TETRA TECH

PITT-05-19-013

May 13, 2019

Project Number 212IC-BF-00387

**Via E-mail and overnight Fed Ex**
Mr. Chris Smith
Construction Permits Section
Department of Environmental Protection
Southeast Regional Office
2 East Main Street
Norristown, Pennsylvania 19401

**Re: Sunoco Pipeline L.P. – Pennsylvania Pipeline Project (Mariner East II)**
**Chapter 102 Permit No. ESG0100015001 – Major Amendment**
**Chapter 105 Permit No. E15-862 – Minor Amendment**
**Modification Request for Installation Method Change at HDD S3-0400 Lisa Drive**
**West Whiteland Township, Chester County, PA**

Dear Mr. Smith:

On behalf of Sunoco Pipeline L.P. (SPLP), please accept the enclosed revised drawings and information as a request for a major modification to the referenced Chapter 102 permit and minor modification to the Chapter 105 permit. This modification is being submitted to authorize a change in installation method for the 20-inch diameter pipeline from a Horizontal Directional Drill (HDD) to an open cut installation measuring approximately 1,269 feet and a direct pipe bore measuring approximately 816 feet that goes under the Exton Bypass (State Route 30), the AMTRAK (American Track National Railroad Passenger Corporation), Norfolk Southern Railroad, and wetland WL-K21.

During installation of the permitted 16-inch HDD through this area, two inadvertent returns (IRs) occurred and subsidence features appeared near an existing 8-inch line. These events required the implementation of corrective actions during an extended period of work in this area. As a result, SPLP has elected to modify the construction method for the 20-inch pipeline through this area and has prepared a plan of construction for the pipeline to be primarily installed using an open cut trenching method with the section of pipeline beneath the Exton Bypass, railroads, and wetland WL-K21 to be installed by a Direct Pipe Bore. These modified construction methods will minimize, to the greatest extent possible, potential IR impacts and subsidence concerns.

While the requested permit modification involves a method change from an HDD to a direct pipe bore under WL-K21, it does not increase the permanent impacts to waters of the Commonwealth, as set forth in the original Chapter 105 authorization.

Tetra Tech, Inc.
661 Andersen Drive, Suite 200, Pittsburgh, PA 15220
Tel 412-921-7090 Fax 412-921-4040 tetratech.com

Mr. Chris Smith
Department of Environmental Protection
May 13, 2019

In accordance with the Chapter 102 major permit amendment requirements, the following information is provided for your information/review and files:

- Preface I-Chester County Conservation District Application
- 1 – Notice of Intent Checklist
- 2 – Notice of Intent Application
- 3 – Erosion and Sediment Control Plan
- 4 – Act 14 Notifications
- 5 – Act 167 Verification Report
- 6 – PNDI Update
- 7 – Site Restoration and Post Construction Stormwater Management Plan
- 9 – NOVs
- 10 – Aquatic Resource Report

Enclosed are two (2) hard copies of the modification request to facilitate your review. The enclosed fee of $900 is for the processing of a Chapter 102 major amendment. Please note that the Chester County Conservation District will also be provided a copy of this request and attachments.

SPLP appreciates your timely review of this modification request. Should you have questions regarding this correspondence, please do not hesitate to contact me at 412-921-8163 or via e-mail at Robert.Simcik@tetratech.com.

Sincerely,

Robert F. Simcik, P.E.
Project Manager
Tetra Tech, Inc.

RFS/clm

Enclosures: 1 original, 1 copy

cc: File 212IC-PB-00387
J. Hohenstein, PA DEP Waterways and Wetlands Program
J. Sofranko, Chester County Conservation District
M. Gordon, Sunoco Pipeline L.P.
C. Embry, Sunoco Pipeline L.P.
M. Styles, Sunoco Pipeline L.P.
L. Gremminger, Energy Transfer
B. Schaeffer, Tetra Tech

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# PREFACE I: CONSERVATION DISTRICT APPLICATIONS, FEES, AND CHECKS

# Chester County Conservation District

688 Unionville Road, Suite 200, Kennett Square, PA 19348-1704
Phone: (610) 925-4920 | Fax: 610-925-4925 | chesco.org/conservation

## APPLICATION FOR DISTRICT SERVICES

**Pages 1 and 2 must be submitted with project | Page 1 must be signed by both parties | Update with each submission | Only folded plans will be accepted.**

**Submission Type:**

- ☐ New
- ☐ Additional Information
- ☐ 2nd Review
- ☐ 3rd Review
- ☑ Major Amendment
- ☐ Minor Amendment
- ☐ Renewal
- ☐ Other

**Project Type:**

- ☑ Residential/Industrial/ Commercial/Institutional
  ___# of Lots (if Residential)
- ☐ Single Residential
- ☐ Small Agricultural
- ☐ Medium Agricultural
- ☐ Large Agricultural
- ☐ Chapter 105
- ☐ Pond/Stream Work

**Acreage:**

Total Project Acreage: 3.99
Disturbed Acreage: 3.99

- ☑ 1 acre & above disturbed:
  - ☐ General NPDES Permit
  - ☐ Individual NPDES Permit
- ☐ less than 1 acre disturbed:
  NOTE: Adequate letter issued.

**Project Information:**

NPDES# (if known)_____

Project Name Sunoco Pennsylvania Pipeline Project
Site Location 250' west of the interestion of Lisa Drive and Michele Drive
Municipality West Whiteland Tax Parcel ID See Attachment A
Receiving Stream Name UNT to Valley Creek Designation (HQ, EV, etc.) CWF

☑ Tier II Category (√ check all that apply) [Note: Does not apply to <1 acre sites.]
☐ 9% of more slopes ☐ deficient infiltration of 2-year storm ☑ more than 25% total area disturbance
☐ less than 150 foot buffer ☐ adjacent property discharge

☐ Other DEP Programs (√ check all that apply)
☐ Act 2 ☐ General Permit (Chapter 105) ☐ Joint Permit 401/404 ☐ Solid Waste
☐ Other:_____

- ☐ Emergency Review Application attached (see website for form)
- ☐ BMP Incentive Application attached (see website for form)

**Applicant Info:**

Name Matthew Gordon Firm Sunoco Pipeline L.P.
Address 535 Fritztown Road, Sinking Spring
Email matthew.gordon@energytransfer.com Phone 610-670-3200

**Plan Designer/Engineer Info:**

Name Robert Simcik Firm Tetra Tech, Inc.
Address 661 Andersen Drive, Foster Plaza 7 Suite 200, Pittsburgh, PA 15220
Email Robert.simcik@tetratech.com Phone 412-921-8163

Fees and plans showing the required information are to be submitted with this application. Any additional plans or information required by the Chester County Conservation District should be submitted promptly. The undersigned agrees to comply with all of the requirements of TITLE 25, CHAPTER 102, EROSION AND SEDIMENTATION CONTROL RULES AND REGULATIONS as set forth by the Pennsylvania Department of Environmental Protection, and further agrees to obtain all necessary permits in connection with the above referenced project. District Service Fees are non-refundable.

Applicant Signature _____ Plan Designer/Engineer Signature _____

# DISTRICT SERVICE / NPDES PERMIT FEE SCHEDULE

**Pages 1 and 2 must be submitted with project | Page 1 must be signed by both parties | Update with each submission | Only folded plans will be accepted.**

## NEW PROJECTS & MAJOR AMENDMENTS

**PLEASE NOTE: Please complete ALL fields in row - including entering the District Service Fee amount. An included checkmark alone is not sufficient.**

**Residential/Industrial/Commercial/Institutional**

| √ Checkmark if Included | Disturbed Project Acres | Enter # Disturbed Acres | Fee | Enter District Service Fee Remitted |
|---|---|---|---|---|
| ☐ | <1 acre [Note: Tier II fee waived] | | $1,125.00 | $ |
| ☐ | 1 - 2 acres | | $1,500.00 | $ |
| ☑ | 2.1 - 5 acres | 3.99 | $2,250.00 | $ 2,250.00 |
| ☐ | 5.1 - 10 acres | | $3,000.00 | $ |
| ☐ | 10.1 - 15 acres | | $4,000.00 | $ |
| ☐ | 15.1 - 20 acres | | $5,000.00 | $ |
| ☐ | Each add'l nearest whole acre above 20 | | X $250.00 | $ |
| ☐ | Oil&Gas add'l nearest whole acre above 20 | | X $450.00 | $ |

**Single Residential Unit-**Single family home built on an individual lot (not part of a larger development)

| √ if Included | Unit | Fee | Enter District Service Fee Remitted |
|---|---|---|---|
| ☐ | 1 unit (<1 acre) [Note: Tier II fee waived] | $225.00 | $ |
| ☐ | 1 unit ($1^{+}$ acre) [Use Residential/Industrial/Com./Inst. above] | | |

**Agricultural Building Projects**

| √ if Included | Size | Fee | Enter District Service Fee Remitted |
|---|---|---|---|
| ☐ | Small (<1 acre) [Note: Tier II fee waived] | $150.00 | $ |
| ☐ | Medium (1 – 5 acres) [Note: Tier II fee applies, if appropriate] | $1,500.00 | $ |
| ☐ | Large (>5 acres) [Use Res/Ind/Com/Inst category above] | | |

**Tier II -** Only applicable to NPDES Permit – 1+ acre disturbed

| √ if Included | Category | Fee | Enter Tier II Fee Remitted |
|---|---|---|---|
| ☑ | Check all that apply on page 1 | $1,000.00 | $ 1,000.00 |

**NPDES Permit –** 1+ acre disturbed

| √ if Included | Category | Fee | Enter NPDES Fee Remitted |
|---|---|---|---|
| ☐ | General Permit | $500.00 | $ |
| ☐ | Individual Permit | $1,500.00 | $ |

**NPDES Disturbed Acreage –** 1+ acre disturbed

| √ if Included | Enter # Acres (rounded to nearest whole acre) Multiply by Fee | Fee | Enter Disturbed Acreage Fee Remitted |
|---|---|---|---|
| ☐ | | X $100.00 | $ |

**Chapter 105 / Pond/Stream Work**

| √ if Included | Type | Fee | Enter District Service Fee Remitted |
|---|---|---|---|
| ☐ | Chapter 105 / Pond/Stream Work | $250.00 | $ |

## MISCELLANEOUS

**Minor Amendment**

| √ if Included | Category | Fee | Enter District Service Fee Remitted |
|---|---|---|---|
| ☐ | General Permit | $600.00 | $ |
| ☐ | Individual Permit | $1,200.00 | $ |

**2nd & 3rd Reviews**

| √ if Included | Category | Original Service District Fee | Enter District Service Fee Remitted |
|---|---|---|---|
| ☐ | 2nd Review: 25% of Original District Service Fee | $ ÷ 4 | $ |
| ☐ | 3rd Review: 25% of Original District Service Fee | $ ÷ 4 | $ |

**NPDES Permit Renewal*** [*Note: Permit renewal must include both District Service Fee **and** NPDES Permit Fee.]

| √ Both for Renewal | Category | Fee | Enter District Service Fee Remitted |
|---|---|---|---|
| ☐ | 25% of Original Service District Fee* | Original District Service Fee: $ ÷ 4 | $ |
| ☐ | NPDES Permit Fee* | General Permit: $500.00<br>Individual Permit: $1,500.00 | Enter NPDES Fee Remitted<br>$ |

**Other**

| √ if Included | Type | Fee | Enter District Service Fee Remitted |
|---|---|---|---|
| ☐ | Plan Stamping | $75.00 | $ |
| ☐ | Revision | $ | $ |
| ☐ | | $ | $ |

### Make Checks Payable to:

- District Service Fee – "Chester County Conservation District"
- Tier II Fee – "Chester County Conservation District"
  NOTE: Tier II fee may be combined with District Service fee on one check or separate checks are acceptable.
- NPDES Fee – "Chester County Conservation District Clean Water Fund"
- Disturbed Acreage Fee – "Commonwealth of PA Clean Water Fund"

# 1. NOTICE OF INTENT CHECKLIST

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF WATER PROGRAMS
OFFICE OF OIL AND GAS MANAGEMENT

# NOTICE OF INTENT (NOI) ADMINISTRATIVE COMPLETENESS CHECKLIST EROSION AND SEDIMENT CONTROL GENERAL PERMIT (ESCGP-3) FOR EARTH DISTURBANCE ASSOCIATED WITH OIL AND GAS EXPLORATION, PRODUCTION, PROCESSING, OR TREATMENT OPERATIONS OR TRANSMISSION FACILITIES

**Please check the following list to make sure that you have included all the required information. Place a check mark in the column provided for all items completed and/or provided. Failure to provide all of the requested information will delay the processing of the application, may preclude the use of the Expedited Review, and may result in the application being placed ON HOLD with NO ACTION, or being considered withdrawn and the application file closed.**

**THIS CHECKLIST MUST BE COMPLETED AND ENCLOSED WITH YOUR GENERAL PERMIT NOI**

**✓CHECKLIST FOR EROSION AND SEDIMENT CONTROL GENERAL PERMIT NOI**

☐ **NEW NOI** ☐ **RENEWAL** ☐ **PHASED** ☒ **MAJOR MODIFICATION**

**If a Renewal, Phased or Major Modification, identify ESCGP Authorization # ESG0100015001**

Minor revisions are not required to be submitted to the regional office for review.

