas, and submit to the Company for approval prior to construction;
- Inspect all tanks daily for leaks and deterioration. The results of all inspections shall be made available to the Company upon request;
- Do not store incompatible materials in sequence in tanks prior to decontamination (A general list of potentially incompatible materials that may be used during construction are included in Appendix A, Table I);
- Store small cans of gasoline, diesel, solvents, etc., within the temporary secondary containment or within secured trailers or vehicles when not in use;
- Replace leaking and/or deteriorated containers as soon as the condition is first detected; and
- Ensure that all container storage and containment areas being used to store hazardous materials or wastes are in compliance with applicable local, state and federal requirements.

4.1.3 Loading/Unloading Areas

Contractor Responsibility

- Transfer liquids and refuel only in pre-designated and pre-approved locations that are at least 100 feet from all waterbodies and wetlands, with certain exceptions as approved by the EI and listed in Appendix A;
- Inspect the area beneath loading/unloading location for spills before and after each use;
- Utilize drip pans at all hose connections while loading/unloading liquids. If a leak or spill occurs, the loading/unloading operation will be stopped and the spill will be contained, cleaned up and collected prior to continuing the operation;
- Inspect all outlets of the tank trucks prior to leaving the loading and unloading area to prevent possible leakage from the truck while in transit;
- Equip any service vehicle used to transport lubricants and fuel with an emergency response spill kit. At a minimum, this kit must include:
    - 25 lbs of granular oil absorbent
    - 10, 48" x 3" oil socks

- 5, 17" x 17" oil pillows
- 1, 10" x 4" oil boom
- 20, 24" x 24" x 3/8" oil mats
- Garden size, 6 mil, polyethylene bags
- 10 pair of latex gloves
- 1, 55-gallon polyethylene open-head drum;

- Equip any service vehicle used to transport lubricants and fuel with a chemical response kit. At a minimum, this kit must include:
  - 1 bag of loose chemical pulp
  - 2 to 3, 17" x 17" chemical pillows
  - 2, 48" x 3" chemical socks
  - 5, 18" x 18" x 3/8" adsorbent mats
  - garden-size, 6 mil, polyethylene bags
  - 10 pair of latex gloves
  - 1, 30-gallon polyethylene open-head drum
  - hazardous waste labels

Company Responsibility

- Personnel shall be present during loading and unloading activities.

5.0 CONTINGENCY PLAN AND EMERGENCY PROCEDURES

All Company and Contractor personnel have responsibilities for spill prevention, control, and countermeasure.

Contractor Responsibility

- Maintain adequate manpower and equipment at the pipe yard or contractor ware yard necessary to divert any spill from reaching waterbodies and wetland areas; and
- Complete Appendix A, Table I, Emergency Response and Personal Protective Equipment, with a list of emergency equipment and storage location.

Company Responsibility

- Complete Appendix A, Table III, Key Emergency Contacts, prior to construction, and update as necessary.

First Responder Responsibility

The first responder is the person who first observes a spill or release of oil or other hazardous materials to the environment.

This person will take the following steps:

- Assess the situation to determine if the situation poses an immediate threat to human health or the environment;
- Identify hazardous material involved, if any;
- Report the spill to the Company Spill Coordinator ("Company SC") and Contractor Spill Coordinator ("Contractor SC") immediately; and
- Standby at a safe distance and keep others away.

Contractor SC Responsibility

- Coordinate the response to all spills which occur as a result of Contractor operations;
- Report the spill to the Company;
- Coordinate with the Company SC; and
- Conduct subsequent site investigations and associated incident reports unless otherwise directed by the Company.

The Contractor SC may be removed by the Company SC as spill response coordinator at the discretion of the Company.

The Contractor SC will direct Contractor personnel to:

- Shut off source of spill or leak as quickly as possible;
- Minimize affected area with appropriate containment or dike/berm;
- Assemble required spill response equipment as required (protective clothing, gear, heavy equipment, pumps, absorbent material, empty drums, etc.);
- Ensure that spilled material is placed in appropriate containers, in accordance with the best management practices and applicable laws and regulations;
- Properly label and store containers in accordance with applicable requirements; and
- Ensure that all spill response equipment is fully functional. Any equipment that cannot be reused shall be replaced.

Company SC Responsibility

The Company SC will be responsible for overseeing the Contractor SC's clean up of all spills of oil or hazardous materials.

Upon notification, the Company SC shall:

- Assess situation for potential threat to human health, environment and the neighboring community;
- Implement evacuation, if necessary;
- Activate emergency shutdown, if necessary;
- Control source as conditions warrant;
- Ensure that incompatible materials are kept away from the impacted area;
- Keep any potential ignition source away from the impact area, if spilled material is flammable;
- Coordinate sampling, disposal and equipment decontamination with Environmental Health and Safety ("EHS") in Houston, if necessary;
- For spills of PCBs, contact EHS for special spill response requirements related to PCB spills;
- Assist with the coordination of cleanup and disposal activities;
- If necessary, contact outside remediation services, in coordination with EHS, to assist with clean up;
- Notify EHS of all quantities and description of wastes to be handled by EHS;
- Complete the *EH&S Incident Investigation Form* (see Appendix C) and distribute accordingly;
- For unanticipated release of hydrostatic test waters, notify state contact if required by state permit, in accordance with timeframes required by state permit;
- Review permits to determine if immediate water sampling of test water is required and arrange if necessary; and
- Determine if local Right of Way agent will notify public officials (e.g. township manager and/or mayor).

6.0 SPILL CLEAN-UP/WASTE DISPOSAL PROCEDURES OF HYDROSTATIC TEST WATER

6.1 Oil/Fuel a;nd Hazardous Material Spills and Unanticipated Releases

Contractor Responsibility

- Ensure no immediate threat to surrounding landowners or environment;
- Identify/verify the material and quantity released;
- Review MSDS to determine the proper handling;
- Ensure that Personal Protective Equipment and containers are compatible with the substance;
- Remediate small spills and leaks as soon as feasible. Use adsorbent pads whenever possible to reduce the amount of contaminated articles;
- Restrict the spill by stopping or diverting flow to the oil/fuel tank;
- If the release exceeds the containment system capacity, immediately construct additional containment using sandbags or fill material. Every effort must be made to prevent the seepage of oil into soils, wetlands and surface waters;
- Block off drains and containment areas to limit the extent of the spill. For chemical spills, never wash down a spill with water;
- If a release occurs into a storm drain or stream, immediately pump any floating layer into drums. For high velocity streams, place oil booms or hay bales between the release area and the site boundary and downstream of affected area. As soon as possible, excavate contaminated soils and sediments within approved work areas;
- Collect and reclaim as much of the spill as possible using a hand pump or similar device. Containerize contaminated soils in an appropriate Department of Transportation ("DOT") container in accordance with applicable requirements. Never place incompatible materials in the same drum;
- For larger quantities of soils, construct temporary waste piles using plastic liners placing the contaminated soils on top of the plastic and covered by plastic. Plastic-lined roll-off bins should be leased for storing this material as soon as feasible;
- Properly label any drums, containers or storage piles in accordance with applicable requirements;
- Move drum to secure staging or storage area;
- Decontaminate all equipment in a contained area and collect fluids in drums;
- Document and report cleanup activities to the Company SC as soon as feasible; and
- If environmentally sensitive resources (wetlands, waterbodies) exist in the area, ensure that Best Management Practices as described in Company's Erosion &Sedimentation Control Plan ("E&SCP") are utilized to minimize impact to these resources.

Company Responsibility

- If necessary, arrange for sampling the substance for analysis and waste profiling, according to instructions from the Company Standard Operating Procedures, and/ or EHS;
- Document and report activities to EHS as soon as feasible.

6.2 Disposal of Contaminated Materials/Soils

For Company and Contractor protocol on the disposal of contaminated materials, soils, or any other waste materials, please see the Company Waste Management Plan.

6.3 Notification

Company Responsibility

- The Company SC shall notify the Emergency Spill Hotline at (800) 735-6364 and those listed in Appendix A, Table III, immediately for spills that meet any of the following criteria:
  - one pound or more of a solid material (excluding Horizontal Directional Drill ("HDD") mud) spilled on land;
  - five gallons or more of a liquid spilled on land;
  - creates a sheen on water; or
  - unanticipated release of hydrostatic test water.
- If necessary, notify the local fire department, law enforcement authority, or health authority as appropriate. The following information should be provided:
  - the name of the caller and callback number;
  - the exact location and nature of the incident;
  - the extent of personnel injuries and damage;
  - the extent of release; and
  - the material involved and appropriate safety information.
- An incident report form should be filled out following containment and cleanup of the spill or release. Incident data should be gathered using the *EH&S Incident Investigation Form* (see Appendix C) and should be sent to the appropriate ECP project manager for records retention and entry into the EPASS/ILP database.