**CLIENT NAME Sunoco Pipeline LP**

**PROJECT and PHASE NAME Pennsylvania Pipeline Project (If applicable)**

| | | | | Applicant Check ✓ if Included | Official Use Only |
|---|---|---|---|---|---|
| **1.** | Fully completed, properly signed and notarized Notice of Intent form (1 original and 2 copies for paper application).<br>(Not required for subsequent phases) | | | ☒ | ☐ |
| **2.** | Is expedited review requested?<br>If yes, complete items (a) and (b) below. If no, proceed to section 3 of this checklist. | | | ☐ Yes | ☒ No |
| | a. Expedited review eligibility has been completed and determined. | Location: _____ | Page: _____ | ☐ | ☐ |
| | b. Expedited review process related questions have fully been answered. | Location: _____ | Page: _____ | ☐ | ☐ |
| **3.** | Complete **Erosion and Sediment Control (E&S) Plans.** (1 original and 2 copies for paper application)<br>NOTE: Identify locations as Drawings (D), Narrative (N). (Identify Not Applicable as "N/A")<br>The E & S Plan must contain, at a minimum, the following: | | | ☒ Yes | ☐ No |
| | **a. Topographic Features**<br>Existing topographic features of the project site and immediate surrounding area. Include the project area outlined on an 8 ½" x 11" photocopy of the U.S.G.S. topo map area. The map must include the name of the appropriate 1:24,000 scale U.S.G.S. 7.5 minute series quadrangle map where the project is located. | Location: Section 3; N | Page: Attachment 1 | ☒ | ☐ |
| | **b. Soil Characteristics**<br>Types, depth, slope, locations and limitations of the soils including methods for resolution of all soil limitations. | Location: Section 3; N | Page: Attachment 5 | ☒ | ☐ |
| | **c. Earth Disturbance Activity**<br>The characteristics of the earth disturbance activity, including the past, present and proposed land uses and proposed alteration to the project site. | Location: Section 3; N | Page: 1-1 | ☒ | ☐ |
| | **d. Project Site Runoff**<br>The Volume and rate of runoff from the project site and its upstream watershed area. Runoff impact analysis on downstream watercourse, design computations for protective measures if applicable, discharge analysis for non-surface water discharges. | Location: Section 3; N | Page: 2-3 | ☒ | ☐ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | e. | **Surface Water Classification**<br>The Location of all surface waters of this Commonwealth which may receive runoff within or from the project site including their classification under Chapter 93 and status as siltation-impaired water. All streams, springs, wetlands, and floodways within, adjacent or receiving water from the project site must be shown on drawings with proper identification of special protection waters and existing uses. | Location: Section 3; N & D | Page: Table 1, Attachment 2 | ☒ | ☐ |
| | f. | **BMP Description Narrative**<br>A narrative description of the location and type of perimeter and onsite BMPs used before, during, and after the earth disturbance activity. | Location: Section 3; N | Page: 3-6 | ☒ | ☐ |
| | g. | **BMP Installation Sequence Narrative**<br>A sequence of BMP installation and removal in relation to the scheduling of earth disturbance activities, prior to, during and after earth disturbance activities that ensures proper functioning of BMPs. | Location: Section 3; N & D | Page: 3-7, Attachment 2 | ☒ | ☐ |
| | h. | **Supporting Calculations and Measurements**<br>All BMP design calculations and information must be attached with the E&S plans. | Location: Section 3, N | Page: Attachment 4 | ☒ | ☐ |
| | i. | **Plan Drawings**<br>Plan drawings must include locations of proposed BMPs and a legend for all symbols used on the drawing. Construction details, notes, and specifications must be included to explain the drawings. | Location: Section 3; D | Page: Attachment 2 | ☒ | ☐ |
| | j. | **Maintenance Program**<br>A maintenance program which provides for the operation and maintenance of BMPs and the inspection of BMPs on a weekly basis and after each stormwater event, including the repair or replacement of BMPs to ensure effective and efficient operation. The program must provide for completion of a written report documenting each inspection and all BMP repair, or replacement and maintenance activities. | Location: Section 3; N | Page: 3-22 | ☒ | ☐ |
| | k. | **Material Recycling and Disposal**<br>Procedures which ensure that the proper measures for the recycling or disposal of materials associated with or from the project site will be undertaken in accordance with this title. | Location: Section 3; N | Page: 3-19 | ☒ | ☐ |
| | l. | **Naturally Occurring Geologic Formations and Soil Conditions**<br>Identify naturally occurring geologic formations or soil conditions that may have the potential to cause pollution during earth disturbance activities and include the locations on plan drawings.<br>Include BMPs to avoid or minimize potential pollution and its impacts from the formations. If the applicant suspects substantial possibility of potential slope failure, include a geotechnical report prepared by a geotechnical engineer. | Location: Section 3; N | Page: Attachment 13 | ☒ | ☐ |
| | m. | **Thermal Impacts**<br>Identification of potential thermal impacts to surface waters of this Commonwealth from the earth disturbance activity including BMPs to avoid, minimize or mitigate potential pollution from thermal impacts. | Location: Section 3; N | Page: 3-20 | ☒ | ☐ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | n. | **E&S Plan and PCSM/SR Plan Consistency**<br>The E&S Plan shall be planned, designed and implemented to be consistent with the PCSM Plan under § 102.8. Unless otherwise approved by the Department, the E&S Plan must be separate from the PCSM Plan and labeled "E&S" or "Erosion and Sediment Control Plan" and be the final plan for construction. | Location: Section 3; D | Page: Attachment 2 | ☒ | ☐ |
| | o. | **Riparian Forest Buffers**<br>Identification of existing and proposed riparian forest buffers should be included on the plan drawings if incorporated into the project site. | Location: Section 3; N | Page: 3-21 | ☒ | ☐ |
| | p. | **Antidegradation Requirements**<br>Satisfy antidegradation implementation requirements for special protection water and siltation-impaired waters including evaluation of nondischarge alternatives and ABACT. | Location: Section 3; N | Page: 3-24 | ☒ | ☐ |
| 4. | | **Permit NOI Filing Fees** of $500 to the appropriate Clean Water Fund plus $100/Acre of earth disturbance payable to the Commonwealth of PA Clean Water Fund ($500 filing fee not required for subsequent phases) is required. For NOIs submitted to delegated county conservation districts, the administrative fee of $500 must be paid to the conservation district and disturbed acreage fee to the Commonwealth of PA (two checks). | Location: Provided separate from D & N | Page: _____ | ☒ | ☐ |
| 5. | | **Municipal Notification:** (3 copies) Not required for subsequence phases. | | | ☐ | ☐ |
| | a. | Act 14 Municipal Notifications to the local municipality and county governments that specify that the application is for Erosion and Sediment Control General Permit for Earth Disturbance Associated with Oil and Gas Activities.<br>A "sample" notification letter is provided as Attachment C of the instructions.<br>**Proof or Receipt** of municipal notifications: copies of certified mail receipts, proof of deliver from a commercial carrier or acknowledgment letters from the local municipality and county government. | Location: Provided separate from D & N | Page: Section 4 | ☒ | ☐ |
| | b. | Pennsylvania Inventory of Historical Places and the National Register of Historical Places: When conducting earth disturbance activities, the permittee shall protect archaeological specimens and historic resources in accordance with applicable State and Federal laws. For permitted activities on lands of the Allegheny National Forest (ANF) or other federal lands, the permittee should coordinate with the appropriate ANF Ranger or other appropriate federal agency on the protection of historic properties. | Location: Provided separate from D & N | Page: Section 6 | ☒ | ☐ |
| 6. | | **Pennsylvania Natural Heritage Program (PNHP).** Include PNDI receipt, PNDI clearance and other information depending on the permit application option. (3 copies for paper application). | Location: Provided separate from D & N | Page: Section 6 | ☒ | ☐ |
| 7. | | **Complete PCSM/SR Plans.** (1 Original, 2 copies)<br>NOTE: Identify location(s) as Drawing (D), Narrative (N). (Identify Not Applicable as "N/A".)<br>The PCSM/SR Plan must contain, at a minimum, the following: | | | ☒ | ☐ |
| | a. | **Topographic Features**<br>The existing topographic features of the project site and immediate surrounding area must be shown plan drawings. The name of the USGS quadrangle map must be included. | Location: Section 7; D | Page: Attachment 1 | ☒ | ☐ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | b. | **Characteristics of Naturally Occurring Geologic Formations and Soil Conditions**<br>The types, depth, slope, locations and limitations of the soils and geologic formations. | Location: Section 7; N | Page: 3, Attachment 2 | ☒ | ☐ |
| | c. | **Earth Disturbance Activity Characterization**<br>The characteristics of the project site, including the past, present and proposed land uses Limit of Disturbance (LOD), areas of cuts and fill, proposed impervious areas, locations of roads, proposed contours of project area and the proposed alteration of the project site. | Location: Section 7; N | Page: 2 | ☒ | ☐ |
| | d. | **Net Change in Volume and Rate of Runoff**<br>An identification of the net change in volume and rate of stormwater from preconstruction hydrology to post construction hydrology for the entire project site and each drainage area. Include pre-development and post-development drainage area map. Post-development drainage area map must show Point of Discharge(s) (PODs) from PCSM BMPs. | Location: Section 7; N | Page: 13 | ☒ | ☐ |
| | e. | **Surface Water Classification**<br>An identification and location of surface waters of this Commonwealth, which may receive runoff within or from the project site and their classification under Chapter 93. | Location: Section 7; N & D | Page: 4 | ☒ | ☐ |
| | f. | **BMP Description Narrative**<br>A written description of the location and type of PCSM/Site Restoration BMPs including construction details for permanent stormwater BMPs including permanent stabilization specifications and locations. | Location: Section 7; N | Page: 5, 16 | ☒ | ☐ |
| | g. | **BMP Installation Sequence Narrative**<br>A sequence of PCSM/Site Restoration BMP implementation or installation in relation to earth disturbance activities of the project site and a schedule of inspections for critical stages of PCSM/Site Restoration BMP installation. | Location: Section 7; N | Page: 5, 16 | ☒ | ☐ |
| | h. | **Supporting calculations**<br>All design information and calculations must be included with the PCSM/SR plan. Include verification of PCSM/SR plan consistency with the Act 167 plan, if a current and DEP approved Act 167 plan exists. Include summary of bio-infiltration BMPs used for the project using Attachment E of the NOI instructions. | Location: N/A | Page: | ☐ | ☐ |
| | i. | **Plan Drawings**<br>The locations of BMPs with tributaries must be shown on the drawings. Notes, specifications, any constructions details, and any other supporting information needed to explain the drawings must also be included. | Location: N/A | Page: | ☐ | ☐ |
| | j. | **Long Term Operation and Maintenance Schedule**<br>A long-term operation and maintenance schedule, which provides for inspection of PCSM/Site Restoration BMPs, including the repair, replacement or other routine maintenance of the PCSM/Site Restoration BMPs to ensure proper function and operation. The program must provide for completion of a written report documenting each inspection and all BMP repair and maintenance activities and how access to the PCSM/Site Restoration BMPs will be provided. | Location: N/A | Page: | ☐ | ☐ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | k. | **Material Recycling and Disposal**<br>Procedures which ensure that the proper measures for recycling or disposal of materials associated with or from the PCSM/Site Restoration BMPs are in accordance with Department laws, regulations and requirements. | Location: Section 7; N | Page: 16 | ☒ | ☐ |
| | l. | **Addressing Impacts from Naturally Occurring Geologic Formations and Soil Conditions**<br>An identification of naturally occurring geologic formations or soil conditions that may have the potential to cause pollution after earth disturbance activities are completed and PCSM/Site Restoration BMPs are operational and development of a management plan to avoid or minimize potential pollution and its impacts. | Location: Section 7; N | Page: 3 | ☒ | ☐ |
| | m. | **Thermal Impacts**<br>An Identification of potential thermal impacts from post construction stormwater to surface water of this Commonwealth including BMPs to avoid, minimize or mitigate potential thermal pollution from thermal impacts. | Location: Section 7; N | Page: 11,16 | ☒ | ☐ |
| | n. | **Riparian Forest Buffer Management Plan**<br>A riparian forest buffer management plan when required under § 102.14. | Location: Section 7; N | Page: 12,16 | ☒ | ☐ |
| | o. | **Antidegradation Requirements**<br>A demonstration of compliance with antidegradation implementation requirements including evaluation of nondischarge alternatives and ABACT for where activities will be conducted in special protection waters or siltation impaired waters. | Location: Section 7; N | Page: 13,17 | ☒ | ☐ |
| 8. | **PCSM Plan Stormwater Analysis**<br>Do the regulated activities require site restoration or reclamation?<br>If Yes, skip to Item 9.<br>If No, provide the following information: | | | ☒ Yes ☐ No | ☒ | ☐ |
| | a. | **Site Characterization and Assessment**<br>Predevelopment site characterization and assessment of soil and geology including infiltration and geotechnical studies that identify location and depths of test sites and methods used. | Location: Section 7; N | Page: 2 | ☒ | ☐ |
| | b. | **Volume Reduction and Water Quality Requirements**<br>Analysis demonstrating that the PCSM BMPs will meet the volume reduction and water quality requirement specified in an applicable Department approved and current Act 167 stormwater management watershed plan; **or** manage the net change for storms up to and including the 2-year/24-hour storm event when compared to preconstruction runoff volume and water quality. | Location: N/A | Page: _____ | ☐ | ☐ |
| | c. | **Rate Requirements**<br>Analyses demonstrating that the PCSM BMPs will meet the rate requirements specified in an applicable Department approved and current Act 167 stormwater management watershed plan; **or** manage the net change in peak rate for the 2-, 10-, 50-, and 100-year/24-hour storm event in a manner not to exceed preconstruction rates. | Location: N/A | Page: _____ | ☐ | ☐ |
| | d. | **Calculation Methodologies**<br>Identification of the methodologies for calculating total runoff volume and peak rate of runoff and provide supporting documentation and calculations. | Location: N/A | Page: _____ | ☐ | ☐ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | e. | **Construction Techniques**<br>Identification of construction techniques or special consideration to address soil and geologic limitations. | Location: N/A | Page: _____ | ☐ | ☐ |
| | f. | **Antidegradation Requirements**<br>Demonstration of compliance with antidegradation implementation requirements including evaluation of nondischarge alternatives and ABACT for where activities will be conducted in special protection waters or siltation impaired waters. | Location: Section 7; N | Page: 14 | ☒ | ☐ |
| **9.** | **Phased Projects**<br>Is the activity being conducted as a phased project? ☐ Yes ☒ No<br>If yes, all of the following must be completed: | | | | ☐ | ☐ |
| | a. | Initial Phase - Is the master plan included? ☐ Yes ☐ No | | | | |
| | b. | Subsequent Phase(s) – Is(are) the subsequent phase(s) identified in the master plan? ☐ Yes ☐ No | | | | |
| **10.** | **Preparedness, Prevention and Contingency (PPC) Plan**<br>Will fuels, chemicals, solvents, other hazardous materials be used or stored on site during earth disturbance activities? ☒ Yes ☐ No<br>If yes, a PPC Plan must be maintained on the site during earth disturbance. | | | | ☐ | ☐ |
| **11.** | **Subsequent Phase Certification for Expedited Reviews**<br>Is the activity being conducted as a phased project? ☐ Yes ☒ No<br>Is an expedited review being requested for subsequent phase? ☐ Yes ☒ No<br>If yes, all of the following must be completed: | | | | ☐ | ☐ |

***I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plan are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.***

| | |
|---|---|
| Signature | Professional Seal |
| Company | |
| Address | |
| Phone | |
| Most Recent DEP Training Attended Location _____ Date _____ | |
| e-Mail Address | |

**EXPEDITED REVIEW PROCESS**

In addition to the certification required above, applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plan developed and sealed by a licensed professional engineer, landscape architect, surveyor or professional geologist. The plans shall contain the following certification:

***I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plan and Post Construction BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.***

| | | | | |
|---|---|---|---|---|
| **12.** | **Permit Renewal**<br>Is a permit renewal being requested? ☐ Yes ☒ No<br>If yes, all of the following must be completed: | | ☐ | ☐ |
| | a. | Administratively complete, signed, and notarized Notice of Intent Form, including Items 1-8.<br>(1 signed original and 2 copies of the NOI/application for paper application) | ☐ | ☐ |
| | b. | Permit filing fee of $500 payable to the appropriate clean water fund plus $100/Acre of earth disturbance payable to the Commonwealth of PA Clean Water Fund. | ☐ | ☐ |

# 2. NOTICE OF INTENT APPLICATION

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF WATER PROGRAMS
OFFICE OF OIL AND GAS MANAGEMENT

| OFFICIAL USE ONLY |
|---|
| ID # |
| Date Received |
| AUTH |
| SITE |
| CLNT |
| APS |
| Fee |
| Check No. |
| Check Date |

# NOTICE OF INTENT (NOI) FOR COVERAGE UNDER THE EROSION AND SEDIMENT CONTROL GENERAL PERMIT (ESCGP-3) FOR EARTH DISTURBANCE ASSOCIATED WITH OIL AND GAS EXPLORATION, PRODUCTION, PROCESSING, OR TREATMENT OPERATIONS OR TRANSMISSION FACILITIES

**READ THE INSTRUCTIONS PROVIDED IN THIS PERMIT APPLICATION PACKAGE BEFORE COMPLETING THIS FORM. PLEASE PRINT OR TYPE INFORMATION IN BLACK OR BLUE INK.**

## SECTION A. APPLICATION TYPE

**Check one:**

**NEW** ☐ **RENEWAL** ☐ **MAJOR MODIFICATIONS (Provide ESCGP number)** ☒ ESG0100015001

**PHASED** ☐ (check only if applicable; *note: Most projects are not submitted as phased projects*)

**Check one: EXPEDITED** ☐ **STANDARD** ☒

If an Expedited Review Process being requested, be advised that the Expedited Review is not available for all projects. Refer to Section D - Expedited Review Process of the ESCGP-3 NOI Instructions to determine if the project is eligible.

## SECTION B. CLIENT INFORMATION

| Applicant's Last Name (If applicable) | First Name | MI | Telephone No. 610-670-3200 |
|---|---|---|---|
| Gordon | Matthew | L | |

| Organization Name or Registered Fictitious Name | Telephone No. |
|---|---|
| Sunoco Pipeline, L.P. | |

DEP Client ID No.

| Headquarters Mailing Address | City | State | ZIP Code |
|---|---|---|---|
| 535 Fritztown Road | Sinking Spring | PA | 19608 |

Email Address matthew.gordon@energytransfer.com

| Co-Applicant's Last Name (If applicable) | First Name | MI | Telephone No. (920) 539-0872 |
|---|---|---|---|
| Fye | Jamye | | |

| Organization Name or Registered Fictitious Name | Telephone No. (920) 924-4300 |
|---|---|
| Michels Pipeline, A Division of Michels Corporation | |

| Address | City | State | ZIP Code |
|---|---|---|---|
| 817 Main Street | Brownsville | WI | 53006 |

Email Address jfye@michels.us

| SECTION C. SITE INFORMATION | | | | | |
|---|---|---|---|---|---|
| Is there an existing ESCGP associated with this site? ☒ Yes ☐ No If yes, Permit No. ESG0100015001 | | | | | |
| Has a well permit application been submitted for this site? ☐ Yes ☒ No If yes, Permit No. _____<br>Does this site have a 911 address? ☐ Yes ☒ No If yes, provide site location address. | | | | | |
| Site Name<br>Pennsylvania Pipeline Project | | | | | |
| Site Location<br>Chester and Delaware Counties | | Site No. (if another permit has been issued for the site) | | | |
| Site Location – City<br>Elverson Township, Chester County to Upper Chichester Township, Delaware County | | | State<br>PA | ZIP Code | |
| Detailed Written Directions to Site<br>See Directions in Attachment 1 | | | | | |
| Primary Location | County<br>Chester and Delaware | Municipality<br>See Municipal Table in Attachment 2. The HDD 620 Major Modification is located in Middletown Township, Delaware County.The HDD 280 Major Modification is located in Upper Uwchlan Township, Chester County. The HDD 400 Major Modification is located in West Whiteland Township, Chester County. | City<br>☐ | Boro<br>☒ | Twp.<br>☒ |

| SECTION D. EXPEDITED REVIEW | |
|---|---|
| **I. Expedited Review Eligibility** | |
| 1. Is any part of the project in the watershed of a surface water with an existing or designated use of exceptional value or high quality pursuant to Chapter 93 (relating to water quality standards), in an exceptional value wetland in accordance with 25 Pa. Code § 105.17, or in the watershed of an impaired surface water where the cause of the impairment is identified as siltation? | ☒ Yes ☐ No |
| 2. Will the project in which the well pad will be constructed be in or on a floodplain? | ☐ Yes ☒ No |
| 3. Is any earth disturbance located or proposed to be located on land known to be contaminated by the release of regulated substances as defined in Section 103 of Act 2, 35 P.S. § 6026.103? | ☐ Yes ☒ No |
| 4. Will naturally occurring geologic formations or soil conditions provide hazards to the project or surrounding environment or have the potential to cause or contribute to pollution when disturbed? | ☒ Yes ☐ No |
| 5. Do any unresolved non-compliance issues exist with the applicant or the facility? | ☒ Yes ☐ No |
| 6. Is the project a transmission project? | ☒ Yes ☐ No |

| | |
|---|---|
| **If yes to any of the above questions the project is not eligible for Expedited Review; If the project is eligible for Expedited Review, all the following items must be completed.** | |
| **II. Expedited Review Process** | |
| 1. Is the technically and administratively complete and accurate NOI package prepared and certified by a licensed professional? | ☐ Yes ☐ No |
| 2. Are E&S and PCSM/Site Restoration Plan drawings and narrative prepared and sealed by a licensed professional? *(Include interim restoration details when needed)* | ☐ Yes ☐ No |
| 3. Include a Resource Delineation Report and answer the following questions: (If the answer to question a. is "Yes" then skip to #4. If the answer to a. is "No" the applicant must answer "Yes" to at least one of the questions, b. through d. to be eligible for expedited review.) | |
| a. Were all wetland resources delineated during the growing season? | ☐ Yes ☐ No |
| b. If not during the growing season, was a follow-up visit conducted during the growing season to verify/adjust boundaries and look for potentially missed resources? | ☐ Yes ☐ No |
| c. Was a quality assurance field review conducted at a later date by an independent qualified wetland professional to verify boundaries and look for potentially missed resources? (If yes, attach Quality Assurance Field Review Report) | ☐ Yes ☐ No |
| d. Was a Jurisdictional Determination (JD) or Preliminary JD conducted by the US Army Corps of Engineers on the whole project? (If yes, attach Preliminary or Jurisdictional Determination Report) | ☐ Yes ☐ No |
| 4. If applicable, have you included PNDI clearance letters or other documentation from applicable resource agencies? | ☐ Yes ☐ No |
| 5. If the project site contains, is along, or within 100 feet of a river, stream, creek, lake, pond or reservoir, will you establish new or preserve existing riparian forest buffer at least 100 feet in width between the top of streambank or normal pool elevation of a lake, pond or reservoir and areas of earth disturbances.<br>If no, will a waiver be obtained? ☐ Yes ☐ No | ☐ Yes ☐ No |
| 6. Name of Licensed Professional<br>Company | |
| Address | |
| Phone | |

| SECTION E. PROJECT INFORMATION | | | |
|---|---|---|---|
| 1. Total Project Area/Project Site (Ac): | 287 | Total Disturbed Area (Ac): | 287 |
| Increased disturbed acreage *(for permit modification only)* | | | 3.99 |
| Fee: ***(For additional information regarding fees, refer to NOI Instructions #3 Permit NOI Filing Fees.)*** | | | $ 900 |
| 2. Project Name: Pennsylviana Pipeline Project | | | |

3. Project Type (Check all that apply)

- ☐ Oil/Gas Well [1]
- ☐ Gathering Facility
- ☐ Treatment Facility
- ☐ Compressor Station
- ☒ Pipeline
- ☐ Storage Field Facility
- ☐ Other
- ☐ Transmission Facility
- ☐ Processing Facility
- ☐ Well Development Impoundment
- ☒ Non-FERC regulated Transmission Facility
- ☐ Ground/Surface Water Withdrawal Site

[1] If Oil/Gas Well; is the well conventional or unconventional? ☐ Conventional ☐ Unconventional

Project Description

Sunoco Pipeline, L.P. (SPLP) proposes to construct and operate the Pennsylvania Pipeline Project that would expand existing pipeline systems to provide natural gas liquid (NGL) transmission service. The project involves the installation of approximately two parallel pipelines within a 306.8-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, Pennsylvania (PA) to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306.8 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the 20-inch line for approximately 255.8 miles. The majority of the new ROW will be co-located adjacent to existing utility corridors, including approximately 230 miles of pipeline that will be co-located in the existing SPLP Mariner East pipeline system. The 20-inch pipeline will be installed first, followed by the 16-inch line. Any temporary stabilization required will be implemented in accordance with the project's Erosion and Sediment (E&S) Plans. For a conventional lay, the pipelines would be installed within the same disturbance to the maximum extent practicable. For safety purposes, the installation would be staggered by what is estimated to be no more than 60 days. At some HDDs with longer drills, however, the time period between installation of the two pipelines may exceed 60 days. Any temporary stabilization required would be implemented in accordance with project's E&S Plans. Any permanent or temporary impacts associated with the second pipeline installation will be similar to the first installation, as described in more detail in the Application and the balance of these responses.

Construction activities will involve clearing and grubbing, trenching, pipe installation, site restoration, and access road construction/improvement. Erosion and sediment controls will be in place during earth disturbance activities. Following completion of pipeline installation, the area will be returned to the general grade present prior to pipeline installation in order to maintain preconstruction elevations and drainage patterns. Disturbed areas will be seeded and mulched. Erosion and sedimentation control devices will be maintained until site work is complete and revegetation is successful.

The 620 Major Modification is being requested for a change in the horizontal directional drill (HDD) installation method for the 20-inch and portions of the 16-inch diameter pipelines to a conventional open trench construction through Wetland WL-I1 and Stream S-I2, conventional auger bore under Glen Riddle Road, and a direct pipe under Riddlewood Drive and the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad.

The 280 Major Modification consists of a change in the route and installation method for the 16 and 20-inch diameter pipeline previously permitted as Horizontal Directional Drill (HDD) 280. The permit request is to convert the installation method of both the 16 and 20-inch diameter pipelines from a HDD to an open cut installation and one conventional bore. The change in methodology is to minimize impacts and avoid potential future growth requirements of the PA Turnpike 76.

The S3-0400 HDD Major Modification change in installation method for 20-inch diameter pipeline from a HDD to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), AMTRAK (American Track National Railroad Passenger Corporation), Norfolk Southern Railroad, and wetland WL-K21. The remaining 1,269 feet will be installed via open trench installation. The change in installation method will not result in any loss of wetland area, impacts are considered minor and temporary.

The project will be constructed for 35 miles in the PADEP South East Region. The project disturbance by county is as follows:

Chester County: 175 Acres previously approved, Minor Modifications 0.52 (Pending Approval), HDD 280 Major Modification 4.86 Acres (Pending Approval), HDD S3-0400 Major Modification 3.99 acres (Total 185 acres)
Delaware County: 94 Acres previsouly approved, Twin Oaks Pump Station Expansion 2.39 acres, HDD 620 Major Modification 5.32 acres (Pending Approval) (Total 102 acres)
Provide the date of pre-application meeting (if conducted with the Department)

4. Provide the latitude and longitude coordinates for the center of the project. The coordinates should be in Decimal degrees and North American Datum 1983. The coordinates must meet the current DEP policy regarding locational accuracy. For linear projects provide the project's termini.