7.0 HOUSEKEEPING PROGRAM

7.1 Construction Area

Contractor Responsibility

- Maintain construction area in neat and orderly manner; and
- Routinely collect and properly dispose of all trash off-site.

7.2 Contractor Yards/Ware Yards

Contractor Responsibility

- Produce a "site specific" plan to address storage, spill prevention and overall yard organization for all contractor yards and ware yards. Contractor yard "site specific" plans should include the following:
    - facility name;
    - physical address;
    - longitude and latitude coordinates;
    - directions to facility (including road names);
    - date of first oil and hazardous material storage;
    - location of oil and hazardous material containers greater than 55 gallons;
    - loading/unloading areas;
    - direction of drainage flow; and
    - primary and secondary evacuation routes.
- Provide adequate aisle spacing to allow unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment as necessary in storage areas;
- Ensure similar housekeeping practices enforced in construction areas are also implemented in storage areas; and
- Any facility with an aggregate aboveground oil storage capacity greater than 1,320 US gallons but less than 10,000 gallons must have the plan self-certified by the owner or operator of the qualified facility or a licensed Professional Engineer. Any facility with an aggregate aboveground oil storage capacity greater than 10,000 gallons must have the plan reviewed and certified by a licensed Professional Engineer.

7.3 Security

Contractor Responsibility

- Hazardous wastes and waste containing PCBs greater than 50 ppm will be stored in a secured location (i.e. fenced, locked, etc.). Fuel storage areas will be located to minimize, as much as possible, tampering by unauthorized personnel during non-operational hours.
- Complete Table V, Waste Storage Security Information, in Appendix A, prior to construction.

Company Responsibility

- Review Table V, Waste Storage Security Information in Appendix A, that has been prepared by the Contractor prior to construction.

Project Signatures:

Company Spill Coordinator:

Print Name

Signature Date

Contractor Spill Coordinator

Print Name

Signature Date

APPENDIX A - TABLES

TABLE I – MATERIAL AND WASTE INVENTORY

Oil and Fuel to be used or stored on site during construction:

STORAGE CAPACITY OF OIL FILLED-CONTAINERS

Container Number[a/]	Storage capacity (volume)	Location

[a/] The reference container numbers should correspond to the facility diagram in Appendix E.

Commercial Chemicals to be used or stored on site during construction:

Hazardous and Non-Hazardous Wastes to be used or stored on site during construction:

Incompatible Materials to be used or stored on site during construction:

Type of Temporary Containment containers to be used:

TABLE I TO BE COMPLETED BY CONTRACTOR Prior to the Start of Construction and updated as necessary

TABLE II – EMERGENCY RESPONSE AND PERSONAL PROTECTIVE EQUIPMENT

Spill Response:

Equipment	Quantity	Location

Fire Protection:

Equipment	Quantity	Location

Personnel Protection:

Equipment	Quantity	Location

TABLE II TO BE COMPLETED BY CONTRACTOR
Prior to the Start of Construction and updated as necessary

TABLE III – KEY EMERGENCY CONTACTS

The list of key personnel who will be contacted in the event of an emergency or spill incident include:

1. ***Company Emergency Contacts*** Contact Name Phone Number

Company Spill Coordinator & Environmental Inspector (within 15 minutes identifying of incident)

24-hour Emergency Spill Hotline -- 1-800-735-6364
(within 15 minutes of identifying incident)

Regional Environmental Coordinator
(within 15 minutes of identifying incident)

ECP's Project Environmental Lead / PM
(notify within 60 minutes of incident & submit Spill Report Form within 24 hours to ECP PM)

Company Project Manager

Company Environmental Coordinator

Field Construction
Company Construction Coordinator

2. ***Contractor Emergency Contact***

Contractor Spill Coordinator

3. ***Local Authorities*** – As necessary

Emergency contact for Police, Fire & Medical assistance ***Dial 911***

Non-Emergency Local Authorities or Contacts		
Location	**Contact**	**Phone Number**

4. ***<u>Environmental Agencies</u>***

Notification to be made by Regional Environmental Coordinator and ECP's PM

5. ***<u>Potential Environmental Remedial Service Contractors</u>***

Clean Harbors Environmental Services, Inc.	Howard Alexander	(800) 782-8805
Safety-Kleen (FS), Inc	Edward A. Mitchell	(281) 478-7700
U.S.A. Environment	Cesar Garcia	(713) 425-6925 or (832) 473-5354
WRS Infrastructure and Environment Inc	Steve Maxwell	(281) 731-0886

TABLE III TO BE COMPLETED BY COMPANY
Prior to the Start of Construction and updated as necessary

TABLE IV – TANK AND CONTAINER STORAGE EXCEPTION AREAS

Tank and container storage shall be located in areas that are at least 100 feet from all waterbodies and wetlands.

The below exceptions have been approved by ECP and EHS:

1.

2.

3.

4.

TABLE IV TO BE COMPLETED BY CONTRACTOR
Prior to the Start of Construction and updated as necessary

TABLE V – WASTE STORAGE SECURITY INFORMATION

TABLE V TO BE COMPLETED BY CONTRACTOR
Prior to the Start of Construction and updated as necessary

TABLE VI–AREAS FOR POTENTIAL LEAKS AND SPILLS

1.

2.

3.

4.

TABLE VI TO BE COMPLETED BY CONTRACTOR Prior to the Start of Construction and updated as necessary

APPENDIX B - MSDS

APPENDIX C – EH&S INCIDENT INVESTIGATION FORM

ENBRIDGE

Enbridge, Inc.

EHS Incident Investigation/Data Collection Form

This form replaces: C-23 Occupational Injury and Illness Report, 19-06 Field Spill Report, 19-20 Outside Agency Inspection, 19-21 Natural Gas Release Record, and 19-25 Contamination Encounter Report

(Must Be Completed)

BUSINESS UNIT	REGION (Circle One)	AREA	LOCATION (Entity)
US	Northeast / Southeast / Corporate		

Common fields applicable to all types of incidents.

*Complete each section and field as applicable for the Incident Type you are entering. All required fields **(bold)** are EPASS ILP system required and must be completed.*

Incident Type: ☐ Injury / Illness ☐ Vehicle ☐ Environmental ☐ Complaint ☐ Near Miss
(Check multiple incident types as appropriate)

Category: ☐ Incident with Loss ☐ Incident without Loss Initiating Event: _____

Status: Open ☐ **Do not include in rates and counts:** ☐ Note: (Pertains to all incidents without loss.)

Date Reported: _____ **Date Occurred:** _____ Time Occurred: _____ AM ☐ PM ☐

Describe exactly how the incident occurred. Be very specific in details without reference to individual(s) names.

Employee Name: _____ **Incident Owner (Supervisor) Name:** _____

Contractor Incident: ☐ Yes ☐ No **Dependent** ☐ **Independent** ☐

Contract Employee Name: _____ **Phone Number:** _____

Contractor Contact Name: _____ **Contractor Company Name:** _____

Contractor Address, City, State, Zip code _____

Time Work Began: _____ AM ☐ PM ☐ **Time work began cannot be confirmed:** ☐

Response Agency Involved: ☐ Police ☐ Fire ☐ Ambulance ☐ HazMat ☐ Insurance ☐ External Response Support

Emergency Response Coordination: ☐ Internal ☐ External **Third Party Damage:** _____

Description of Immediate Response: (Note: This information is included in the ILP e-mail initial incident notification.)

Section A

Injury / Illness Incident Detail **SRS TeleClaim Contact #: 1-866-880-1777** Enbridge, Inc. Account #: 57568

Classification: ☐ First Aid ☐ Medical Treatment ☐ Modified / Restricted Work ☐ Lost Time ☐ Fatality

NOTE: Contact Human Resources to determine if Certificate of Disability is appropriate.