Latitude (DD) 40.1556 Longitude (DD) - 75.8429

Latitude (DD) 39.8445 Longitude (DD) - 75.4186

Horizontal Collection Method: ☐ GPS ☒ Interpolated from U.S.G.S. Topographic Map ☐ DEP's eMAP

5. U.S.G.S. 7.5 min. topographic quadrangle Name Cresson, Hollidaysburg, Frankstown, Williamsburg, Cassville, Entriken, Huntingdon, Butler Knob, Aughwick, Blairs Mills, Blain, Andersonburg, Newburg, Newville, Landisburg, Plainfield, Carlisle, Shermans Dale, Mechanicsburg, Wetzville, Lemoyne, Steelton, Middletown, Elizabethtown, Hershey, Lebanon, Palmyra, Richland, Womelsdorf, Sinking Spring, Terre Hill, Reading, Morgantown, Elverson, and Washington.

(*Include a copy of the project area on the 7.5 min quad map)*

6. Will the project be conducted as a phased permit project? ☐ Yes ☒ No

If Yes, Include Master Site Plan Estimated Timetable for Phased Projects. ☐ Additional sheet(s) attached.

| Phase No. or Name | Description | Total Area | Disturbed Area | Start Date | End Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

7. List existing and previous land use for a minimum of the previous 5 years. Forested/agricultural/rural residential

8. Other Pollutants: Will the stormwater discharge contain pollutional substances other than sediment? ☐ Yes ☒ No

If yes, explain and provide any available quantitative data.

9. Will fuels, chemicals, solvents, other hazardous waste or materials be used or stored on site during earth disturbance activities or will Horizontal Directional Drilling (HDD) activities be conducted?

Yes ☒ No ☐ ***(If yes, Preparedness, Prevention and Contingency (PPC) Plan must be maintained on site during earth disturbance. See NOI Instructions, E.9 PPC Plan Guidance for further information.)***

10. Is the project in the watershed of an impaired surface water where the cause of the impairment is identified as siltation?

Yes ☒ No ☐ ***(If yes, show how the project will not result in a net change in volume, rate or water quality. See section I below, and E.10 of NOI instructions.)***

11. Are there potentially hazardous naturally occurring geological or soil conditions in any portion of the project or surrounding area? Yes ☒ No ☐

If yes, do the potentially hazardous geologic or soil conditions have the potential to cause or contribute to pollution as a result of the proposed earth disturbance activities?

If no, provide an explanation.

If yes, Geologic Hazard Mitigation Plan must be attached and explain where in this application details are provided.

12. Has the Act 14 Municipal Notification and proof of receipt of notification been attached to the NOI?

Yes ☒ No ☐ ***(If not, the NOI is not complete, see E.12 and #4 Municipal Notification in the NOI Instructions for additional guidance.)***

13. Has the PNDI receipt been attached to the NOI?

Yes ☒ No ☐ ***(If not, the NOI is not complete, see E.13 and #5 PNHP in the NOI Instructions for additional guidance.)***

14. Have the E&S Plan and PCSM/SR Plan been planned and designed to be consistent?

Yes ☒ No ☐

15. Have existing and/or proposed Riparian Forest Buffers been identified?

Yes ☒ N/A ☐ ***(If yes, they must be shown on the E&S Plan as well as the PCSM/SR Plans.)***

16. Have antidegradation implementation requirements for special protection waters been addressed?

Yes ☒ No ☐ N/A ☐ ***(If yes, antidegradation requirements must be included in the plan.)***

17. Has the seasonal high groundwater level been identified and 20-inch separation established at all excavation locations for pits for conventional operations and Well Development Impoundments for unconventional operations?

Yes ☐ No ☐ N/A ☒

| 18. Receiving Waters | Chapter 93, Designated Use Stream Classification | Chapter 93, Existing Use Stream Classification |
|---|---|---|
| See Attachment 3 | ☒ HQ ☐ EV ☒ Other WWF, CWF, TSF<br>☒ Siltation-impaired | ☐ HQ ☐ EV ☐ Other _____<br>☐ Siltation-impaired |
| HDD 620 Major Modification: Chester Creek | ☐ HQ ☐ EV ☐ Other TSF<br>☐ Siltation-impaired | ☐ HQ ☐ EV ☐ Other _____<br>☐ Siltation-impaired |
| HDD 280 Major Modification: UNT to Marsh Creek | ☒ HQ ☐ EV ☐ Other TSF<br>☐ Siltation-impaired | ☐ HQ ☐ EV ☐ Other _____<br>☐ Siltation-impaired |
| S3-0400 HDD Major Modification: UNT to Valley Creek | ☐ HQ ☐ EV ☒ Other CWF<br>☒ Siltation-impaired | ☐ HQ ☐ EV ☐ Other _____<br>☐ Siltation-impaired |
| Secondary Receiving Water<br>See Attachment 3 | Secondary Chapter 93, Designated Use | Secondary Existing Use |
| Name of Municipal or Private Separate Storm Sewer Operator, if applicable.<br>See Attachment 4 | | |
| Non-Surface Receiving Water: (include off-site discharges) | | |

## SECTION F. EROSION AND SEDIMENT CONTROL (E&S) PLAN

**See the attached Instructions for additional guidance with E&S Plans**

Erosion and Sediment Control Plan BMPs should be designed to minimize accelerated erosion and sedimentation through limiting the extent and duration of earth disturbance, protection of existing drainage and vegetation, limiting soil compaction and controlling the generation of increased runoff. The Department recommends the use of the *Pennsylvania Erosion & Sedimentation Pollution Control Program Manual (E&S Manual)* (363-2134-008) to achieve this goal. The E&S Plan must meet the requirements of Pa. Code § 102.4(b) and submitted with the NOI. Also, see section 2. of the NOI instruction for detailed information on completing the E&S plan and additional requirements.

**a. E&S Plan Summary**

Provide a summary of proposed E&S BMPs and their performance to manage E&S for the project.

Provide a summary of proposed E&S BMPs and their performance to manage E&S for the project.

Compost Filter Socks - This temporary sedimentation control measure consists of wood or metal posts driven through a compost filled mesh tube. Filter socks will be located as needed on side-slope and down-slope boundaries of disturbed areas. Compost filter socks will be sized using the DEP Construction Detail.

Tarpaulin Covers - Tarpaulin covers may be used, as necessary, to protect topsoil storage stockpiles from wind and precipitation erosion. Stockpile slopes will be 2:1 or less. A minimal amount of soil will be stockpiled so that the height of the stockpile is less than 35 feet.

Rock Construction Entrance – Temporary access routes will be established on and proximate to the site to facilitate construction activities. The use of access routes will help confine truck and equipment traffic to specific corridors thus minimizing land disturbance and protecting vegetation. Site traffic during wet weather will be limited. No vehicles will be permitted in streams or rivers.

Wash Racks – Wash racks will be used at rock construction entrances and will be designed to accommodate anticipated vehicular traffic. A water supply will be made available at wash racks to wash the wheels of vehicles exiting the site.

Pumped Water Filter Bag – Pumped water filter bags may be used to filter water pumped from disturbed areas prior to discharging to surface waters. Compost filter socks shall be installed within 50 feet of any receiving surface water or where grassy area is not available.

Erosion Control Blanket - A manufactured erosion control blanket shall be installed on all slopes 3:1 (H:V) or steeper and within 100 feet of stream banks, where applicable. The blanket shall be biodegradable but capable of providing protection for two growing seasons. Straw or similar fiber material shall be placed between two biodegradable nets. The top net shall be heavyweight and UV stabilized; the bottom net shall be a lightweight netting. Erosion control blankets shall be anchored and stapled in place in accordance with the manufacturer's recommendations and the detail on the construction drawings. For slopes between 3:1 and 1:1 (H:V) use erosion control blanket SC 150 as manufactured by North American Green or Owner approved equal material or equal method.

Waterbars – Waterbars shall be installed across the right-of-way on all slopes greater than 5%. Waterbars should be constructed at a slope of 2% and discharge to a well-vegetated area. Waterbars should not discharge into an open trench. Waterbars should be oriented so that the discharge does not flow back onto the right-of-way. Obstructions (e.g. compost filter socks etc.) should not be placed in any waterbars. Where needed, they should be located below the discharge end of the waterbar.

Trench Plugs - To be used to prevent piping along the pipeline.

**b. E&S Plan BMP Design**

Check those that apply:

☒ E&S Plan is designed using BMPs in the *E&S Manual*.

☐ E&S Plan is designed using an alternative BMP or design standard approved by DEP.

*Note: NOI packages submitted with alternate BMPs not approved by the Department will be returned to the Applicant.*

**c.** Do you have any information regarding riparian buffer which differs from Section G, Riparian Buffer?

Yes ☐ No ☒

Explain:

**d. Thermal Impacts Analysis**

Explain how thermal impacts associated with this project were avoided, minimized, or mitigated. Potential thermal impacts to surface waters will be minimized by minimizing clearing and retaining existing vegetation where possible. The disturbed areas will be reseeded as soon as practicable following construction

**e. Off-Site Discharge Analysis**

Does the activity propose any off-site discharges to areas other than surface waters? ☒ Yes ☐ No

If yes, it is the applicant's responsibility to ensure that they have legal authority for any off-site discharge to neighboring properties.

The applicant must provide a demonstration in both E&S and PCSM/SR plans that the discharge will not cause erosion, damage, or a nuisance to off-site properties.

## SECTION G. RIPARIAN BUFFER

1. Will you be protecting, converting or establishing a voluntary riparian forest buffer as part of this project? ☒ Yes ☐ No
   If yes, as part of the PCSM/SR Plan, provide a Buffer Management Plan.
2. Will proposed earth disturbance activities be conducted in an EV or HQ watershed AND within 150 feet of a perennial or intermittent river, stream, or creek, or lake, pond, or reservoir? ☒ Yes ☐ No

   If no, proceed to the next section/module.
3. Does this project qualify for an exception (see § 102.14(d)(1))? ☒ Yes ☐ No

   If yes, indicate below the type of project for which the exception applies by marking the appropriate box.

   ☐ Oil and gas activities for which site reclamation or restoration is part of the permit authorization in Chapter 78 and 78a.

   ☐ Road maintenance activities.

   ☐ The repair or maintenance of existing pipelines and utilities.

   ☒ Other (see §102.14(d)(1))

   If exceptions are checked, explain how existing riparian buffer will be undisturbed to the extent practicable. Provide a demonstration that the requirements of §102.14(b) are met, or provide the necessary information to request a riparian buffer waiver.
4. Are you requesting a riparian buffer waiver for this project (see § 102.14(d)(2))? ☒ Yes ☐ No

   If yes, indicate below the type of project for which you are requesting a waiver by marking the appropriate box.

   ☒ Linear project that may include pipelines, public roadways, rail lines, or utility lines.

   ☐ Project is of a temporary nature where the site will be fully restored to its preexisting conditions during the ESCGP permit term.

   ☐ Project where compliance with mandatory riparian buffers is not appropriate or feasible due to site characteristics or existing structures at the project site.

   ☐ Other (see §102.14(d)(2)):

   If waivers are checked, explain how existing riparian buffers will be undisturbed to the extent practicable.

   Note: If “Yes” to #2 **AND** “No” to #3 and #4, provide an attachment to demonstrate how the requirements of §102.14 are met.

## SECTION H. POST CONSTRUCTION STORMWATER MANAGEMENT (PCSM) AND/OR SITE RESTORATION(SR) PLAN

**See NOI Instructions for additional guidance with PCSM Plans**

PCSM/SR BMPs should be designed to use natural measures to eliminate pollution, infiltrate runoff, not require extensive construction/maintenance, promote pollutant reduction, and preserve the integrity of stream channels. All PCSM/SR BMPs proposed in the PCSM/SR Plan must be designed in accordance with Ch. 102, Ch. 78a for unconventional operations, Ch. 78 for conventional operations and the *Pennsylvania Stormwater Best Management Practices Manual (Stormwater BMP Manual)* (363-0300-002). If alternate design criteria are utilized for the proposed project, they must have prior approval by the Department, or the NOI Application will be returned to the Applicant.

After construction is completed, how much of the entire disturbed area will be restored to meadow in good condition or better, or existing conditions? ☐ All ☒ Partial ☐ None

Include PCSM narrative and drawings for remaining impervious area. Also include a map showing the proposed contours of the site restoration plan.

If there are additional stages of the project prior to permit termination or expiration, list the stages and provide the documents required by subsection 'a' to section 'g' for each stage (e.g. partial restoration or changes to the amount of compacted areas, gravel, and/or impervious areas). Upload a narrative for each additional stage in addition to the drawings.

**EXAMPLE**

| Stage No | Stage Name | PCSM Plan | SR Plan |
|---|---|---|---|
| Stage 1 | | ☐ | ☐ |
| Stage 2 | | ☐ | ☐ |
| Stage 3 | | ☐ | ☐ |
| Stage 4 | | ☐ | ☐ |

**Act 167 Consistency**. Check those that apply.

Is there an Act 167 Plan? ☐ Yes ☐ No

☐ The attached PCSM/SR Plan is consistent with an applicable approved Act 167 Plan.

Complete the following for all approved Act 167 Stormwater Management Plans. (Use additional sheets if necessary)

| Act 167 Plan Name | Date Adopted | |
|---|---|---|
| | | Consistency Letter Included ☐ |
| See Attachment 5 | | Verification Report Included ☒ |

*Note: A consistency letter is not required if a verification report is provided. See NOI Instructions. The PCSM/SR Plan must satisfy either sub paragraph 1, 2, or 3 below. Check those that apply.*

1. ☒ Act 167 Plan approvals on or after January 2005 – The attached PCSM/SR Plan, in its entirety, is consistent with all requirements pertaining to rate, volume, and water quality from an Act 167 Stormwater Management Plan approved by DEP on or after January 2005. Box 1 must be checked if a current, DEP approved Act 167 plan exists.

2. ☒ The PCSM/SR Plan meets the standard design criteria from sections 102.8(g)(2) and (3) and the *Stormwater BMP Manual*. For projects involving oil and gas activities authorized by a permit issued under Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure, post construction stormwater management requirements are met for all areas that are restored to preconstruction conditions or to a condition of meadow in good condition or better. *[Note: PCSM plans must meet both the volume and rate requirements in the regulations, which are provided in the 2 sections mentioned in this paragraph].*

3. ☐ Alternative Design Standard – The attached PCSM/SR Plan was developed using approaches as provided in 102.8(g)(2)(iv) and 102.8(g)(3)(iii). Demonstrate/explain in the space provided below how this standard will be either more protective than what is required in 102.8(g)(2) and 102.8(g)(3) or will maintain and protect existing water quality and existing and designated uses.

**PCSM/SR BMP Alternative Standards**:

Has the alternative BMP or design standard been approved by the Department?

☐ Yes

☐ No – Do not submit the ESCGP-3 application and see Section (H) of the NOI Instructions concerning the alternative BMP approval process.

**Water Quality Compliance:**

Does the PCSM/SR plan comply with requirements for volume control? ☒ Yes ☐ No

If yes, is at least 90% of the disturbed area controlled by a PCSM BMP? ☒ Yes ☐ No

If yes, do you have the Standard PCSM Worksheet # 10 attached to show water quality compliance has achieved?
☒ Yes ☐ No

If no, attach Standard PCSM Worksheets # 12 and #13 to show water quality compliance has achieved.

If PCSM/SR plan is not complying with the requirements for volume control, attach Standard PCSM Worksheets # 11, # 12 and #13 to show water quality compliance has achieved.

**a. PCSM/SR Plan Summary**

Provide a summary of proposed BMPs and their performance to manage PCSM/SR for the project.

The right-of-way and the area where the major modification will take place will be returned to meadow in good condition. Areas where PCSM BMPs were required have not changed with the major modification and information regarding PCSM BMPs can be found in the original Permit NOI (ESG0100015001).

Check all that apply ☐ PCSM BMPs ☐ SR BMPs

**b.** Do you have any information regarding riparian buffer which differs from what was submitted in the Section G, Riparian Buffer?

☐ Yes ☒ No

Explain:

**c. Thermal Impacts Analysis**

Explain how thermal impacts associated with this project were avoided, minimized, or mitigated. Explain how thermal impacts associated with this project were avoided, minimized, or mitigated. Potential themal impacts to surface waters will be minimized by minimizing clearing and retaining existing vegetation where possible. Permanent seeding will occur as soon as practicable during germinating months.

**d. Off-Site Discharge Analysis.**

Does the activity propose any off-site discharges to areas other than surface waters? ☒ Yes ☐ No

If yes, it is the applicant's responsibility to ensure that they have legal authority for any off-site discharge to neighboring properties.

The Applicant must provide a demonstration in both the E&S and PCSM/SR Plans that the discharge will not cause erosion, damage, or a nuisance to off-site properties.

**e. Summary Table for Supporting Calculation and Measurement Data**
***(See NOI Instructions for additional guidance with this section)***

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

**Watershed Name: No change for major modification, see original permit NOI, permit # ESG0100015001**

| Volume Control design storm frequency _____ Rainfall amount _____ inches | Pre-construction | Post Construction | Net Change |
|---|---|---|---|
| Impervious area (acres) | | | |
| Volume of stormwater runoff (acre-feet) without planned stormwater BMPs | | | |
| Volume of stormwater runoff (acre-feet) with planned stormwater BMPs | | | |
| Stormwater discharge rate for the design frequency storm | Pre-construction | Post Construction | Net Change |
| 1) 2-Year/24-Hour | | | |
| 2) 10-Year/24-Hour | | | |
| 3) 50-year/24-Hour | | | |
| 4) 100-year/24-Hour | | | |

**f. Summary Description of PCSM/SR BMPs**

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

| BMP | Function(s) | Purpose(s) | Volume of stormwater treated | Acres treated |
|---|---|---|---|---|
| **Site Restoration ONLY**<br>☒ Restore Site to Meadow in Good Condition or Better, or Existing Conditions | Infiltration/Recharge<br>Detention/WQ Treatment | ☒ VC ☒ RC ☒ WQ | _____ | _____ |
| **Bio-infiltration areas**<br>☐ Infiltration Trench<br>☐ Infiltration Bed<br>☐ Infiltration Basin<br>☐ Rain Garden/ Bioretention<br>☐ Infiltration Berm | Infiltration/Recharge | <br>☐ VC ☐ RC ☐ WQ<br>☐ VC ☐ RC ☐ WQ<br>☐ VC ☐ RC ☐ WQ<br>☐ VC ☐ RC ☐ WQ<br>☐ VC ☐ RC ☐ WQ | <br>_____<br>_____<br>_____<br>_____<br>_____ | <br>_____<br>_____<br>_____<br><br>_____ |

| | | | | |
|---|---|---|---|---|
| **Natural Area Conservation** | Infiltration/Recharge | | | |
| ☐ Streamside Buffer Zone | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Wetland Buffer Zone | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Sensitive Area Buffer Zone | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☒ Pre-Construction Drainage Pattern Intact | | ☒ VC ☒ RC ☒ WQ | _____ | _____ |
| **Stormwater Retention** | Detention/Retention | | | |
| ☐ Constructed Wetlands | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Wet Ponds | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Retention Basin | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| **Sediment and Pollutant Removal** | Water Quality Treatment | | | |
| ☐ Vegetated Filter Strips | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Compost Filter Sock | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Detention Basins | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| **Access Road Design** | Infiltration/Recharge | | | |
| ☐ Road Crowning | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Ditches | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☒ Turnouts | | ☒ VC ☒ RC ☒ WQ | _____ | _____ |
| ☐ Culverts | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Roadside Vegetated Filter Strips | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| **Stormwater Energy Dissipaters** | Infiltration/Recharge | | | |
| ☐ Level Spreaders | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Riprap Aprons | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Upslope Diversions | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |
| ☐ Other_____ | | ☐ VC ☐ RC ☐ WQ | _____ | _____ |

**g. Critical PCSM Plan stages**

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

Refer to the original permit NOI for Permit #ESG0100015001

## SECTION I. ANTIDEGRADATION ANALYSIS

**This section must be completed where earth disturbance activities will be conducted in the watershed of a surface water with an existing or designated use of exceptional value or high quality pursuant to Chapter 93 (relating to water quality standards), projects where any part is located in an exceptional value wetland in accordance with 25 Pa. Code § 105.17, and projects where any part is located in the watershed of an impaired surface water where the cause of impairment is identified as siltation.**

### Part 1 - NONDISCHARGE ALTERNATIVES EVALUATION

The applicant must consider and describe any and all non-discharge alternatives for the entire project area which are environmentally sound and will**:**