Event/Exposure (i.e. fall, slip/trip, strain) _____ **Injury source (i.e. tool, chemicals)** _____

Body Part (i.e. R/L leg, hand, back) _____ **Nature of Injury (i.e. cut, bruise, burn)** _____

Reported to Case Manager / SRS : ☐ Yes ☐ No **OSHA Log Injury Type(i.e. injury, illness, hearing loss)** _____

OSHA Log Injury Short Description: _____

Section B

Vehicle Incident Detail Driver **MUST CALL** PHH @ 800-446-7052 and provide vehicle unit #.
For any other claims, contact SRS Teleclaim @ 866-880-1777 w/Enbridge, Inc. Account #: 57568

Vehicle Type: (i.e. car, pickup) _____ **Ownership (i.e. company, rental)** _____

Activity (i.e. turning, passing, backing): _____ **Location:(i.e. urban, ROW, highway):** _____

Collision Location (i.e. ROW, parking lot, intersection) _____ **Road Type (i.e. concrete, dirt)** _____

Contributing Factors (i.e. failure to yield, keep safe distance): _____

Traffic Controls (i.e. stop sign, traffic signal, railroad crossing): _____

Collision Type i.e. backing, turning, rear ended) _____ **Collision Object (i.e. vehicle, animal, object)** _____

Road Conditions (i.e. dry, wet, ice, snow) _____ **Weather Conditions (i.e. rain, snow, clear)** _____

Journey Purpose (i.e. Business, Personal, T/F Work) _____ Lighting (i.e. dawn, day, night): _____

Third Party Name _____ Address: _____

Environmental Incident Detail

Section C

Spill/release Source: _____ **Reportable:** ☐ Yes ☐ No **Unplanned Release:** ☐ Yes ☐ No

Unexpected Contaminated Soil Encountered: ☐ Yes ☐ No

Medium: ☐ Air ☐ Containment ☐ Ground ☐ Treatment System ☐ Water

Units: ☐ Gallons ☐ Pounds ☐ mmscf (millions) ☐ mcf (thousands) **Spill / Release Amount:** _____

Material (i.e. natural gas, oil, pipeline condensate, glycol) _____ Occur near wetlands: ☐

Environmental Impact: _____ Wind: Direction: _____ Speed: _____ Temperature: _____

Line Size: _____ Line Pressure: _____ Start Time: _____ End Time: _____

Section D

Transportation Incident Detail

Type of Shipment:

☐ Hazardous Material Shipment ☐ Undeclared shipment with no release ☐ Specification cargo tank

Type of Report: ☐ Initial Report ☐ Follow-up Report

Mode of Transportation: ☐ Air ☐ Highway/Roadway ☐ Rail ☐ Water

Spill Occurred: ☐ In transit ☐ Loading ☐ Unloading ☐ In Transit Storage

Carrier: _____ **Shipper:** _____

Spill Location - Address, City, State, Zip code: _____

Hazardous Material: _____ **Quantity:** _____ **Units (i.e. gallons)** _____

Comments: _____

Section E

Regulatory Information / Notification / Outside Agency Inspection Detail

Regulatory Notification: ☐ **Date:** _____ **Routine Inspection:** ☐ **Tests conducted:** ☐ **Explain:** _____

Regulatory Agency: _____ **Officer Name:** _____

Warning Issued: ☐ **Fine Issued:** ☐ **Amount:** _____ **Order / NOV Issued:** ☐ **Date:** _____

Reference #: _____ **Extension:** ☐ **Date:** _____ **Rescind:** ☐ **Date:** _____

Found During Inspection: ☐ **Suspect Soil:** ☐ **Sampling Required:** ☐ **Permit Exceedance:**

Accompanied by (name): _____ **Comments:** _____

Section F

EHS Complaint Detail

Complaint type (i.e. noise, odor, property damage): _____ ☐ New ☐ Ongoing

Parameters of Concern: _____

Attach any additional doctor injury status, police or agency reports as appropriate for the incident.

FAX OR EMAIL THIS DOCUMENT TO YOUR REGION EHS SPECIALIST for data entry into ILP within 24 hours of an environmental or safety incident AND fax a copy to Houston EHS at 713-386-4249.

Reported by: _____ Signature: _____ Phone: _____

Causal Factors (TapRoot®) and Corrective Actions*

(Contact Region EHS Specialist for help in completing this section.)
(EHS Specialist will utilize the most current version of the TapRoot® Root Cause Tree® Dictionary*)

Section G

ILP Incident #: _____ **Investigation End Date:** _____

It is essential to record the unique identifying number from the ILP database.