- Minimize accelerated erosion and sedimentation during the earth disturbance activity
- Achieve no net change from pre-development to post-development volume, rate and concentration of pollutants in water quality

| E & S Plan | PCSM/SR Plan |
|---|---|
| Check off the environmentally sound nondischarge Best Management Practices (BMPs) listed below to be used prior to, during, and after earth disturbance activities that have been incorporated into your E & S Plan based on the site analysis. For non-discharge BMPs not checked, provide an explanation of why they were not utilized. Also for BMPs checked, provide an explanation of why they were utilized. (Provide the analysis and attach additional sheets if necessary)<br>The best possible pipeline route was selected based on landowner agreements, and minimization of environmental impacts, and engineering/constructibiliy factors. The project's disturbed area will be limited to the area required for construction, and the duration of construction will be minimized to the extent practicable. Riparian forest buffers will be protected to the extent practicable during construcion activities at stream crossings. | Check off the environmentally sound nondischarge Best Management Practices (BMPs) listed below to be used after construction that have been incorporated into the PCSM/SR Plan based on your site analysis. For non-discharge BMPs not checked, provide an explanation of why they were not utilized. Also for BMPs checked, provide an explanation of why they were utilized. (Provide the analysis and attach additional sheets if necessary)<br>The best possible pipeline route was selected based on landowner agreements, and minimization of environmental impacts, and engineering/constructibility factors. The pipeline right of way will be restored to a meadow condition at original contours to maintain the pre-construction drainage patterns. Riparian forest buffers will be protected to the extent practicable. |
| **Nondischarge BMPs**<br>☐ Alternative Siting<br>☐ Alternative location<br>☐ Alternative configuration<br>☐ Alternative location of discharge<br>☒ Limited Disturbed Area<br>☒ Limiting Extent & Duration of Disturbance (Phasing, Sequencing)<br>☐ Riparian Buffers (150 ft. min.)<br>☐ Riparian Forest Buffer (150 ft. min.)<br>☐ Other _____ | **Nondischarge BMPs**<br>☐ Alternative Siting<br>☐ Alternative location<br>☐ Alternative configuration<br>☐ Alternative location of discharge<br>☐ Low Impact Development (LID / BSD)<br>☐ Riparian Buffers (150 ft. min.)<br>☐ Riparian Forest Buffer (150 ft. min.)<br>☒ Infiltration<br>☐ Water Reuse<br>☒ Other re-construction drainage pattern intact within the right-of-way |
| Will the non-discharge alternative BMPs eliminate the net change in rate, volume and quality during construction?<br>☐ Yes ☒ No<br><br>If yes, antidegradation analysis is complete.<br>If no, proceed to Part 2. | Will the non-discharge alternative BMPs eliminate the net change in rate, volume and quality after construction?<br>☐ Yes ☒ No<br><br>If yes, antidegradation analysis is complete.<br>If no, proceed to Part 2. |

## PART 2 - ANTIDEGRADATION BEST AVAILABLE COMBINATION OF TECHNOLOGIES (ABACT)

If the net change in stormwater discharge from or after construction is not fully managed by nondischarge BMPs, the applicant must utilize ABACT BMPs to manage the difference. The Applicant must specify whether the discharge will occur during construction, post-construction or both, and identify the technologies that will be used to ensure that the discharge will be a non-degrading discharge. ABACT BMPs include but are not limited to:

### E & S Plan

☒ **Treatment BMPs:**
- ☐ Sediment basin with skimmer
- ☐ Sediment basin ratio of 4:1 or greater (flow length to basin width)
- ☐ Sediment basin with 4-7 day detention
- ☐ Flocculants
- ☒ Compost Filter Socks
- ☐ Compost Filter Sock Sediment Basin
- ☒ RCE w/ Wash Rack

☐ **Land disposal:**
- ☐ Vegetated filters
- ☐ Riparian buffers <150ft.
- ☐ Riparian Forest Buffer <150ft.
- ☐ Immediate stabilization

☒ **Pollution prevention:**
- ☒ PPC Plans
- ☐ Street sweeping
- ☐ Channels, collectors and diversions lined with permanent vegetation, rock, geotextile or other non-erosive materials

☐ **Stormwater reuse technologies:**
- ☐ Sediment basin water for dust control
- ☐ Sediment basin water for irrigation

☒ **Other** **Rock construction entrances with wash rocks, compost filter sock, and erosion control blanket,placed within 100 feet of streams.**

Are the ABACT BMPs selected sufficient to minimize E&S discharges to the extent that existing or designated surface water uses are protected?

☒ Yes ☐ No

If yes, Antidegradation analysis is complete.
If no, NOI Application will be returned to the Applicant.

### PCSM/SR Plan

☒ **Treatment BMPs:**
- ☒ Infiltration Practices
- ☐ Wet ponds
- ☐ Created wetland treatment systems
- ☐ Vegetated swales
- ☐ Manufactured devices
- ☐ Bio-retention/infiltration
- ☐ Green Roofs

☐ **Land disposal:**
- ☐ Vegetated filters
- ☐ Riparian Buffers <150ft.
- ☐ Riparian Forest Buffer <150ft.
- ☐ Disconnection of roof drainage
- ☐ Bio-retention/bio-infiltration

☒ **Pollution prevention:**
- ☐ Street sweeping
- ☐ Nutrient, pesticide, herbicide or other chemical application plan alternatives
- ☒ PPC Plans
- ☐ Non-structural Practices
- ☒ Restoration BMPs

☐ **Stormwater reuse technologies:**
- ☐ Divert rainwater into impoundment
- ☐ Underground storage

☐ Spray/Drip Irrigation

☐ **Other** _____

Are the ABACT BMPs selected sufficient to achieve no net change and assure that existing or designated surface water uses are protected?

☒ Yes ☐ No

If yes, Antidegradation analysis is complete.
If no, NOI Application will be returned to the Applicant.

## SECTION J. COMPLIANCE HISTORY REVIEW

Is/was the applicant(s) in violation of any Department regulation, order, schedule of compliance or permit or in violation of any department regulated activities within the past five years?

☒ Yes ☐ No

If yes, provide the permit number or facility name, a brief description of the violation, the compliance schedule (including dates and steps to achieve compliance) and the current compliance status. (Attach additional information on a separate sheet, when necessary)

**Permit Program or Activity:** See Attachment 9 **Permit Number (if applicable):** _____

**Brief Description of non-compliance:**

| Steps taken to achieve compliance | Date(s) compliance achieved |
|---|---|
| | |

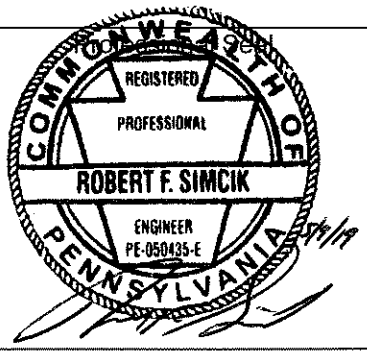
Current Compliance Status: ☐ In-Compliance ☐ In Non-Compliance

If in non-compliance, attach schedule for achieving compliance.

## SECTION K. CERTIFICATION BY PERSON PREPARING E&S AND PCSM/SR PLANS

I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plans are true and correct, represent actual field conditions, and are in accordance with the 25 Pa. Code Chapters 78/78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

| | | |
|---|---|---|
| Print Name Robert Simcik | Signature | |
| Company Tetra Tech, Inc. | | |
| Address 661 Andersen Drive, Suite 200, Pittsburgh, PA 15220 | | |
| Phone 412-921-8163 | | |
| Most Recent DEP Training Attended | Location | Date |
| | Greensburg, PA | 04/03/2014 |
| e-Mail Address robert.simcik@tetratech.com | | |




### EXPEDITED REVIEW PROCESS

In addition to the certification required above, applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plans developed and sealed by a licensed professional engineer, surveyor or professional geologist. The plans shall contain the following certification:

*I do hereby certify to the best of my knowledge, information, and belief, that the E & S Control and PCSM/SR BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 / 78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.*

## SECTION L. APPLICANT CERTIFICATION

Applicant Certification

I certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that this application and all related attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my own knowledge and on inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. The responsible official's signature also verifies that the activity is eligible to participate in the ESCGP, and that the applicant agrees to abide by the terms and conditions of the permit. BMP's, E&S Plan, PPC Plan, PCSM Plan, and other controls are being or will be, implemented to ensure that water quality standards and effluent limits are attained.

I grant permission to the agencies responsible for the permitting of this work, or their duly authorized representative to enter the project site for inspection purposes. I will abide by the conditions of the permit if issued and will not begin work prior to permit issuance.

(For individuals no indication of title is necessary, choose the box below. All others proceed to the next paragraph)

☐ **Individual; proceed to signature portion.**

I hereby certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that I am the person who is responsible for decision-making regarding environmental compliance functions for Enter Entity name, the manager of one or more manufacturing, production, or operating facilities of the applicant and am authorized to make management decisions which govern the operation of regulated facility including having explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure the applicant's long term environmental compliance with environmental laws and regulations; and I am responsible for ensuring that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements.

(choose one of the following; not applicable for individuals):

☐ The responsible corporate officer ☐ president ☐ vice president ☐ secretary
☐ treasure of _____ Corporation/Company
Entity name

☒ The ☐ member or ☒ manager of Energy Transfer _____ LLC
Entity name

☐ The general partner of _____ partnership/LP/LLP
Entity name

☐ The principal executive officer or ranking elected official of _____ Municipality/State/Federal/other public agency
Entity name

☐ Power of Attorney/delegation of contractual authority (documentation supporting delegation of contracting authority must be provided) for _____
Entity name

Matthew Gordon, Senior Director
Print Name and Title of Applicant

Signature of Applicant

5/7/2019
Date Application Signed

Jayme Fye, Project Manager
Print Name and Title of Co-Applicant (if applicable)

Signature of Co-Applicant

Date Application Signed

**Notarization**

Sworn to and subscribed to before me this
7TH day of MAY, 2019

Ronald J. Furman
Notary Public

AFFIX SEAL

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Ronald J. Furman, Notary Public
Spring Twp., Berks County
My Commission Expires April 4, 2020
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

Commonwealth of Pennsylvania

County of _____

My Commission expires _____

(choose one of the following; not applicable for individuals):

☐ The responsible corporate officer ☐ president ☐ vice president ☐ secretary
☐ treasure of _____ Corporation/Company
Entity name

☒ The ☐ member or ☒ manager of Michels Pipeline LLC
Entity name

☐ The general partner of _____ partnership/LP/LLP
Entity name

☐ The principal executive officer or ranking elected official of _____ Municipality/State/Federal/other public agency
Entity name

☐ Power of Attorney/delegation of contractual authority (documentation supporting delegation of contracting authority must be provided) for _____
Entity name

Matthew Gordon, Senior Director
Print Name and Title of Applicant

Signature of Applicant

Date Application Signed

**Notarization**
Sworn to and subscribed to before me this

_____ day of _____, 20_____

Notary Public

AFFIX SEAL

Jayme Fye, Project Manager
Print Name and Title of Co-Applicant (if applicable)

Signature of Co-Applicant

5/10/19
Date Application Signed

Commonwealth of Pennsylvania
County of Chester
My Commission expires April 26, 2021

Alaa Afifi

Commonwealth of Pennsylvania
Notarial Seal
ALAA H AFIFI – Notary Public
BUCK TWP, BUCKS COUNTY
My Commission Expires Apr 26, 2021

| SECTION M. ADDITIONAL CONTACT INFORMATION | | | | |
|---|---|---|---|---|
| Contact's Last Name | First Name | MI | Phone | 412-921-8163 |
| Simcik | Robert | F | FAX | 412-921-4040 |
| Mailing Address | City | | State | ZIP + 4 |
| 661 Andersen Drive, Suite 200 | Pittsburgh | | PA | 15220 |
| e-Mail Address Robert.Simcik@tetratech.com | | | | |

| Summary of Bio-Infiltration BMPs | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Infiltration Information | | | | | Drainage Information | | | | BMP Information | | | | |
| Proposed Structural bio-Infiltration BMPs (site specific) | Measured Infiltration Rate[1] (in./hr) | Factor of safety (min. of 2) | Design Infiltration rate (in./hr) | De-watering time[2] (hr) | Elevation of limiting zone-water table bedrock, etc.[3] | Total drainage area to BMP (sq. ft) | Total impervious drainage area to BMP (sq. ft) | Infiltration BMP Surface area (sq. ft) | Volume of runoff tributary to BMP during the 2yr/24 hr design storm[4] (cf) | Calculated removed volume (cf) | Maximum water surface elevation in BMP from 2yr storm[6] | Infiltration elevation bottom of bed/basin[6] | Elevation of infiltration test[7] | Elevation of E&S sediment basin bottom (if applies) |
| | | | | | | | | | | | | | | |

All information should be based on the 2-yr/24-hr storm.
Provide page numbers from the stormwater narrative identifying the location of the above information.

[1]The infiltration testing information should be located on the plan view of the PCSM plan and should include infiltration test elevation and rate
[2]Can include active infiltration time-dewatering time should not exceed 72 hours after the 2-yr/24-hr storm
[3]Depth to limiting zone is recommended to be at least 2 ft below infiltration
[4]The value should be greater than or equal to the volume to be infiltrated or managed by the BMP
[6]A maximum of 2 ft hydraulic head is recommended
[7]Provide supporting field notes/documentation from soil evaluation

Any deviation from the recommendations above should be adequately justified by a qualified professional and included with the application.

**Note: This chart is for summary purposes only and should be consistent with all design calculations and worksheets.**

ATTACHMENT 1:

Site Directions

# Detailed Written Directions to the Site

## S3-0400 HDD Major Modification

**From the DEP South East Regional Office to Lisa Drive, West Chester, PA 19380**

Turn right on PA-926 E to US-202N (8.3 mi). Turn left onto US-202N (10.0 mi). Take US-30W (1.7 mi). Turn left on South Ship road (0.6 mi). Turn right onto Michele drive (0.2 mi). Turn right on Lisa Drive.

## Chester County

**From the DEP South East Regional Office to Exton Junction Block Valve site (approximately 500 Lancaster Pike, Exton, PA 19341)**

Head northwest on E Main St toward Swede St (0.3 mi). Turn left onto Markley St (0.1 mi). Continue onto US-202 S/William F. Dannehower Memorial Bridge (14.3 mi). Take the US-30 W exit toward Downingtown/Coatesville (0.2 mi). Keep left, follow signs for US-30 E/US-30 BUS/Exton/Frazer (0.3 mi). Turn right onto US-30 BUS/Lancaster Pike/Lincoln Hwy E. The drive for the Exton Junction Block Valve (500 Lancaster Pike) will be on the left approximately 1.6 miles down the road.

## Delaware County

**From the DEP South East Regional Office to West Baltimore Pike Block Valve site (approximately 219 Lenni Road, Glen Riddle, PA 19063)**

Head southeast on E Main St toward Strawberry Alley (1.6 mi). Continue onto E Ridge Pike (0.2 mi). Continue onto E Main St (0.2 mi). Continue onto Ridge Pike (0.7 mi). Slight right to merge onto I-476 S (0.2 mi). Merge onto I-476 S (13.2 mi). Take exit 5 to merge onto U.S. 1 S/Media Bypass (0.7 mi). Merge onto U.S. 1 S/Media Bypass (3.3 mi). U.S. 1 S/Media Bypass turns slightly right and becomes U.S. 1 S/W Baltimore Pike (1.0 mi). Turn left onto PA-452 S (0.6 mi). Slight right onto Lenni Rd. The entrance to the West Baltimore Pike Block Valve site will be on the right approximately 500 feet down the road.

ATTACHMENT 2:

Municipalities Table

Section didn't change as a result of the Major Modification

# Municipalities

Pennsylvania Pipeline Project

SouthEast Region

| County | Muncipality |
|---|---|
| **Chester** | Elverson Borough |
| | West Nantmeal Township |
| | East Nantmeal Township |
| | Wallace Township |
| | Upper Uwchlan Township |
| | Uwchlan Township |
| | West Whiteland Township |
| | East Whiteland Township |
| | West Goshen Township |
| | East Goshen Township |
| | Westtown Township |
| **Delaware** | Thornbury Township |
| | Edgmont Township |
| | Middletown Township |
| | Aston Township |
| | Brookhaven Borough |
| | Chester Township |
| | Upper Chichester Township |

ATTACHMENT 3:

Water/Watershed Table

**Receiving Waters Table**

Pennsylvania Pipeline Project

Southeast Region

Siltation Impairment Highlighted

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Conestoga River | Chester | West Nantmeal | WARM WATER FISHES | WWF | Yes | Agriculture- Nutrients; Other- Nutrients; Other- Organic Enrichment/Low D.O.; Source Uknown- Pathogens | Yes | Nutrients; Organic Enrichment/Low D.O. |
| UNT to South Branch French Creek | Chester | West Nantmeal | EXCEPTIONAL VALUE | EV | Yes | Source Unknown- Pathogens | No | N/A |
| South Branch French Creek | Chester | West Nantmeal | EXCEPTIONAL VALUE | EV | Yes | Source Unknown- Pathogens | No | N/A |
| UNT to Marsh Creek | Chester | West Nantmeal | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | East Nantmeal | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Upper East Branch Brandywine Creek | Chester | Wallace | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | Wallace | WARM WATER FISHES | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| Marsh Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Black Horse Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Black Horse Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Shamona Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Shamona Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Upper East Branch Brandywine Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | No | N/A |
| UNT to Valley Creek | Chester | Uwchlan | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Valley Creek | Chester | West Whiteland | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Valley Creek | Chester | West Whiteland | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| East Branch Chester Creek | Chester | West Whiteland | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| East Branch Chester Creek | Chester | West Goshen | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Chester | West Goshen | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Chester | West Goshen | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Chester Creek | Chester | Westtown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Chester | Westtown | HIGH QUALITY-TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Ridley Creek | Delaware | Thornbury | HIGH QUALITY-TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Chester Creek | Delaware | Thornbury | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Delaware | Edgmont | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Delaware | Edgmont | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| Rocky Run | Delaware | Middletown | HIGH QUALITY-COLD WATER FISHES | HQ | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Agriculture - Cause Unknown | No | N/A |
| UNT to Rocky Run | Delaware | Middletown | HIGH QUALITY-COLD WATER FISHES | HQ | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Agriculture - Cause Unknown | No | N/A |
| UNT to Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation | No | N/A |
| Chrome Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Crum Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Crum Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Delaware | Aston | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Aston | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Aston | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Delaware River | Delaware | Aston | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Aston | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Brookhaven | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Baldwin Run | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**

Pennsylvania Pipeline Project

Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Chester Creek | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Delaware River | Delaware | Chester | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Upper Chichester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Delaware River | Delaware | Upper Chichester | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Recieving Wetlands**
**Pennsylvania Pipeline Project**
**South-East Region**

| Municipality | Receiving Water | Number of Wetlands | Number of EV Wetlands (Classification) |
|---|---|---|---|
| **CHESTER COUNTY** | | | |
| West Nantmeal | UNT to South Branch French Creek | 9 | 7 (EV Stream) |
| West Nantmeal | UNT to Marsh Creek | 1 | 0 |
| East Nantmeal | UNT to Marsh Creek | 2 | 0 |
| Wallace | UNT to Marsh Creek | 6 | 0 |
| Upper Uwchlan | UNT to Marsh Creek | 16 | 0 |
| Upper Uwchlan | UNT to Black Horse Creek | 4 | 2 (Wild Trout/Bog Turtle) |
| Uwchlan | UNT to Shamona Creek | 5 | 1 (Wild Trout) |
| West Whiteland | UNT to Valley Creek | 17 | 0 |
| West Whiteland | UNT to Chester Creek | 2 | 0 |
| West Goshen | UNT to Chester Creek | 1 | 0 |
| East Goshen | UNT to Chester Creek | 2 | 0 |
| Westtown | UNT to Chester Creek | 1 | 0 |
| **DELAWARE COUNTY** | | | |
| Edgmont | UNT to Chester Creek | 6 | 0 |
| Middletown | UNT to Chester Creek | 18 | 2 (PuWS) |
| Middletown | UNT to Rocky Run | 4 | 1 (Wild Trout) |
| Middletown | UNT to Chrome Creek | 1 | |
| Aston | UNT to Chester Creek | 1 | 0 |
| Aston | UNT to Baldwin Run | 3 | 0 |
| Chester | UNT to Baldwin Run | 12 | 0 |
| Chester | UNT to Chester Creek | 2 | 0 |
| Upper Chichester | UNT to Baldwin Run | 14 | 0 |

Revised for Major Modification

ATTACHMENT 4:

Storm Sewer Operator Table

Section didn't change as a result of the Major Modification

**Municipal Separate Storm Sewer Operators**

Pennsylvania Pipeline Project

Southeast Region

| MUNICIPALITY | TYPE | COUNTY | STATUS | PERMIT NUMBER | APPROVED |
|---|---|---|---|---|---|
| WEST WHITELAND | Township | Chester | Individual | PAI130530 | 2/18/2004 |
| EAST GOSHEN | Township | Chester | Individual | PAI130520 | 2/23/2004 |
| WEST GOSHEN | Township | Chester | Individual | PAI130532 | 2/13/2004 |
| UPPER UWCHLAN | Township | Chester | Individual | PAI130527 | 2/19/2004 |
| UWCHLAN | Township | Chester | Individual | PAI130505 | 2/19/2004 |
| WALLACE | Township | Chester | Individual | PAI130529 | 2/18/2004 |
| WESTTOWN | Township | Chester | Individual | PAI130528 | 2/23/2004 |
| BROOKHAVEN | Borough | Delaware | General | PAG130125 | 2/10/2004 |
| ASTON | Township | Delaware | General | PAG130122 | 2/23/2004 |
| MIDDLETOWN | Township | Delaware | Individual | PAI130510 | 2/4/2004 |
| THORNBURY | Township | Delaware | Individual | PAI130517 | 2/27/2004 |
| EDGMONT | Township | Delaware | Individual | PAI130522 | 2/23/2004 |
| UPPER CHICHESTER | Township | Delaware | General | PAG130082 | 1/28/2004 |
| CHESTER | Township | Delaware | General | PAG130089 | 1/31/2004 |

ATTACHMENT 5:

Act 167 Tracking Table

Section didn't change as a result of the Major Modification

## 102-1 Block Valve and Pump Station PCSM Design Standard

| Region | Site | Designed to meet regulator standards within 102.8(g)(2) and 102.8(g)(3) or Act 167 | Act 167 compliance | Summary of Design Standard within Act 167 Plan |
|---|---|---|---|---|
| **Block valve** | | | | |
| SWRO | Koontz Road | 102.8(g)(2) and 102.8(g)(3) | Westmoreland County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Bush Road | 102.8(g)(2) and 102.8(g)(3) | Westmoreland County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Newport Road | 102.8(g)(2) and 102.8(g)(3) | Indiana County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Cooney Road | 102.8(g)(2) and 102.8(g)(3) | Cambria County does not have an approved Act 167 Stormwater Management Plan | N/A |
| SCRO | Charger Highway | 102.8(g)(2) and 102.8(g)(3) | Blair County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Valley Forge Road | 102.8(g)(2) and 102.8(g)(3) | Blair County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Locke Mountain Road | 102.8(g)(2) and 102.8(g)(3) | Blair County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | High Street | 102.8(g)(2) and 102.8(g)(3) | Blair County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Shade Valley Road | 102.8(g)(2) and 102.8(g)(3) | Huntingdon County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Creek Road | Act 167 | Cumberland County has a County-wide Act 167 with specific requirement for Lower Conodoguinet Creek watershed, where the block valve is located. The PCSM design at the Creek Road block valve has been designed for consistency with Cumberland County's approved Act 167 Plan. For more detail see the Cumberland County Act 167 verification report in Tab 5. | The Lower Conodoguinet Creek watershed has a 100% release rate. All design standards within Cumberland County's approved Act 167 Plan are met. |
| | Gates Road | Act 167 | Dauphin County has a County-wide Act 167 plan with specific requirements for Spring Creek (East), where the block valve is located. The PCSM design at the Gates Road block valve site has been designed for consistency with Dauphin County's approved Act 167 Plan. For more detail see the Dauphin County Act 167 verification report in Tab 5. | This plan requires a 90% post development release rate for the 2, 10, and 25-year storm events. All design standards within Dauphin County's approved Act 167 Plan are met. |
| **Pump Stations** | | | | |
| SWRO | Houston Injection | 102.8(g)(2) and 102.8(g)(3) | N/A | N/A |
| | Delmont | 102.8(g)(2) and 102.8(g)(3) | Westmoreland County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Ebensburg | 102.8(g)(2) and 102.8(g)(3) | Cambria County does not have an approved Act 167 Stormwater Management Plan | N/A |
| SCRO | Mt. Union | 102.8(g)(2) and 102.8(g)(3) | Huntingdon County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Doylesburg | 102.8(g)(2) and 102.8(g)(3) | Perry County does not have an approved Act 167 Stormwater Management Plan | N/A |
| | Middletown | 102.8(g)(2) and 102.8(g)(3) | N/A | N/A |
| | Beckersville | 102.8(g)(2) and 102.8(g)(3) | Berks County does not have an approved Act 167 Stormwater Management Plan | N/A |
| SERO | Twin Oaks | 102.8(g)(2) and 102.8(g)(3) | Delaware County does not have an approved Act 167 Stormwater Management Plan | N/A |

# ATTACHMENT 6:

# RIPARIAN BUFFER WAIVER REQUEST INFORMATION

# Attachment 6 - Riparian Buffer Waiver Request

# Pennsylvania Pipeline Project -

## South East Region: Spread 6

## Major Modification-HDD S3-0400

May 2019

**Prepared for:**

Sunoco Logistics, L.P.
525 Fritztown Road
Sinking Spring, PA

**Prepared by:**
Tetra Tech, Inc.
661 Andersen Drive
Pittsburgh, PA 15220

**PENNSYLVANIA PIPELINE PROJECT - RIPARIAN BUFFER WAIVER REQUEST**

The receiving waters for the HDD S3-0400 Major Modification LOD is a UNT to Valley Creek, which is designated as CWF in Pa. Code 25 Chapter 93. Since the LOD is not located in a special protection watershed the Riparian Forest Buffer requirements is not applicable.

ATTACHMENT 7: DOA for Matthew Gordon

Section didn't change as a result of the Major Modification

***Delegated Individual:*** **Matthew L. Gordon, Principal Engineer**
***Project:*** **Sunoco Pipeline L.P. – Mariner East Pipeline**

I, David R. Chalson, Vice President of Sunoco Logistics Partners Operations GP LLC, the General Partner of Sunoco Pipeline L.P. hereby delegate to the above listed individual, authority to sign air quality permit applications and reports, that are submitted to government agencies regarding operations for the Mariner East Pipeline Project. Such government agencies include, but are not limited to, the Pennsylvania Department of Environmental Protection and the U. S. Environmental Protection Agency.

David R. Chalson
Vice President
Sunoco Logistics Partners Operations GP LLC

(air)

***Delegated Individual:*** **Matthew L. Gordon, Principal Engineer**
***Project:*** **Sunoco Pipeline L.P. – Mariner East Pipeline**

I, David R. Chalson, Vice President of Sunoco Logistics Partners Operations GP LLC, the General Partner of Sunoco Pipeline L.P. hereby delegate to the above listed individual, authority to sign water quality permit applications and reports including Discharge Monitoring Reports that are submitted to government agencies regarding operations for the Mariner East Pipeline Project. Such government agencies include, but are not limited to, the Pennsylvania Department of Environmental Protection and the U. S. Environmental Protection Agency.

David R. Chalson
Vice President
Sunoco Logistics Partners Operations GP LLC

(water)

# ATTACHMENT 8:
# OFF SITE DISCHARGE ANALYSIS

# Attachment 8 –Off Site Discharge Analysis

# Pennsylvania Pipeline Project -

## South East Region: Spreads 6

## Major Modification-HDD S3-0400

May 2019

**Prepared for:**

Sunoco Pipeline, L.P.
525 Fritztown Road
Sinking Spring, PA

**Prepared by:**
Tetra Tech, Inc.
661 Andersen Drive
Pittsburgh, PA 15220

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## LIST OF ATTACHMENTS

1 Table 1 – Off-Site Discharge to Non Surface Water Locations

## LIST OF ACRONYMS

| ACRONYM | MEANING |
|---|---|
| BMP | Best Management Practice |
| E&SC | Erosion and Sediment Control |
| LOD | Limit of Disturbance |
| PCSM | Post-Construction Stormwater Management |
| ROW | Right of way |

## PENNSYLVANIA PIPELINE PROJECT – OFF-SITE DISCHARGES OF STOMRWATER TO AREAS THAT ARE NOT SURFACE WATERS

The Pennsylvania Pipeline Project involves the installation of two parallel pipelines within a 306-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, PA to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the initial line for approximately 255 miles. Spread 6 (South East Region) of this project are cross through Chester and Delaware Counties, PA.

The Major Modification consists of a change in installation method for the 20-inch diameter pipeline previously permitted as Horizontal Directional Drill (HDD) S3-0400. The permit request is to convert the installation method for the 20-inch diameter pipelines from an HDD to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, Norfolk Southern Railroad, and wetland WL-K21. The remaining 1269 feet will be installed via open trench installation.

Throughout the length of the pipeline there are areas which propose to discharge stormwater to off-site areas other than a surface water. All of these discharges will be non-erosive to adjacent property owners and is detailed in the E&SC and PCSM plans per DEP Document No. 3140-FS-DEP4124. The locations of these discharges are detailed below.

### PUMP STATIONS

The Major Modification contains no pump stations.

### BLOCK VALVES

The Major Modification contains no block valves.

### MAINLINE

There are several locations along the Major Modification length of the pipeline which have off-site discharges to areas other than surface waters and a list of these locations can be found in table 1. All of these discharges are from waterbars installed throughout the length of the pipeline installation. These water bars are designed in accordance with the PADEP's Erosion and Sediment Pollution Control Program Manual (363-2134-008) and the Pennsylvania Stormwater Best Management Practices manual (363-0300-002) and are non-erosive discharges. Details of these measures can be found in the E&SC plan.

## Table 1:
## Off-Site Discharge to Non Surface Water Locations

| E&S SHEET NUMBER | STREAM NAME | STATIONING |
|---|---|---|
| **CHESTER** | | |
| ES - 6.49 | UNT to Valley Creek | 15171+00 |
| ES - 6.50 | UNT to Valley Creek | 15178+50 trhough 15184+00 |

# 3. E&S REPORT AND ATTACHMENTS

# Erosion and Sediment Control Plan

# Pennsylvania Pipeline Project – Southeast Region: Spread 6

## Major Modification-HDD S3-0400

May 2019

**Prepared for:**

Sunoco Pipeline, L.P.
535 Fritztown Road
Sinking Spring, PA 19608

**Prepared by:**

Tetra Tech, Inc.
661 Andersen Drive
Pittsburgh, PA 15220

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT F. SIMCIK
ENGINEER
PE-050705-E

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4 Compost Filter Sock Worksheets and Construction Details
5 Limiting Soil Characteristics Table, Soil Descriptions, Soil and Geological Maps
6 OSHA Trenching and Shoring Tables and Construction Sequence
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8 Temporary Stream Crossing Profiles
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10 Antidegradation Analysis
11 Planting Plans for Wetland Restoration
12 Geohazard Report

# LIST OF ACRONYMS

| ACRONYM | MEANING |
|---|---|
| % CCE | Calcium carbonate equivalent |
| % ENV | Effective neutralizing value |
| ABACT | Antidegradation Best Available Combination of Technologies |
| BMPs | Best management practices |
| CWF | Cold water fisheries |
| DELCORA | Delaware County Regional Water Quality Control Authority |
| E&S | Erosion and sediment |
| E&SC | Erosion and sediment control |
| EV | Exceptional value |

| | |
|---|---|
| FEMA | Federal Emergency Management Agency |
| HDD | Horizontal directional drill |
| HQ | High quality |
| LOD | Limit of disturbance |
| NGL | Natural gas liquid |
| OSHA | Occupational Safety and Health Administration |
| PA | Pennsylvania |
| PADEP | Pennsylvania Department of Environmental Protection |
| PASDA | Pennsylvania Spatial Data Access |
| PCSM | Post Construction Stormwater Management |
| PWS | Public water source |
| Pls | Pure live seed |
| ROW | Right of way |
| SPLP | Sunoco Pipeline, L.P. |
| SPPP | Sunoco Pennsylvania Pipeline Project |
| SWS | Surface water source |
| Tt | Tetra Tech, Inc. |
| TSF | Trout stock fishery |
| UNT | Unnamed tributary |
| USGS | United States Geological Survey |
| WWF | Warm water fisheries |

# 1.0 INTRODUCTION

Tetra Tech, Inc. (Tt) has prepared this Erosion & Sediment Control (E&SC) Plan for Sunoco Pipeline, L.P. (SPLP) – Pennsylvania Pipeline Project, South East Region: Spread 6. Spread 6 (South East Region) of this project is located in Chester and Delaware Counties, Pennsylvania (PA). The plan addresses activities associated with a major modification to the Sunoco Pennsylvania Pipeline Project (SPPP) installation. The HDD S3-0400 modification is located in West Whiteland Township, Chester County. Site location maps are provided in Attachment 1. This E&SC Plan, if properly implemented, will provide for effective E&SCs throughout construction.

## 1.1 PROJECT DESCRIPTION

Sunoco Pipeline, L.P. (SPLP) proposes to construct and operate the Pennsylvania Pipeline Project that would expand existing pipeline systems to provide natural gas liquid (NGL). The project involves the installation of approximately two parallel pipelines within a 306.8-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, Pennsylvania (PA) to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306.8 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the initial line for approximately 255.8 miles. The majority of the new ROW will be co-located adjacent to existing utility corridors, including approximately 230 miles of pipeline that will be co-located in the existing SPLP Mariner East pipeline system. The 20-inch pipeline will be installed first, followed by the 16-inch line. Any temporary stabilization required will be implemented in accordance with this Erosion and Sediment (E&S) Plan. Both pipelines will be installed within the same limit of disturbance (LOD) and in the same construction period. This E&S Plan specifically relates to impacts associated with the South East Region, Construction Spread 6.

Fifty feet will be maintained as permanent ROW. In addition, temporary use areas or extra workspaces will be required at some stream and road/railroad crossings; these will typically expand the construction ROW by 25 feet where needed. Construction activities will involve tree removal, clearing and grubbing within the ROW, trenching, pipe installation, and site restoration. The total LOD in the South East Region will be approximately 287 acres. Acres disturbed by county will be as follows: Chester County with 185 acres disturbed and Delaware County with 102 acres disturbed.

The HDD S3-0400 Major Modification consists of a change in installation method for the 20-inch diameter pipeline. This permit modification is being requested for a change in installation method for the 20-inch diameter pipeline from an HDD to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, Norfolk Southern Railroad, and wetland WL-K21. The remaining 1269 feet will be

installed via open trench installation. There will be no additional Limits of Disturbance (LOD) requested within the wetland and the change in installation method will not result in any loss of wetland area impacts are considered minor and temporary. The change in installation method does require additional temporary work space therefore includes a request for an additional 3.99 acres of LOD in upland areas. This E&S plan specifically relates to impacts associated with the proposed HDD S3-0400 Major Modification.

For a conventional lay, the pipelines would be installed within the same area of disturbance to the maximum extent practicable. For safety purposes, the installation would be staggered by what is estimated to be no more than 60 days. Any temporary stabilization required would be implemented in accordance with project's E&S Plans. Any permanent or temporary impacts associated with the second pipeline installation will be similar to the first installation.

There are locations where the Project lines (16" and 20") share the ROW with another Sunoco 8" line, and in some cases, the Project line will cross the Sunoco 8" line. The new lines are still expected to be installed underneath the existing line. If for some reason, the Project lines must cross over top of the Sunoco 8" line while still maintaining the minimum necessary cover, Sunoco will be able to stop flow through any line, as necessary, to facilitate safe access to their crossed line.

Past and present land use of the project area and surrounding area is agricultural and forested land. Future land use will be a maintained vegetated natural gas pipeline ROW and agricultural land and forested land. Relevant topographic features including streams, streets, pipelines, structures, utility lines, fences, paving and other significant items along the gas line alignment are indicated on the plans, where applicable.

## 1.2 APPROACH AND OVERVIEW

This E&SC Plan was developed using Pennsylvania Department of Environmental Protection (PADEP) guidance documents and sound engineering judgment. When implemented properly, the E&SC practices identified herein will minimize uncontrolled surface water runoff from disturbed areas and minimize the migration of construction-generated sediment. The following general principals apply:

- Planning. Site topography, soil types, and potential effects of construction-related activities on E&S migration have been considered in developing this E&SC Plan. Areas of steep, erodible slopes and erodible soils, if encountered during construction activities, will not be disturbed without instituting proper engineering controls to minimize these concerns.

- Minimize Land Disturbance. To the extent possible and practical, disturbed areas and the duration of exposure to erosion elements will be minimized. Clearing of vegetation will be limited to only those areas of the site to be disturbed. To the extent possible and practical, existing vegetation will be retained and protected.

- Installation of Erosion and Sediment Controls. E&SC best management practices (BMPs) will be constructed, stabilized, and functional before earth disturbance activities begin within the tributary areas of those BMPs.

- Maintenance of Erosion and Sediment Controls. Until the site is stabilized, E&SCs will be properly maintained. Maintenance will entail inspections of E&SC features on a weekly basis and after runoff events. Preventative and corrective maintenance work, including clean out, repair, replacement, regrading, reseeding, and remulching will be performed as soon as practical. If E&SCs fail to perform as expected, replacements or modifications of those installed will be required.

- Stabilization of Disturbed Areas. If a cessation of earth disturbance activities lasts 4 days or longer, the site will be immediately seeded, mulched, or otherwise protected from accelerated E&S. BMPs will remain in place and be maintained until permanent stabilization is achieved. Disturbed areas will be stabilized as soon as is practical, including areas disturbed during the removal of BMPs. Temporary and permanent vegetation, mulch, gravel cover, repaving or a combination of these measures, will be employed immediately following the completion of backfilling and final grading activities. Any areas adversely impacted while acquiring access to the dig sites will be repaired to previous conditions.

- Floodplain. (See 25 Pa. Code § 105.1) – The lands adjoining a river or stream that have been or may be expected to be inundated by flood waters in a 100-year frequency flood. Unless otherwise specified, the boundary of the floodplain is as indicated on maps and flood insurance studies provided by Federal Emergency Management Agency (FEMA). In an area where no FEMA maps or studies have defined the boundary of the 100-year frequency floodplain, it is assumed absent evidence to the contrary, that the floodplain extends from (1) any perennial stream to 100 feet horizontally from the top of the bank, and (2) from any intermittent stream to 50 feet horizontally from the top of the bank of such intermittent stream.

- Floodway – The channel of the watercourse and portions of the adjoining floodplains which are reasonably required to carry and discharge the 100-year frequency flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year frequency floodway, it is assumed, absent evidence to the contrary, that the floodway extends from the stream to 50 feet from the top of the bank of the stream (See 25 Pa. Code § 105.1). The FEMA boundary is shown on the E&S Sheets (Attachment 2), when this information is available. When this information is not available, the floodway is shown as defined above for perennial and intermittent streams only.

# 2.0 SITE DESCRIPTION

The South East Region of SPPP will involve the installation of a 20-inch and a 16-inch diameter NGL pipeline approximately 35 miles long, primarily across agricultural and forested areas from the western border of Chester County to the eastern portion of Delaware County. Past and present land use of the project area and surrounding area is agricultural and forested land. The HDD S3-0400 Major Modification consists of a change in installation method for the 20-inch diameter pipeline from an HDD to a Direct Pipe Bore and open trench installation. The reroute includes an additional 3.99 acres of LOD. Future land use will be a vegetated, maintained pipeline ROW and agricultural land and forested land.

Relevant topographic features including streams, streets, pipelines, structures, utility lines, fences, paving and other significant items along the gas line alignment are indicated on the E&S plans, where applicable (Attachment 2). The E&S Plan Sheets also provide information regarding the typical controls and construction sequence to be followed. The construction details provided in Attachment 4 are the standard E&SCs to be used.

## 2.1 TOPOGRAPHY

The work zone is located on ground of varying elevations. Site elevations vary from 23 feet (Chester Creek in Delaware County) to 741 feet (western border of Chester County) above mean sea level based on the Pennsylvania Spatial Data Access (PASDA). The construction plans show the topography of the site and the surrounding area.

## 2.2 GEOLOGY AND SOILS

The soils and geologic formations surrounding the project are shown on the figures provided in Attachment 5. Attachment 5 also provides the soil descriptions and properties of the soils found at the site. Attachment 5 also provides the Void Mitigation Plan for Karst Terrain and Underground Mining. Attachment 12 is a geohazard evaluation of the HDD S3-0400 Major Modification reroute which details and provides mitigation recommendations for documented and suspected landslides, steep slopes, karst features, and soils that are prone to slope failure. In general, the following actions will be taken to counteract soil limitations:

- E&S BMPs will be in place and functional prior to earth disturbance to counteract erodible soils. Prompt stabilization practices will be implemented.
- Cut slopes will be stabilized as soon as possible with seed and mulch or erosion control blanket to prevent sliding. Cut slopes are not designed to exceed 3:1.
- The pipeline being installed will be coated steel.
- If a high groundwater table is encountered, water will be drained away from disturbed areas to a well vegetated area or a placed compost filter sock prior to being discharged off the site. If dewatering is

required during construction activities or diversion of a stream is required, the water will be pumped through a pumped water filter bag in accordance with the details provided. Saturated soils are to be dried prior to being used on site.