Risk Rank: ☐ **1** ☐ **2** ☐ **3** ☐ **4** (Check only one box.)
(See Risk Matrix)

TapRoot® Cause Outcome*

Causal Factor: A problem or issue that, if corrected, could have prevented and incident from occurring or significantly reduced the incident's consequences.*

Effective Corrective Action is **SMART**, effective, and reviewed for unintended consequences.*

Specific
Measureable
Accountable
Reasonable
Timely

1. Identify causal factors - up to 4 cause codes. (Free form text.)
2. Select from the following menu. Note: the line number on this form relates to text on the drop down menu in the ILP database. The number is not found in ILP.

No. Cause Code Menu (Not inclusive of all TapRoot® Cause Codes*)

Section H

1	Human Performance Difficulty	Procedures	Not Used/Not Followed
2	Human Performance Difficulty	Procedures	Wrong
3	Human Performance Difficulty	Procedures	Followed Incorrectly
4	Human Performance Difficulty	Training	No Training
5	Human Performance Difficulty	Training	Understanding NI (Needs Improvement)
6	Human Performance Difficulty	Quality Control	No Inspection
7	Human Performance Difficulty	Quality Control	QC NI (Quality Control Needs Improvement)
8	Human Performance Difficulty	Communications	No Communication or Not Timely
9	Human Performance Difficulty	Communications	Turnover NI
10	Human Performance Difficulty	Communications	Misunderstood Verbal Communication
11	Human Performance Difficulty	Management System	SPAC NI (Standard Practices and Controls Need Improvement)
12	Human Performance Difficulty	Management System	SPAC Not Used (Standard Practices and Controls Not Used)
13	Human Performance Difficulty	Management System	Oversight/Employee Relations
14	Human Performance Difficulty	Management System	Corrective Action
15	Human Performance Difficulty	Human Engineering	Human/Machine Interface
16	Human Performance Difficulty	Human Engineering	Work Environment
17	Human Performance Difficulty	Human Engineering	Complex System
18	Human Performance Difficulty	Human Engineering	Non Fault Tolerant System
19	Human Performance Difficulty	Human Engineering	Preparation
20	Human Performance Difficulty	Work Direction	Selection of Worker
21	Human Performance Difficulty	Work Direction	Supervision During Work
22	Equipment Difficulty	Tolerable Failure	
23	Equipment Difficulty	Design	Design Specs
24	Equipment Difficulty	Design	Design Review
25	Equipment Difficulty	Design	Independent Review NI (Needs Improvement
26	Equipment Difficulty	Equipment/Parts Defective	Procurement
27	Equipment Difficulty	Equipment/Parts Defective	Manufacturing
28	Equipment Difficulty	Equipment/Parts Defective	Handling
29	Equipment Difficulty	Equipment/Parts Defective	Storage
30	Equipment Difficulty	Equipment/Parts Defective	Quality Control
31	Equipment Difficulty	Preventive/Predictive Maintenance	PM NI (Preventive Maintenance Needs Improvement)
32	Equipment Difficulty	Repeat Failure	Management System
33	Natural Disaster	Sabotage	
34	Other		

Complete the Causal Factors and Cause Code on page 4.

Causal Factors free form text box. Cause Code Number i.e. 1 through 34

Section H

Causal Factor 1: _____

Cause Code Number: _____
Cause Code Number: _____
Cause Code Number: _____

Causal Factor 2: _____

Cause Code Number: _____
Cause Code Number: _____
Cause Code Number: _____

Causal Factor 3: _____

Cause Code Number: _____
Cause Code Number: _____
Cause Code Number: _____

Causal Factor 4: _____

Cause Code Number: _____
Cause Code Number: _____
Cause Code Number: _____

Section I

Corrective Action Information:

Title: _____

Author: _____

Author Date: _____

Origin Cause: _____

Proposed Corrective Action: _____

Proposed Completion Date: _____

Assigned to: _____

Actual Corrective Action: _____

Actual Completion Date: _____

After the investigation is complete, and when a corrective action is developed, ensure the causal factors, codes and corrective action information in this document is sent to the person responsible for data entry into ILP i.e. Region EHS Specialist or Supervisor.