- Soils will be evaluated throughout the construction process to determine whether additional measures will need to be taken to make the soil suitable for its intended use on site.
- Where necessary, trench plugs will be used to prevent piping.
- Soil amendments will be added to site soils to promote vegetative growth.
- A wetland delineation and stream investigation has been conducted to determine the presence and location of hydric soils.
- If a sinkhole is encountered, repair should be done under the direct observation and supervision of a professional geologist or licensed geotechnical engineer. Site specific sinkhole repairs should be developed on a case by case basis.

In accordance with PADEP's guidance for avoiding and handling acid-producing rock formations encountered during site development, this plan has been prepared to address acid-producing rock formations which may be present at the Pennsylvania pipeline project. USGS topographic mapping shows that the pipeline traverses through areas that were previously strip mined.

PADEP recommends two strategies for handling acid-producing rock formations – avoidance and handling. Acid-producing rock formations will be avoided to the maximum extent practicable at the site. If coal or other acid-producing rock is encountered at the project site, the acid producing rock will either be removed from the site or handled onsite. If coal or other acid-producing rock must be handled on site is should be sampled and analyzed for total percent sulfur. The percent sulfur can be used to predict if the material is acid-producing and can also provide the ability to develop remedial strategies, such as using neutralizing agents and encapsulating with a layer of low permeability clay. Determination of percent sulfur shall be conducted in accordance with PADEP's guidance.

Soil Maps were generated and the soil types are shown on the Limiting Soil Characteristics Table of Attachment 5. **Detailed descriptions of the soil types are presented in Attachment 5.**

To prevent sediment from leaving the site, E&SCs will be in place and functional prior to earth disturbances, and stabilization practices will be implemented in disturbed areas as soon as practical. Geologic formations or soil conditions that may have the potential to cause pollution after earth disturbance were not observed during field activities.

## 2.3 SURFACE WATER HYDROLOGY

The SPPP area surface water runoff drains to surface waters and unnamed tributaries (UNT's) designated as high quality (HQ), warm water fisheries (WWF), exceptional value (EV), cold water fisheries (CWF), and trout stock fisheries (TSF) under Pa. Code 25 Chapter 93. The receiving waters for the HDD S3-0400 Major Modification LOD is a UNT to Valley Creek, which is designated as CWF and siltation impaired in Pa. Code 25 Chapter 93. This E&S plan contains Antidegradation Best Available Combination of Technologies (ABACT) BMPs to maintain the designated use of the receiving waters. The locations of the receiving waters relative to the project area can be seen on the USGS location map in Attachment 1 and the plan drawings in Attachment 2.

The proposed pipeline route has been designed to maximize the use of existing utility corridors and minimize the number and linear footage of crossings of all surface waters, including those classified as High Quality (HQ) or Exceptional Value (EV). The Trenchless Construction Feasibility Study sets forth an analysis of the possible implementation of trenchless construction methods at each stream or wetland crossing and indicates the use of trenchless crossing installation methods where feasible. For those surface water crossings crossed by the open cut installation method, the E&S Plan identifies and incorporates ABACT E&S best management practices (BMPs).

**Descriptions of the Primary Receiving Waters are presented in Table 1.**

# 3.0 EROSION AND SEDIMENT CONTROL PRACTICES

Two general types of E&SCs will be used on site during construction: stabilization controls and structural controls. Stabilization controls are implemented as needed to preserve existing vegetation or disturbed areas. Structural controls are used to divert or convey runoff, prevent sediment migration, and reduce the erosive runoff forces. For the purposes of this plan, structural controls are mainly temporary; however, some of the controls may be permanent. The following sections describe the construction sequence and the E&SCs.

## 3.1 CONSTRUCTION SEQUENCE

Refer to the E&SC plan drawings for the location of the proposed work and the associated BMPs. A generalized construction sequence is provided below. The construction sequence is intended to provide a general course of action in order to conform to the applicable regulatory agency requirements for temporary and permanent soil erosion and sedimentation controls. Necessary parts for proper and complete execution of work pertaining to this plan, whether specifically mentioned or not, are to be performed by the contractor. It is not intended that the drawings and this report show detailed information on methods and materials. The contractor will comply with all requirements listed in this section. The contractor may be required to alter controls based on effectiveness of controls or differing conditions encountered in the field. A preconstruction meeting is required prior to the start of any construction activity. The PADEP, contractors, the landowner, appropriate municipal officials, and the E&S plan preparer must be invited to this meeting at least seven days in advance.

This E&SC Plan does not outline specific steps for the protocols for the construction of pipelines in regards to Health and Safety. A Site-Specific Health and Safety Plan should be developed and followed during the construction of the pipeline; however, general guidelines are attached as follows:

- **Attachment 6 includes OSHA Trenching and Shoring Tables and Construction Sequence.**
- **Attachment 7 includes OSHA Construction Standard 1926 Subpart P – Excavations**.

1. Make all appropriate modifications as indicated in general notes on plan sheet ES-0.01.
2. Flag or fence project limits of disturbance and approved access. Sign and flag wetland boundaries and streams.
3. Orange construction fence will be provided and installed at wetland areas adjacent to the LOD and not planned to be impacted to identify and deter construction equipment, vehicles and personnel from entering wetland.
4. Locate staging areas and access points including construction entrances. Install compost filter socks down slope of these areas.

5. Install rock construction entrances as needed. Refer to the rock construction entrance detail on plan sheet ES-0.05.

6. Construct the proposed access roads and implement temporary improvements as identified in access road summary table and detailed on the plan sheets.

7. Install compost filter socks as shown on the construction drawings. Installations sizing, and spacing must conform to the chart and details provided on plan sheet ES-0.05. Install temporary upslope diversions and temporary slope pipes as shown on plan sheets and details.

8. Clearing, grubbing, and topsoil stripping shall commence along the pipeline route and be limited to those areas described in each stage of the construction sequence. General site clearing, grubbing and topsoil stripping may not commence in any stage or phase of the project until the E&S BMPs specified by the bmp sequence for that stage or phase have been installed and are functioning as described in this E&S plan. For clearing, grubbing, and topsoil removal in all stream, river, wetland or other water body crossings, refer to construction sequence notes below. Topsoil will be segregated at locations throughout the project where topsoil exists.

9. Temporary waterbars or approved interceptor dykes will be installed along the alignment prior to pipe installation at the end of each work day. During the periods of time where pipe trench is open contractors will provide positive control of all storm water on site, temporary waterbars will be constructed by the end the work day, or during each work day if required contractor will install compost filter sock to control erosion until 70% vegetation growth has been achieved.

10. Minimize total area of disturbance. Maintain temporary soil stockpiles within existing soil erosion and sediment controls. Should excavation enter streams, follow specific details for these areas shown on the drawings and include the steps detailed in the specific sections below. Pullback areas for HDDs will be cleared and prepared as needed to support staging, welding and testing of the HDD pipe sections. Areas not utilized for construction activities should be avoided to minimize impacts.

11. Install pipe and trench plugs in accordance with details on plan sheet ES-0.07. When open cutting driveways and access roads, contractor shall have road plates available to maintain access for landowners. The 20-inch pipeline will be installed first, followed by the 16-inch line. Any temporary stabilization required between the two installations will be implemented in accordance with this E&S Plan. Both pipelines will be installed within the same limit of disturbance and in the same construction period.

12. For open-cut areas, the length of time required to clear and grade the area, excavate the trench, install the pipelines, backfill the trench and begin stabilization of disturbed areas will not exceed 30 calendar days for most installations. Longer time periods may be approved on a case-by-case basis.

13. Backfill excavated area and cover with topsoil (where topsoil was segregated).

14. Before restoration of grade, the second 16-inch pipeline will be installed. All temporary BMPs will be implemented between the two installations in accordance with the notes and details for temporary seeding and cover.

15. Restore grade to original surface elevations as soon as practicable following completion of installation of pipes. Install permanent waterbars in accordance with plan sheet ES-0.08. Immediately seed and mulch disturbed areas or prepare for paving in roadway areas.

16. Install erosion control blanket on all slopes 3:1 or greater and all areas, regardless of slope and within 100 feet of special protection waters or 50 feet of non-special protection surface waters. Locations are shown on plan sheets.

17. In areas that used stone or timber mats for temporary stabilization and/or access, the stone or mats will be removed and, if needed, the soil will be scarified or ripped to a depth of 8-12 inches to de-compact the soil. After reestablishing preconstruction contours, topsoil will be replaced to a minimum depth of 4-8 inches and seeded and mulched. Vehicular traffic after site restoration should be restricted from areas to prevent soil compaction.

18. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70% perennial vegetative cover is established. Remove soil and erosion sediment control measures upon establishment of a uniform 70% perennial vegetative coverage over the disturbed area. Re-grade and revegetate areas disturbed during the removal of the soil erosion and sediment controls.

19. As part of the ongoing storm water bmp inspection and maintenance program any structural bmp recorded on this project will be inspected maintained, and repaired in accordance with the plan filed with the deed.

20. In accordance with 25 Pa code 102.7, upon completion of all steps in the construction sequence, a notice of termination form will be submitted to terminate the authorization of coverage indicating all activities under this permit have been completed.

21. For all EV wetland and stream crossings, SPLP will install the second pipeline immediately following the installation of the first pipeline, as long as no unanticipated, extraneous circumstances or safety issues are encountered. The two pipes will be installed in a single disturbance that will not require interim temporary stabilization/restoration.

**For stream, river, wetlands or other water body utility crossings that will be open cut:**

1. No work shall commence through a stream, river, wetlands or other water body during inclement weather.

2. A utility line crossing of a stream channel 10 feet in bottom width or less shall be completed within 24 hours from start to finish including trench backfill, stabilization of stream banks and stabilization of the area 50 feet back from the top of each stream bank.

3. A utility line crossing of a stream channel between 10 feet and 100 feet in bottom width shall be completed within 48 hours from start to finish including trench backfill, stabilization of stream banks and stabilization of the area 50 feet back from the top of each stream bank.

4. Wetland crossings are to be completed along with the mainline installation and will be dependent upon the length of the crossing.

5. Facilities for removing sediment from pumped water should be available at the stream crossing site before trenching commences and maintained until trench backfilling is completed. Assembly areas, temporary equipment and non-hazardous material storage areas shall be located at least 50 feet back from the top of any bank.

6. Install temporary equipment crossings at streams and temporary timber mats at wetland crossings in accordance with notes and details.

7. For dry stream crossings install pump bypass, dry flume, or cofferdam in accordance with notes and details.

8. Dewatering work area. Water from the excavation shall be pumped to a sediment filter bag. Where possible, excavation shall be from the top of the stream bank, where technically feasible.

9. Stabilize channel excavation and stream banks prior to redirecting stream flow.

**For conventional and HDD bore crossings:**

**<u>Conventional bores</u>**

1. Conventional bores will be conducted along with main line installation to limit the time of disturbance in those areas.

2. Install compost filter socks downgradient of the bore and receiving pits.

3. Excavate pits as shown in the typical stream crossing detail on plan sheet ES-0.17

4. Bore beneath streams where indicated on the construction drawings.

5. Water from the bore pits and work areas shall be pumped to a pumped water filter bag in accordance with detail on plan sheet ES-0.07.

6. Upon completion, backfill all pits.

**HDD bores**

1. Install compost filter socks at staging and pullback areas in accordance with E&S plan sheets. Where applicable temporary grading of staging areas is provided on plan sheets.

2. Bore and pullback areas shall be located a minimum of 50 feet back from each top of stream bank unless authorized by PADEP.

3. The HDD bore alignment shall be monitored for inadvertent returns. An inadvertent return plan has been developed for this project. This plan is to be reviewed, onsite, and implemented for each drill conducted.

4. Upon completion of HDD bore, restore bore and pullback areas to pre-construction conditions in accordance with E&S plans and details.

**See Attachment 3 for the HDD Plans and Profiles.**

**For working within a wetland area:**

1. Locate staging areas and access points. Staging areas should be located at least 50 feet from the edge of the wetland. Install sediment barriers down slope of these areas.

2. Install rock construction entrance as needed. Refer to the rock construction entrance detail on drawings for suggested dimensions.

3. Install orange flagging around perimeter of wetland and sediment barriers along the perimeters of the site as shown on the construction drawings.

4. Mats, pads, or similar devices shall be used during the crossings of wetlands. Original grades through wetlands must be restored after trenching and backfilling. Any excess fill materials must be removed from the wetland and not spread on-site.

5. Soil excavated from wetland areas shall be carefully removed with the roots intact. This soil should be placed in a separate stockpile to be reused during the wetland surface restitution.

6. Dewater work area; water from the excavation shall be pumped to a sediment trap or a filter bag.

7. Install pipe.

8. Install trench plugs in wetland areas to prevent the trench from draining the wetland or changing its hydrology.

9. Backfill pipe trench. Backfill the top 12-inches of the excavated trench with the stockpiled wetland soil to match original surface grades.

10. No soil amendments such as agricultural lime, fertilizer, etc. Will be used within wetland areas.

11. Compact backfill and grade the surface of the trench area to allow for positive drainage to soil erosion and sediment controls and to prepare disturbed areas for permanent trench restoration.

12. Maintain all erosion and sedimentation control devices until site work is complete and a uniform 70% perennial vegetative cover is established.

13. Remove all soil and erosion sediment control measures upon establishment of a uniform 70% vegetative cover over the disturbed area. Re-grade and revegetate areas disturbed during the removal of the soil erosion and sediment controls.

**For temporary stream and wetland crossings:**

1. Install temporary equipment crossings and temporary timber mat wetland crossings in accordance with plan sheet ES-0.10.

2. Temporary stream crossings shall be inspected on a daily basis. Damaged crossings shall be repaired within 24 hours of the inspection and before any subsequent use. Sediment deposits on the crossing or its approaches shall be removed within 24 hours of the inspection.

3. As soon as the temporary crossing is no longer needed, remove temporary crossing. All materials shall be disposed of properly and disturbed areas stabilized. Remove all soil and erosion sediment control measures upon establishment of a uniform 70% vegetation cover over the disturbed area.

## 3.2 BEST MANAGEMENT PRACTICES

An effective method to minimize E&S migration is to promote and implement BMPs. BMPs are relatively simple, inexpensive, and cost-effective protocols to prevent E&S migration. The basic BMPs that are anticipated to be employed during the construction activities include:

- Minimizing disturbances to site areas, especially those currently covered with pavement or vegetation.
- Minimize the time that soil is exposed.
- Prevent the runoff from flowing across disturbed areas (divert the flow to vegetated areas).
- Stabilize disturbed soils as soon as possible.

- Slow down the runoff flowing across the site.
- Remove sediment from surface water runoff before it leaves the site.

## 3.3 SEQUENCE OF BMP INSTALLATION

General stabilization and structural controls will be used in E&SC practices to (1) divert stormwater flows away from exposed areas, (2) convey runoff, (3) prevent sediments from moving off-site, and (4) reduce the erosive forces of runoff waters. Compost filter socks and other structural controls that will be utilized during construction activities will include the following:

**Vegetative Stabilization Controls**

Grounds disturbed by any of the operations necessary to complete the work for this project are to be permanently seeded, or if specified, sodded, unless occupied by structures or paved. A temporary cessation of earth disturbance activities that lasts for four days or longer requires temporary stabilization. Disturbed areas, which are at final grade, will be seeded and mulched immediately.

If seeding cannot be completed immediately after the area reaches final grade due to weather conditions, the disturbed area will be stabilized and mulched with straw at the rate of 3 tons per acre. This straw will be anchored using a method described under Mulching of this narrative.

**Structural Controls**

Temporary control facilities to be used during construction include the use of compost filter socks and rock construction entrances. Other structural controls as described below may also be used as deemed necessary based on conditions encountered in the field. Installation guidelines and locations for the below devices are as shown on standard drawings and plans. The temporary control measures that will be used on this project include, but are not limited to:

- Compost Filter Socks - This temporary sedimentation control measure consists of wood or metal posts driven through a compost filled mesh tube. Filter socks will be located as needed on side-slope and down-slope boundaries of disturbed areas. Both ends of each compost filter sock should be extended at least 8 feet upslope. Compost filter socks will be sized using the PADEP Construction Detail provided in Attachment 4. Compost filter socks will be used in drainage areas with HQ and EV waters.
- Rock Filter Outlet – Rock filter outlets will be used, as necessary, to address problems of concentrated flows to sediment barriers. In the event of unanticipated concentrated flow and sediment barrier failure, install a rock filter outlet unless the concentrated flow can be diverted away from the barrier. Rock filter outlets used in drainage areas with HQ and EV waters need a 6” layer of compost installed on the upslope side of the rock.

- Rock Filter – Rock filters are proposed to trap sediment in a newly constructed channel, diversion of channels, and at the inlet of pipe diversions.

- Compost Sock Sediment Trap - This temporary sedimentation control measure is useful in controlling runoff from access roads and may also be used at other locations where a temporary sediment trap is appropriate. The minimum base width will be equivalent to the height of the trap and sediment accumulation will not exceed 1/3 the total height of the trap. Ends of the trap will be a minimum of 1 foot higher in elevation that the mid-section, which will be located at the point of discharge. Compost sock sediment trap will be sized using the PADEP Construction Detail provided in Attachment 4. Compost sock sediment traps can be used in drainage areas with HQ and EV waters.

- Tarpaulin Covers - Tarpaulin covers will be used, as necessary, to protect topsoil storage stockpiles from wind and precipitation erosion. Stockpile slopes will be 2:1 or less. A minimal amount of soil will be stockpiled so that the height of the stockpile is less than 35 feet. Compost filter sock is also proposed to protect sediment runoff from stockpile areas.

- Rock Construction Entrance – Temporary access routes will be established on and proximate to the site to facilitate construction activities. The use of access routes will help confine truck and equipment traffic to specific corridors thus minimizing land disturbance and protecting vegetation. Site traffic during wet weather will be limited. No vehicles will be permitted in streams or rivers.

- Wash Racks – Wash racks will be used at rock construction entrances and will be designed to accommodate anticipated vehicular traffic. A water supply will be made available at wash racks to wash the wheels of vehicles exiting the site. Reasonable methods which are sanctioned by the PADEP as alternatives to installation of tire wash stations on public road access points for gathering pipeline projects in EV/HQ or siltation impaired watersheds include:

    1. For paved surface public roads: use of a vacuum truck sweeper or sweeper with a catch bin attachment.

    2. For dirt or gravel surface public roads: rigorous manual removal of mud/dirt from vehicle/equipment tires prior to exiting construction site, supplemented by immediate recover, by manual or mechanical means, of soil which may become discharged onto public roadways. Dust control and/or compaction via rolling of the dirt public road surface will be implemented as needed.

    A predicate for utilizing alternative 1 and 2 above is that the rock pad construction entrance must be extended to a minimum total length of 100 feet and will be constantly maintained including structure thickness to insure its effectiveness remains intact at all times.

Frequency of mechanical and/or manual controls will be dependent upon construction traffic intensity, weather, and soil moisture conditions. At a minimum for paved roads – any day in which construction traffic is exiting the rock construction entrance, the vacuum truck sweeper or sweeper with a catch bin attachment will clean the roadway at the end of the work day and prior to any forecasted rain event. The requirement is to not introduce sediment load from construction traffic onto public road surfaces and into road ditches which will flow into the EV/HQ or siltation impaired water resources which are the subject of the increased protection measures.

- Pumped Water Filter Bag – Pumped water filter bags may be used to filter water pumped from disturbed areas prior to discharging to surface waters. Compost filter socks will be installed within 50 feet of any receiving surface water or where grassy area is not available. Filter bags will be installed according to the details shown in the PADEP Construction Detail provided in Attachment 4.

- Erosion Control Blanket - A manufactured erosion control blanket will be installed on all slopes 3:1 or steeper and within 50 feet of surface water or 100 feet of special protected water. The blanket will be biodegradable but capable of providing protection for two growing seasons. Straw or similar fiber material will be placed between two biodegradable nets. The top net will be heavyweight and UV stabilized; the bottom net will be a lightweight netting. Erosion control blankets will be anchored and stapled in place in accordance with the manufacturer's recommendations and the detail on the construction drawings. For slopes between 3:1 and 1:1 use erosion control blanket SC 150 as manufactured by North American Green or Owner approved equal material or equal method. In areas where livestock is kept use erosion control blanket BioNet SC150BN as manufactured by North American Green or Owner approved equal material or equal method

- Waterbars – Waterbars will be installed across the ROW on all slopes greater than 5 percent. Waterbars will be constructed at a slope of 2 percent and discharge to a well-vegetated area. Waterbars will not discharge into an open trench. Waterbars will be oriented so that the discharge does not flow back onto the ROW. Obstructions (e.g. compost filter socks etc.) will not be placed in any waterbars. Where needed, they will be located below the discharge end of the waterbar. Waterbars will be installed in accordance with the detail provided in Attachment 4.