FAX OR EMAIL THIS DOCUMENT TO YOUR REGION EHS SPECIALIST for data entry into ILP AND fax a copy to Houston EHS at 713-386-4249.

Prepared by: _____ Signature: _____ Phone: _____

* © System Improvements, Inc.

DISTRIBUTION:
Original - Station ENV File 9.2 or 10.0
Original - S&H File # 22.1, 22.2, or 22.5 as appropriate per H&S SOP
Copy - Region EHS
Copy - Houston EHS - fax 713-386-4249
Copy - Houston Fleet Services

RETENTION:
Original - See SOP 3 or 5 years
Original - See EHS Retention Rule
Copy - As needed
Copy - Permanent
Copy - As needed

ENBRIDGE, INC. EHS RISK MATRIX

Frequency	Likelihood *(facility, region, major project)*	Likelihood Category						
> 1/yr	Expected to occur more than once per year at a facility/project		L5	III	II	II	I	I
>1/10yrs	Expected to occur several times in facility/project lifetime		L4	III	III	II	II	I
>1/100yrs	Expected to occur once in the facility/project lifetime		L3	IV	III	III	II	II
>1/1,000 yrs	May occur in the facility/project lifetime		L2	IV	IV	III	III	II
>1/10,000 yrs	Remote chance of happening		L1	IV	IV	IV	III	III
				C1	C2	C3	C4	C5
				Consequence Category				
Consequence		Injury Outcome		First Aid or Minor Illness	Medical Aid / OSHA Recordable Restricted Work.	Lost Time Injury	Permanent Disability	Fatality
		Environment		Insignificant onsite / localized impact	Negligible onsite or offsite impact below	Environmental impact resulting in regulatory	Significant impact leading to enforcement	Catastrophic impact, long-term liability,
		Financial		<$1K	$1-10K	$10-100K	$100K-$1M	>$1M
		Reputation		Individual concern, no media attention	Community concern with local media attention	State / Provincial concern with regional media attention	Response causing impact on share price	Response causing major impact on share price

Risk Ranking	Guideline Interpretation
I	It is recommended that no activity be permitted without immediate mitigation taken to lower the risk rank.
II	Further risk controls should be considered to lower either the probability or consequence of the risk.
III	Some risk controls may be required.
IV	No further reduction in risk is required.

APPENDIX D – REQUIRED SIGNATURE FORMS

Management Approval and Cleanup Commitment
40 CFR §112.7

This Spill Prevention, Control and Countermeasures Plan (Plan), including the Spill Procedures Chart and Supplemental Document, which has been prepared in accordance with 40 CFR 112, has been reviewed and approved by the Project Manager. The Project Manager has the level of authority to commit the necessary resources to fully implement this Plan and to contain and clean up any oil discharged at this facility. By signing below, the **Project Manager** also **authorizes station supervisors to expediently commit manpower, equipment, and materials necessary to contain and remove any harmful quantity of oil discharged from this facility** (40 CFR §112.7). **This commitment includes the authority to use company and/or contract personnel and equipment.**

Facility Name: _____

Location: _____

Signature: _____

Name: _____

Date: _____

Title: _____

CERTIFICATE OF DETERMINATION OF SUBSTANTIAL HARM CRITERIA

Facility Name: _____

Location: _____

Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons? Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is large enough to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area?
Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in rule 40 CFR 112 Attachment C-III or a comparable formula) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments? For further description of fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA's "Guidance for Facility and Vessel Response Plans: Fish and Wildlife and Sensitive Environments" (see Appendix E to this Part, Section 13, for availability) and the applicable Area Contingency Plan.
Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula) such that a discharge from the facility would shut down public drinking water intake? For the purpose of 40 CFR 112, public drinking water intakes are analogous to public water systems as described in 40 CFR 143.2(c)
Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil discharge in an amount greater than or equal to 10,000 gallons within the last five years?
Yes___ No ___

Certification
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for this information, I believe that the submitted information is true, accurate, and complete.