- Trench Plugs – Impervious trench plugs are required for all stream, river, wetland, or other water body crossings. Trench plugs are also used on slope run spacing. See drawings.

- Upslope Diversion Berms – Diversion berms are proposed to divert clean water runoff around the disturbed area for the project.

- Slope Pipes – Slope pipes are proposed to convey the water from the upslope diversion berms through the disturbed area. The slope pipes will outlet to a triple stack of compost filter sock to act as a level spreader to minimize outlet velocities so that they are non-erosive and dissipate flows.

- Water Deflectors – Water deflectors are proposed to direct runoff off of rock construction entrances and temporary access roads to discharge to stabilized vegetated areas. Compost filter socks can also be used at the outlet ends to trap sediment and minimize velocities.

- Public Rights of Way - In an effort to reduce the tracking of sediment onto public ROW, stabilized construction entrances of crushed stone located at points where traffic will be entering or leaving the site will be installed. Mud and soil accumulating on roadways, as a result of construction activities, will be removed with hand tools, such as shovels, and disposed of properly. The contractor will check the road a minimum of twice daily to verify cleanliness at road crossings and take necessary corrective action. Gravel will be used to limit dust and erodability.

- Restoration - All improved areas disturbed by construction will be restored.

- Additional Requirements – Any additional requirements to adequately control E&S pollution will be the responsibility of the contractor and will be considered incidental to construction activities.

## 3.4 PRIMARY CONSTRUCTION ACTIVITIES

**Clearing and Grubbing**

When required, brush, scrub growth, saplings and trees so directed to be cut and removed will be completely removed from the site of the work. The contractor will remove stumps and large roots and refill the depressions with suitable compacted earth fill where necessary to bring the grade back to its original elevation or final design grade. The contractor will protect exposed bare earth by mulch, or other appropriate measures if clearing and grubbing operations are completed more than two days prior to pipeline installation.

Vegetation clearing, grubbing, or removal within the permanent ROW is not anticipated to occur as part of the operations and maintenance of the pipelines to be installed via an HDD or bore except in the areas within the LOD, which is depicted in the plan drawings. However, in instances where the LOD extends into wetlands, floodplains, and floodways, no maintenance clearing, cutting, removal, or other alteration will occur. Instead, alternative methods of inspections (e.g., foot patrol) will be employed to maintain the pipeline ROW in wetlands, floodplains, and floodways.

**Grading and Topsoil Stockpiling**

Before beginning excavation and/or filling work, the topsoil from all areas to be affected will be stripped and stockpiled in a separate stockpile from the other excavated soil material. After completion of the major construction work, the topsoil will then be replaced as the upper layer of backfill. In general, all topsoil stockpiles will be located within the LOD away from nearby streams and/or drainage ditches or watercourses. Temporary erosion protection devices such as compost filter socks will be used to protect

all stockpiled topsoil from being carried into nearby water courses by the action of any overland runoff water.

As topsoil stockpiles become completely depleted, the disturbed areas will be graded and revegetated. The compost filter socks will be removed only after a uniform 70-percent perennial vegetative coverage has been established across the disturbed area.

Topsoil will not be placed when the subgrade is frozen or when it is excessively wet or dry, and will not be handled when in a frozen or muddy condition.

**Vegetation**

Grounds disturbed by any of the operations necessary to complete the work for this project are to be permanently seeded, unless occupied by structures or paved. *The disturbed areas will be restored to meadow conditions or to the pre-existing condition (residential lawn or previously existing paved, gravel, or dirt roads).* Any temporary cessation of earth disturbance activities which lasts for four days or longer requires temporary stabilization. Disturbed areas, which are at final grade, will be seeded and mulched immediately.

If seeding cannot be completed immediately after the area reaches final grade due to weather conditions, the disturbed area will be stabilized and mulched with straw at the rate of 3 tons per acre. This straw will be anchored using a method described under Mulching of this narrative.

Seeded areas will be inspected weekly and after each runoff event. Necessary repairs will be made by the end of the week.

**Permanent Seeding**

| SITE CONDITIONS | NURSE CROP | SEED MIXTURE (SELECT ONE MIXTURE) |
|---|---|---|
| SLOPES AND BANKS (NOT MOWED)<br>WELL-DRAINED<br>VARIABLE DRAINAGE | <br>1 PLUS<br>1 PLUS | <br>3, 5, 8, OR 12 (1)<br>3 OR 7 |
| SLOPES AND BANKS (MOWED)<br>WELL-DRAINED<br>SLOPES AND BANKS (GRAZED/HAY)<br>WELL-DRAINED | 1 PLUS<br><br>1 PLUS | 2 OR 10<br><br>2,3, OR 13 |

| SITE CONDITIONS | NURSE CROP | SEED MIXTURE (SELECT ONE MIXTURE) |
|---|---|---|
| GULLIES AND ERODED AREAS<br>EROSION CONTROL FACILITIES (BMPS) | 1 PLUS | 3, 5, 7, OR 12 (1) |
| SOD WATERWAYS, SPILLWAYS, FREQUENT WATER FLOW AREAS | 1 PLUS | 2, 3, OR 4 |
| DRAINAGE DITCHES | | |
| SHALLOW, LESS THAN THREE FEET DEEP | 1 PLUS | 2, 3, OR 4 |
| DEEP, NOT MOWED | 1 PLUS | 5 OR 7 |
| POND BANKS, DIKES, LEVEES, DAMS, DIVERSION CHANNELS, AND OCCASIONAL WATER FLOW AREAS | | |
| MOWED AREAS | 1 PLUS | 2 OR 3 |
| NON-MOWED AREAS | 1 PLUS | 5 OR 7 |
| FOR HAY OR SILAGE ON DIVERSION CHANNELS AND OCCASIONAL WATER FLOW AREAS | 1 PLUS | 3 OR 13 |
| HIGHWAYS (2) | | |
| NON-MOWED AREAS | | |
| WELL-DRAINED | 1 PLUS | 5, 7, 8, 9, OR 10 |
| VARIABLE DRAINED | 1 PLUS | 3 OR 7 |
| POORLY DRAINED | 1 PLUS | 3 OR 9 |
| AREAS MOWED SEVERAL TIMES PER YEAR | 1 PLUS | 2, 3, OR 10 |
| UTILITY ROW | | |
| WELL-DRAINED | 1 PLUS | 5, 8, OR 12 (1) |
| VARIABLE DRAINED | 1 PLUS | 3 OR 7 |
| WELL-DRAINED AREAS FOR GRAZING/HAY | 1 PLUS | 2, 3, OR 13 |
| EFFLUENT DISPOSAL AREAS | 1 PLUS | 3 OR 4 |
| SANITARY LANDFILLS | 1 PLUS | 3, 5, 7, 11 (1), OR 12 (1) |
| SURFACE MINES | | |
| SPOILS, MINE WASTES, FLY ASH, SLAG, SETTLING BASIN RESIDUES AND OTHER SEVERELY DISTURBED AREAS (LIME TO SOIL TEST) | 1 PLUS | 3, 4, 5, 7, 8, 9,11 (1) OR 12(1) |
| SEVERELY DISTURBED AREAS FOR GRAZING/HAY | 1 PLUS | 3 OR 13 |

| RECOMMENDED SEED MIXTURES | | | |
|---|---|---|---|
| MIXTURE NO. | SPECIES | SEEDING RATES – PLS (1) | |
| | | MOST SITES | ADVERSE SITES |
| 1 (2) | spring oats (spring), or 64 96 | 64 | 96 |
| | annual ryegrass (spring or fall), or | 10 | 15 |
| | winter wheat (fall), or | 90 | 120 |
| | winter rye (fall) | 56 | 112 |
| 2 (3) | tall fescue, or 75 | 60 | 75 |
| | fine fescue, or 40 | 35 | 40 |
| | kentucky bluegrass, plus 25 30 | 25 | 30 |
| | redtop(4), or | 3 | 3 |
| | perennial ryegrass | 15 | 20 |
| 3 | birdsfoot trefoil, plus 6 10 | 6 | 10 |
| | tall fescue | 30 | 35 |
| 4 | birdsfoot trefoil, plus | 6 | 10 |
| | reed canarygrass | 10 | 15 |
| 5 (5) | Big Bluestem, plus | 10 | 15 |
| | tall fescue, or | 20 | 25 |
| | perennial ryegrass | 20 | 25 |
| 6 (5,6) | Big Bluestem, plus | 10 | 15 |

| RECOMMENDED SEED MIXTURES | | | |
|---|---|---|---|
| **MIXTURE NO.** | **SPECIES** | **SEEDING RATES – PLS (1)** | |
| | | MOST SITES | ADVERSE SITES |
| | annual ryegrass | 20 | 25 |
| 7 (5) | birdsfoot trefoil, plus | 20 | 30 |
| | Big Bluestem, plus | 20 | 30 |
| | tall fescue | 20 | 25 |
| 8 | flatpea, plus | 20 | 30 |
| | tall fescue, or | 20 | 30 |
| | perennial ryegrass | 20 | 25 |
| 9 (7) | serecia lespedeza, plus | 10 | 20 |
| | tall fescue, plus | 20 | 25 |
| | redtop(4) | 3 | 3 |
| 10 | tall fescue, plus | 40 | 60 |
| | fine fescue | 10 | 15 |
| 11 | deertongue, plus | 15 | 20 |
| | birdsfoot trefoil | 6 | 10 |
| 12(8) | switchgrass, or | 15 | 20 |
| | big bluestem, plus | 15 | 20 |
| | birdsfoot trefoil | 6 | 10 |
| 13 | orchardgrass, or | 20 | 30 |
| | smooth bromegrass, plus | 25 | 35 |
| | birdsfoot trefoil | 6 | 10 |

1. Pure live seed (pls) is the product of the percentage of pure seed times percentage germination divided by 100. For example, to secure the actual planting rate for switchgrass, divide 12 pounds pls shown on the seed tag. Thus, if the pls content of a given seed lot is 35 percent, divide 12 pls by 0.35 to obtain 34.3 pounds of seed required to plant one-acre. All mixtures in this table are shown in terms of pls.

2. If high-quality seed is used, for most sites seed spring oats at a rate of two bushels per acre, winter wheat at 11.5 bushels per acre, and winter rye at one bushel per acre. If germination is below 90 percent, increase these suggested seeding rates by 0.5 bushel per acre.

3. This mixture is suitable for frequent mowing. Do not cut shorter than 4 inches.

4. Keep seeding rate to that recommended in table. These species have many seeds per pound and are very competitive. To seed small quantities of small seeds such as weeping lovegrass and redtop, dilute with dry sawdust, sand, rice hulls, buckwheat hulls, etc.

5. Use for highway slopes and similar sites where the desired species after establishment is Big Bluestem.

6. Use only in extreme southeastern or extreme southwestern PA. Serecia lespedeza is not well adapted to most of PA.

7. Do not mow shorter than 9 to 10 inches.

8. If liming, fertilization, and preparation of seedbed are properly done and if care is taken to drill and cover the seed (or mulch applied), the rate for "most sites" should suffice. However, on eroded or coarse and poorly prepared seedbeds, particularly if the soil is very acidic or infertile, the rate for "adverse sites" should be used.

9. For seed mixtures 11 and 12, only use spring oats or weeping lovegrass (included in mix) as nurse crop.

In lawn areas, permanent cover will be established using the following PENNDOT seed mixture:

| **PENNDOT FORMULA B** | | | | |
|---|---|---|---|---|
| **Seeding Rate** | 3 lbs. per 1,000 square feet | | | |
| **Species** | **% by Weight** | **Purity %** | **Minimum % Germination** | **Maximum % Weed Seed** |
| **Kentucky Bluegrass** | 50 | 98 | 80 | 0.20 |
| **Perennial Rye** | 20 | 98 | 90 | 0.15 |
| **Red Fescue** | 30 | 98 | 85 | 0.15 |

| **PEM WETLAND SEED MIX** | | |
|---|---|---|
| **ERNST CONSERVATION SEED MIX NO. ERNMX-122 FACW Meadow Mix** | | |
| Seeding Rate | 20 lb per acre, or ½ lb per 1,000 sq ft | |
| Mix Type | Wet Meadow & Wetland Sites | |
| | | |
| Species List | 31% | Fox Sedge (Carex vulpinoidea) |
| | 20% | Virginia Wildrye (Elymus virginicus) |
| | 14% | Lurid (Shallow) Sedge (Carex lurida) |
| | 5% | Green Bulrush (Scipus atrovirens) |
| | 4% | Blue Vervain (Verbena hastate) |
| | 3.5% | Wood Reedgrass (Cinna arundinacea) |
| | 3% | Soft Rush (Juncus effuses) |
| | 3% | Blunt Broom Sedge (Carex scoparia) |
| | 3% | Hop Sedge (Carex luputina) |
| | 2% | Sensitive Fern (Onoclea sensibilis) |
| | 2% | Oxeye Sunflower (Heliopsis helianthoides) |
| | 1% | Rattlesnake Grass (Glyceria Canadensis) |
| | 1% | Woolgrass (Scirpus cyperinus) |
| | 1% | Swamp Milkweed (Asclepias incarnata) |
| | 1% | New England Aster (Aster novae-angliae (Symphyotrichum n.)) |
| | 1% | Flat Topped White Aster (Aster umbellatus (Doellingeria umbellate)) |
| | 0.5% | Joe Pye Weed (Eupatorium fistulosum) |
| | 0.5% | Boneset (Eupatorium perfoliatum) |
| | 0.5% | Ditch Stonecrop (Penthorum sedoides) |
| | 0.5% | Narrowleaf Blue Eyed Grass (sisyrinchlum angustifolium) |
| | 0.5% | Seedbox (Ludwigia alternifolia) |

| | |
|---|---|
| 0.5% | Great Blue Lobelia (Lobelia siphilitica) |
| 0.5% | Mud Plantain (Water Plantain) (Alisma subcordatum (A. plantago-aquatica)) |
| 0.5% | Square Stemmed Monkeyflower (Mimulus ringens) |
| 0.4% | Bladder (Star) Sedge (Carex intumescens) |
| 0.1% | Slender Mountainmint (Pycnanthemum tenuifolium) |
| Total 100% | |

**Planting Specifications for PFO or PSS Wetland Restoration Areas (see ES-0.17 for restoration detail)**

| Vegetation Planting Type | Size | Species [a] | | Wetland Status [b] |
|---|---|---|---|---|
| Shrub Species | Two to three-foot whip[c] | *Alnus serrulata* | Smooth Alder | OBL |
| | | *Cornus amomum* | Silky Dogwood | FACW |
| | | *Lindera benzoin* | Spicebush | FAC |
| | | *Viburnum dentatum* | Northern arrow-wood | FAC |
| Tree Species | Containerized (1-inch DBH)[c] | *Acer rubrum* | Red maple | FAC |
| | | *Betula alleghaniensis* | Yellow Birch | FAC |
| | | *Platanus occidentalis* | American Sycamore | FACW |
| | | *Quercus bicolor* | Swamp White Oak | FACW |
| | | *Salix nigra* | Black Willow | OBL |

a – If the listed species is unavailable during planting, a comparable native substitute will be used.

b - USACE Eastern Mountains and Piedmont Wetland Status Trees and shrubs will be planted at a density of at least 400 plants/trees per acre in accordance with USACE guidance.

c - DBH = Diameter at breast height

**Liming Rates**

Minimum 6 tons per acre at 100% effective neutralizing value (% ENV), unless the soil test determines that a lesser amount is needed. To determine the actual amount of regular lime to apply, divide the amount called for by the soil test by the % ENV for the product used. For example, if 6 tons per acre is needed and the env for the lime used is 88%, divide 6 by 0.88 resulting in 6.8 tons needing to be applied. For dolomitic lime, which has a significant amount of magnesium in it, divide the amount called for by the soil test by the % calcium carbonate equivalent (% CCE) listed for the product instead of the % ENV. The % CCE may be above 100% which accounts for the fact that magnesium has a greater effect per pound than the calcium

in regular lime. Note: When a soil test requires more than 8,000 pounds of lime per acre, the lime must be mixed into the top 6 inches of soil.

**Fertilization Rates**

Apply 10-20-20 at 600 pounds/acre, if top dressed or 1,000 pounds/ac, if incorporated, unless the soil test determines that the rate can be less than these minimums.

| SOIL AMENDMENT APPLICATION RATE EQUIVALENTS | | | | |
|---|---|---|---|---|
| Soil Amendment | Per Acre | Per 1,000 sq. ft. | Per 1,000 sq. yds. | |
| AGRICULTURAL LIME | 6 TONS | 240 LBS. | 240 LBS. | or as per soil test; may not be required in agricultural fields |
| 10-20-20 FERTILIZER | 1,000 LBS. | 25 LBS. | 25 LBS. | or as per soil test; may not be required in agricultural fields |

**Temporary Seeding**

Temporary grass cover will be established in the following areas:

1. Where soil stockpiles are to be exposed for a period greater than four (4) days, the stockpile will be seeded.

2. Where vegetative filters must be established below filter bags, a minimum distance of 10 feet will be seeded down slope of the trap outlet.

Temporary Cover - Seed mixture for temporary cover will consist of 100-percent annual ryegrass. Seed will be applied at the rate of 40 lb per acre or as recommended by a local recognized seed supplier approved by the owner's representative. Prior to seeding, apply 1 ton of agricultural grade limestone per acre plus 10-10-10 fertilizer at the rate of 500 lb. per acre and work into soil.

**Mulching**

The purpose of mulch is to reduce runoff and erosion, prevent surface compaction or crusting, conserve moisture, and control weeds. Mulch will be applied on any area subject to erosion, or which has unfavorable conditions for plant establishment and growth. The practice may be used alone or in conjunction with other structural and vegetative conservation practices, such as waterways, ponds, sedimentation traps or critical area planting. On sediment producing areas where the period of exposure is less than 2 months, mulch materials will be applied according to the following guidelines:

1. Straw mulch will be applied at the rate of three tons per acre. Chemically treated or salted straw is not acceptable as mulch.

2. Straw mulch will be anchored immediately after application by at least one of the following methods.

    A. "Crimped" into the soil using tractor drawn equipment (straight bladed coulter or similar). This method is limited to slopes no steeper than 3:1. Machinery should be operated on the contour. (Crimping of hay or straw by running it over with tracked machinery is not recommended)

    B. Asphalt, either emulsified or cut-back, containing no solvents or other diluting agents toxic to plant or animal life, uniformly applied at the rate of 31 gallons per 1,000 square feet.

    C. Synthetic binders (chemical binders) may be used as recommended by the manufacturer to anchor mulch provided sufficient documentation is provided to show that it is non-toxic to native plant and animal species.

    D. Lightweight plastic, fiber, or paper nets may be stapled over the mulch according to the manufacturer's recommendations.

Mulched areas will be checked periodically and after each runoff event (e.g. rain, snowmelt, etc.) for damage until the desired purpose of the mulching is achieved. Damaged portions of the mulch or tie-down material will be repaired upon discovery.

**Protection of Streams and Wetlands**

If a stream or wetland crossing or encroachment is required, work will be in accordance with all PADEP permits. Refer to E&SC detail sheets for stream and wetland crossing details for diversion of stream channel flow and protection of wetlands.

1. Contractor will minimize construction area through and along streams. When wetland areas are temporarily disturbed, isolate and stockpile soil for replacement after grading is completed.
2. Native stream bed material will be separated from other spoil for reinstallation after restoration (see the E&S Plan provided in Attachment 2). An evaluation was completed for sheer stress of stream flow against restored native stream bed material. If the evaluation indicated that the stream will not be stable with native material, then rip rap will be used. Site specific waterbody crossing and restoration plans providing direction for the installation of rip rap at these streams are included within the E&S Plans provided in Attachment 2. In these cases where rip rap is used and the stream bed is composed of rock, cobble, or gravel, then the native stone will be used for the top six inches of rip rap. Every effort will be made to segregate the entire top layer of native stone in streams with less than six inches of native stone where rip rap is proposed.

Furthermore, stream restoration will involve the application of rip rap for bank stabilization must comply with site specific drawings included within the E&S Plan provided in Attachment 2. Rip rap will be used to the minimum extent necessary to stabilize the stream bank, which is typically no more than 12 inches above the normal flow depth often evidenced by a lack of vegetation or a strand line. Stream banks above this elevation will be stabilized with erosion control blanket and revegetated.