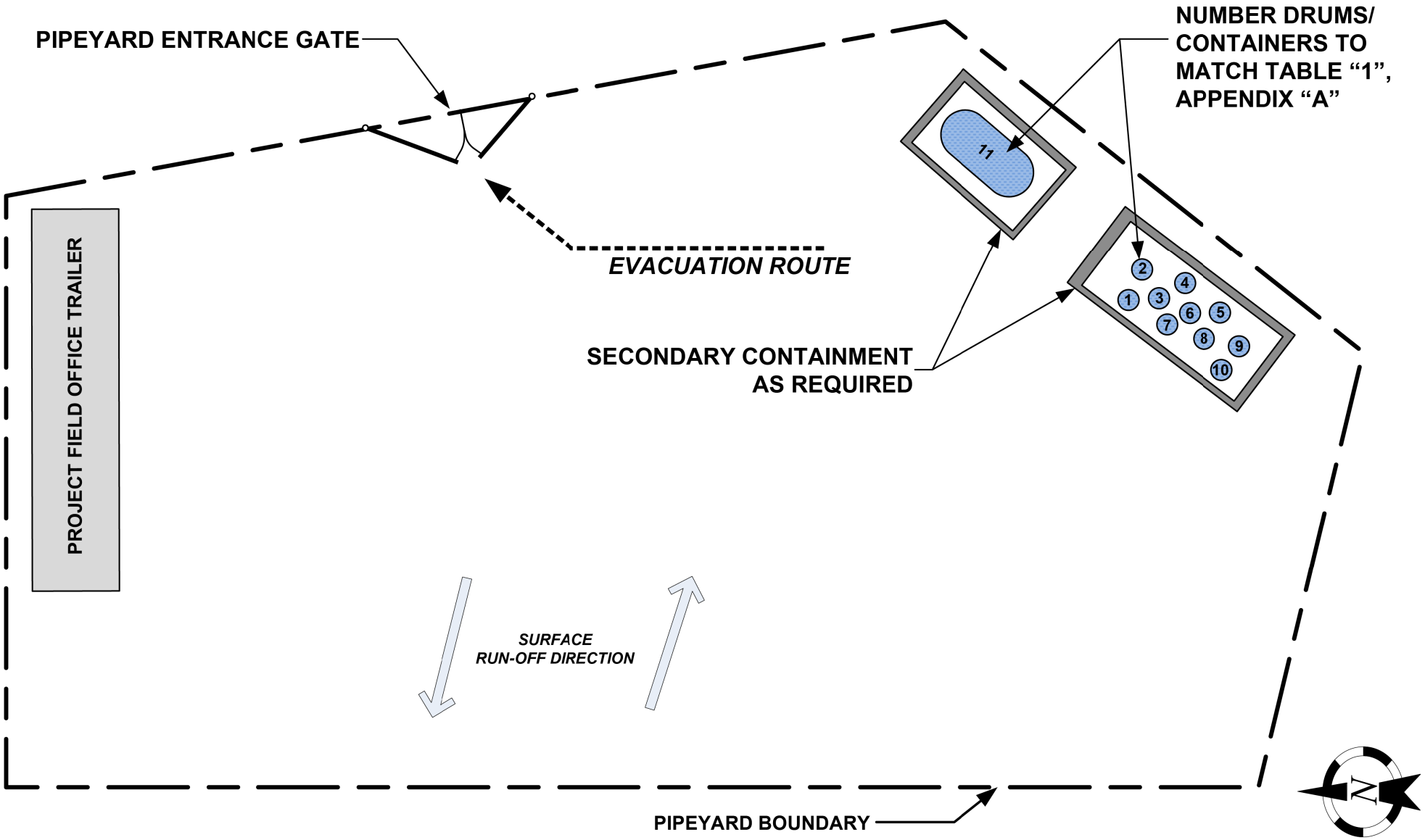
Signature: _____

Title: _____

Name (please type or print): _____

Date: _____

APPENDIX E – PIPEYARD / FACILITY STORAGE DRAWING



LEGEND

PIPEYARD BOUNDARY

STORAGE CONTAINERS

OFFICE TRAILER

SAMPLE
PIPEYARD: FACILITY STORAGE DRAWING

REV.	REV. DATE		REV. APRVD.
CKD.BY	ENG.	DATE 1/6/2011	W.O.
DRN.BY J.M.F.	SCALE NONE	DWG.NO .	

ENBRIDGE

5400 Westheimer Ct.
Houston, TX. 77056-5310
713.627.5400