3. Immediately upon completion of encroachment or crossing, stabilize stream bed and banks (i.e. seeding, erosion blanket, and native substrate material) prior to removal of temporary E&SC devices.
4. Should excavation extend to within 50 feet of the stream bank, construct compost filter socks (Standard Details on construction plans) parallel to the stream, a minimum of 1 foot beyond disturbed earth, to protect the stream. Disturbed areas within 50 feet of a stream or wetland will be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized. Seed and mulch all disturbed areas.

**Temporary Stream and Wetland Equipment Crossings**

No vehicular traffic will be permitted in the streams at any time during construction.

If crossing a stream by vehicles is required to facilitate construction, a temporary stream crossing will be installed for this purpose. Work will be in accordance with PADEP Permit Requirements.

**Travel Lanes**

Portions of the project LOD have been identified as travel lanes. These areas exist along the project ROW and will be used for travel between HDD workspaces. Some of these areas will also be mechanically-cleared of trees and brush to improve travel and/or line-of-sight for HDD activities. For travel lanes involving mechanical clearing, the LOD limits have been sighted outside of wetlands and most floodplains and floodways. For any portions of the travel lanes that are crossing resources, an equipment bridge/working platform will be installed per details provided in the E&S Plan Sheets (Attachment 2).

Travel lanes have also been labeled on the E&S Plan Sheets and designated as either “ROW-Travel LOD” (temporary impacts) or “ROW-Travel and Clearing LOD” (permanent impacts). Necessary E&S control have been added as well.

**Minimization of Soil Compaction**

Pre-construction planning and final design has reduced the LOD, and therefore the area subjected to compaction, to the maximum extent while allowing safe installation of the pipeline. During construction, all land disturbance is limited to the defined LOD. Within the LOD, contractors are to minimize land disturbance to the maximum extent. Repeated travel is restricted to travel lanes and travel throughs are limited to those

necessary to complete the work. Implementation of construction sequencing ensures the number of passes with equipment and duration of the project is minimized. In wetlands and other sensitive areas, the installation of timber mats (or equal such as composite matting), and limiting equipment and vehicle travel, ensures compaction is minimized. In addition, top soil segregation and restoration BMPs offer significant protection to the layer most vulnerable to compaction. Upon completion of pipeline installation and trench backfill, replace segregated topsoil to pre-construction grades. Contractor is to take every precaution to minimize compaction during placement of topsoil. Provide surface roughening in accordance with PADEP E&S Pollution Control Program Manual. Surface roughing is the practice of providing a rough soil surface with horizontal depressions for the purpose of reducing runoff velocity, increasing infiltration, aiding the establishment of vegetation, and reducing erosion. During the preparation for seeding on slopes 3H:1V or steeper, unless a stable rock face is provided, surface roughening is to be conducted by tracking the slopes by running tracked equipment (with blades up) across the surface as to leave track marks parallel to the contour. Any area where stone and/or timber mats are used for temporary stabilization, soil will be decompacted through multiple passes using tracked equipment to roughen the surface. The tracking method can be used elsewhere to aid in the decompaction of soils as deemed necessary to facilitate successful restoration. This tracking method can be used on the subsoil before topsoil replacement and/or on the topsoil prior to seeding. In agricultural areas, severely compacted areas are to be plowed with a harrow, paraplow, paratill or other equipment before subsoil replacement. Vehicular traffic is to be restricted from areas that are ready to be seeded.

A note consistent with the Department's Manual will be included on all construction plans which states that any area that used stone and/or timber mats for temporary stabilization and/or access will be completely removed, soil will be decompacted by using tracked equipment making multiple passes over area, reestablish preconstruction contours, and replace topsoil to a minimum of 4-8 inches deep and seed and mulch areas. Vehicular traffic should be restricted from areas to prevent soil compaction.

**Waste Considerations**

The operator will remove from the site, recycle, or dispose of all building materials and wastes in accordance with the PADEP's solid waste management regulations at 25 Pa. Code 260.1 et seq., 271.1 et seq., and 287.1 et seq. The contractor will not illegally bury, dump, or discharge building material or wastes at the site. Excess material brought into the site areas to facilitate construction access will be completely removed prior to rough grading and final surface stabilization. Expected construction wastes will consist of packaging material and sediment cleaned from BMPs. Packaging from the materials brought on site will be disposed of by a licensed hauler. Sediment removed from BMPs will either be spread in a protected area to dry and then recycled as fill material or disposed of off-site. In cases where disposal is necessary, waste materials are to be disposed of at an approved PADEP waste disposal site.

**Thermal Impacts**

Thermal impacts are most commonly associated with urbanization (i.e., increased impervious surfaces) that results in heated stormwater runoff flowing into receiving waters where it mixes, and potentially increases the base temperature of the surface water in streams. However, another contributing factor for stream temperature is solar exposure (radiant energy input) to the surface water, typically ponded, standing waters. The amount of heat transferred, and the degree of thermal pollution is of importance for fisheries management and the ecological integrity of receiving waters. Among the attributes that determine the contribution of solar energy to thermal impacts are the presence of riparian vegetation, as well as stream width, depth, flow regime (perennial, intermittent, ephemeral), and orientation. However, a singular linear crossing of minimal width and vegetation clearing is not considered a contributing factor to thermal impacts.

Potential pollution to surface waters from thermal impacts will be minimized by minimizing the clearing of riparian vegetation at stream crossings along the ROW and avoiding the addition/creation of impervious surfaces in riparian areas, The Project does not have thermal impacts. Following construction, permanent seeding will occur as soon as practicable to facilitate vegetative growth during germinating months.

Specifically, thermal impacts will be avoided by implementing the following:

- Siting parallel to and overlapping with existing ROWs to minimize vegetation clearing at stream crossings;
- Reducing the construction ROW width and additional temporary workspaces at stream crossings;
- No grubbing, grading, or clearing of trees will occur within 50 feet of the top of stream bank until pipeline construction/installation is ready to proceed through that area.
- Restoring (seeding) disturbed areas/ROW as soon as practicable and /or directing runoff to vegetated areas to reduce the temperature of runoff prior to discharge into the streams; and,
- Restoring the stream banks and seeding/planting as soon as practicable to facilitate vegetative growth along the stream channel.

**Riparian Forest Buffers**

A separate waiver request has been prepared and is provided as Attachment 6 to the NOI application. The following summarizes that request. The Pennsylvania Pipeline Project qualifies for an exemption of the riparian forest buffer requirement under Chapter 102.14(d)(1)(ix) for areas within the Chapter 105 permit area. Existing riparian forest buffers within the project area are identified on the E&S plan drawings in Attachment 2 of the E&S Plan.

In addition to the exemption, we are requesting a waiver under 102.14(d)(2)(ii) for areas within 150' of surface waters that are outside of the Chapter 105 permit area.

**Demonstration of Waiver Necessity**

A riparian forest buffer waiver is necessary to complete the intended scope of the pipeline project. The project is from Houston to Delmont, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. The project crosses through Chester County for approximately 23.6 miles, and Delaware County for approximately 11.4 miles. Due to the linear nature of the project and the surrounding topography, riparian forest buffers could not be avoided altogether.

**Alternatives Analysis**

Impacts to environmental resources, including riparian forest buffers, were evaluated during the pipeline routing phase of the project. Field teams were deployed to evaluate alternate routes based on environmental and constructability constraints. The final route that was selected minimizes environmental impacts to the maximum extent practicable while still maintaining the project's overall constructability and ensuring a safe working environment while also taking landowner constraints into consideration. Additionally, several variations of horizontal direction drill profiles were evaluated to minimize pullback areas, additional workspaces, and overall disturbance within riparian forest buffers.

**Demonstration of Minimizing Impacts**

All disturbance activities, including those which impact riparian forest buffers, have been reduced to the maximum extent practicable. The LOD has been reduced to 50 feet wide at all stream crossings within the riparian forest buffer area where possible adjacent to the stream area required for crossing and construction. In areas where it is not practicable to reduce the LOD throughout the entire extent of the riparian forest buffer, the LOD has been reduced to 50 feet wide within 10 feet of the stream banks to limit the proximity of the work areas as per the stream crossing detail from the PADEP manual. The operations within the LOD near stream crossings typically includes a topsoil stockpile, a stockpile for pipe trench excavation material, a pipe trench, a travel lane, a work area for equipment operation and pipeline welding outside the trench, and an area to install the erosion control BMPs. In addition, site conditions such as steep slopes, varying depths of topsoil, and other on-site conditions limit the amount of work area. Reducing the LOD to a greater extent could potentially result in unsafe working conditions and would hinder the ability to complete the stream crossing within the required time frame of 24 hours or less. Workspaces that provide additional space for stream crossing activities have been placed outside of riparian forest buffers where possible.

**Meeting Requirements of Chapter 102**

All other requirements of Chapter 102 to minimize impacts to riparian buffers are being met in the project's Erosion and Sediment Control Plan and Site Restoration/Post-Construction Stormwater Management Plans which have been designed in accordance with Chapter 102 and in HQ/EV watersheds to implement ABACT controls where non discharge alternatives do not exist. In accordance with Chapter 102, and E&S plan has been developed to minimize the sediment entering the buffer areas through the use of properly designed E&S bmp's such as, but not limited to, waterbars, compost filter sock, diversion berms, slope pipes and erosion control blanket. A site restoration plan is proposed to revegetate the buffer areas within the right of way. The post construction stormwater management plan has been designed to control runoff rate and volume at permanent above ground facilities through infiltration practices.

**Stormwater Runoff Analysis**

The pre-construction drainage patterns surrounding the project will be maintained. All disturbed areas within the Major Modification LOD will be restored to a meadow in good condition or lawn where required by landowners. As a result of restoring the pipeline ROW and associated workspaces associated with the Major Modification to a meadow in good condition and maintaining pre-construction drainage patterns, there will be no increase in stormwater runoff rate or volume attributed to those areas.

## 3.5 MAINTENANCE AND INSPECTION PROCEDURES

Maintenance to the temporary E&SC structures will be performed by the contractor during the construction period. A log or written report showing dates that E&S bmp's were inspected as well as any deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection.

**Compost Filter Socks**

- Accumulated sediment will be removed as required, and in all cases where uniform accumulations are half the above ground height of the filter sock. Any accumulated earth behind the filter sock will be disposed of by the contractor in such a manner that the removed earth will not be excessively eroded and transported into a waterbody.

- The filter sock/silt fence installation will be inspected weekly and after every runoff event. Loosened support stakes will be removed and new stakes driven. Filter socks will be maintained and repaired as per manufacturer specifications.

- Temporary E&SCs will be removed by the contractor only after a uniform 70-percent perennial vegetative coverage has been established across the disturbed area. Temporary E&SCs will be disposed of by the contractor at an approved PADEP waste disposal facility.

**Rock Construction Entrances**

- Rock construction entrance thickness will be constantly maintained to the specified dimensions by adding rock. A stockpile will be maintained on site for this purpose.

**Access Road**

- The proposed access roads will be inspected weekly and after runoff events. Additional aggregate will be applied to the road as needed to maintain an adequate thickness, and ruts will be smoothed to prevent channelizing flow.

**Water bars**

- Water bars will be inspected weekly, daily on active roads, and after each runoff event.
- Damaged or eroded water bars will be restored to original dimensions within 24 hours of inspection.
- Maintenance of water bars will be provided until roadway, skid trail or ROW has achieved permanent stabilization.

**Pumped Water Filter Bags**

- Filter bags will be replaced when they become half full of sediment.
- Filter bags will be inspected daily. If any problem is detected, pumping will cease immediately and not resume until the problem is corrected.

**Vegetation**

Seeded areas will be inspected weekly and after each runoff event. Necessary repairs will be made immediately.

**Mulch**

Mulched areas will be checked periodically and after severe storms for damage until the desired purpose of the mulching is achieved. Damaged portions of the mulch or tie-down material will be repaired upon discovery.

**Inspection and Maintenance**

Until the site is stabilized, E&SC BMP's will be maintained properly. Preventative and corrective maintenance work, including clean-out, repair, replacement, regarding, reseeding, mulching, and reknitting will be performed as soon as practical. If E&SC BMP's fail to perform as expected, replacement BMP's, or modifications to those installed will be required. The following inspection and maintenance practices will be used to maintain E&SCs on-site during activities.

- E&SC measures will be in-place and inspected at the end of the workday. E&SC measures will also be inspected after each runoff event. The contractor will immediately repair any deficiencies.
- Maintenance and inspection of sediment control facilities will conform to PADEP Chapter 102 and 105 rules and regulations.
- Sediment will be removed when it accumulates half the aboveground height of the compost filter sock. All undercutting of erosion of the toe anchor will be repaired with compacted backfill material. The contractor will adhere to the manufacturer's recommendations for replacing filter socks due to weathering.
- Sediment removed from filter socks and any other control devices will be mixed in with the other waste soil on the construction site and properly disposed of as discussed in Section 3.4.
- Sediment will be removed from the sediment removal facilities associated with wash racks as necessary. Sediment deposited on paved roadways will be removed and returned to the construction site daily, at a minimum.
- Re-vegetated areas will be inspected for bare spots, washouts, and healthy growth during the construction. Identified bare spots and washouts will be repaired as soon as practical.
- All soil stockpiles that are to remain more than 4 days will be seeded with temporary grass, as noted in the seeding specification on the construction drawings.
- The contractor will make certain that all runoff is directed to the sedimentation control devices.
- All sedimentation control measures will remain in place until the disturbed areas are stabilized and a uniform 70-percent perennial vegetative cover is established. Any area not achieving a 70-percent vegetative cover will be re-seeded and mulched within 24 hours of detection.

If E&S BMPs are found to be inoperative or ineffective during an inspection, PADEP should be contacted within 24 hours, followed by the submission of a written noncompliance report to PADEP within 5 days of the initial contact.

## 3.6 ANTIDEGRADATION

The HDD S3-0400 Major Modification reroute is located within an Siltation Impaired watershed. A combination of non-discharge alternatives and the use of ABACT BMPs will be implemented during construction to protect and maintain the existing water quality of the receiving waters. For special protection watersheds 25 Code §§102.8 (h) was followed, and for all the special protection watersheds listed in Table 1 non-discharge alternatives were evaluated and included, when possible. For areas where non-discharge alternatives were not available the ABACT site restoration BMPs were incorporated. Due to the linear

nature of this project all of the HQ/EV special protection watersheds received the same incorporation of ABACT site restoration BMPs throughout the pipeline.

Non-discharge alternatives were evaluated to minimize accelerated E&S and achieve zero net change in runoff between the pre- and post-construction conditions. Non–discharge alternatives exist when the existing land use is re-vegetated and grade is restored, and therefore no increase in runoff rate or volume from pre- to post-construction results. Other non-discharge alternatives implemented are limiting and minimizing the extent of disturbed areas and limiting the extent and duration of disturbance (phasing and sequencing), then stabilizing disturbed areas as soon as practicable. ABACT BMPs will be used onsite to protect and maintain the existing water quality of receiving waters also in areas where non-discharge alternatives exist.

Where non-discharge alternatives do not exist, ABACT BMPs will be used onsite to protect and maintain the quality of the receiving HQ, EV and siltation impaired resources. The extent of the disturbed area will be minimized, and the duration of disturbance will be minimized by stabilizing disturbed areas as soon as practicable. ABACT BMPs will be used onsite to protect and maintain the existing water quality of receiving waters.

The following ABACT E&S BMPs will be used onsite:

- Wash racks located at rock construction entrances,
- Compost filter sock is to be used,
- Erosion control blanket on disturbed areas within 100 feet of a receiving surface waters, where applicable, and on slopes 3:1 or steeper,
- Implementation of a PPC plan.

# 4.0 SITE RESTORATION PRACTICES

Following completion of pipeline installation and trench backfilling, the pipeline right of way, associated workspaces, and temporary access roads shall be returned to the general grade present prior to pipeline installation to maintain pre-construction drainage patterns. After completion of major construction work, topsoil that was stockpiled during construction will be placed along the ROW. Grounds disturbed by any of the operations necessary to complete the work for this project within the ROW are to be permanently seeded, or if specified, sodded, unless occupied by structures, paved, or designated as a permanent access road. Disturbed areas, which are at final grade, shall be seeded and mulched once final grades are achieved. The permanent seed mixture will restore disturbed areas to a meadow in good condition or better. If seeding cannot be completed within a four (4) day period due to weather conditions, the disturbed area will be mulched with straw at the rate of three (3) tons per acre. This straw will be anchored using a method described in Section 3.4.

## 4.1 BMP DESCRIPTION AND CONSTRUCTION SEQUENCE

A generalized construction sequence is provided below. The construction sequence is intended to provide a general course of action to conform to the applicable regulatory agency requirements for restoration and post-construction stormwater management of the site. Necessary steps for proper and complete execution of work pertaining to this plan, whether specifically mentioned or not, are to be performed by the contractor. The contractor will comply with all requirements listed in this section. The contractor may be required to alter controls based on the effectiveness of controls or differing conditions encountered in the field. The appropriate county conservation district and DEP shall be contacted and must approve any deviation to the authorized plans.

A pre-construction meeting is required prior to the start of any construction activity. The Pennsylvania Department of Environmental Protection (PADEP) or applicable county conservation district, contractors, the landowner, appropriate municipal officials, and the plan preparer must be invited to this meeting at least 7 days in advance.

**General Construction Sequence**

1. Grade surface to finished grade elevations as soon as practicable following completion of pipe installation.

2. Surface roughening will be utilized to rough the soil surface with horizontal depressions for the purpose of reducing runoff velocity, increasing infiltration, aiding the establishment of vegetation, and reducing erosion. Surface roughening should be applied to slopes 3H:1V or steeper unless a stable rock face is provided or it can be shown that there is not a potential for sediment pollution to surface waters. For roughened surfaces within 50 feet of a surface water, and where blanketing of seeded areas is proposed as the means to achieving permanent stabilization, spray-on type blankets are

recommended. Surface roughening shall be accomplished using dozers affixed with grouser tracked equipment. Dozers shall run up and down the slopes leaving horizontal grooves perpendicular to the slope. Dozer blades shall be raised and not used during surface roughening. Where compaction does occur, contractor shall scarifiy the soil or provide additional roughening such as deep ripping or chisel ripping to restore the area to a minimal compacted state. In areas of proposed infiltration, soils shall be amended to 2' below grade. See Soil Amendment and Restoration construction sequence below.

3. Place topsoil from topsoil stockpiles as the upper layer of backfill. Topsoil shall not be placed when the subgrade is frozen or when it is excessively wet or dry and shall not be handled when in a frozen or muddy condition.

4. Remove gravel and geotextile from the temporary access roads and scarify the soil. Refer to step 2 of this sequence to address compaction at access roads. After addressing compaction concerns, place topsoil that was stripped prior to installation of the access roads.

5. Immediately seed and mulch disturbed areas in accordance with the permanent seeding schedule once final grade is established and topsoil is placed.

6. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70-percent perennial vegetative cover is established. Regrade and revegetate areas disturbed during the removal of the erosion and sediment controls.

**Soil Amendment and Restoration Construction Sequence**

1. Grade surface to finished grade elevations as soon as practicable following completion of pipe installation.

2. In the designated soil amendment area, till the ground and mix in the compost at a ratio of 2:1 (soil:compost) to a depth of 24 inches.

3. Immediately seed and mulch disturbed areas once final grade is established in accordance with the permanent seeding schedule.

4. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70% perennial vegetative cover is established.

# 5.0 HYDROSTATIC TESTING AND ASSOCIATED PERMITTING

There are no changes to the hydrostatic testing locations as a result of the HDD S3-0400 Major Modification.

# 6.0 REFERENCES

Erosion and Sediment Pollution Control Program Manual, Commonwealth of Pennsylvania, Department of Environmental Protection, Office of Water Management, March 2012.

Stormwater Management for Construction Activities - Developing Pollution Prevention Plans and Best Management Practices, United States Environmental Protection Agency, Office of Water, 1993.

Pennsylvania Stormwater Best Management Practices Manual Draft, Pennsylvania Department of Environmental Protection, Bureau of Watershed Management, October 2009.

Downingtown, Elverson, Pottstown, Wagontown, Malvern, West Chester, and Media Quadrangles, Pennsylvania – Chester County, Geological Survey, United States Department of Interior.

Soil Survey of Chester County, Pennsylvania, United States Department of Agriculture, Soil Conservation Service.

DCNR, 2016. *Invasive Plants in Pennsylvania, Crown Vetch,* Coronilla varia. Accessed October 25, 2016. http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_010284.pdf.

TABLE 1:

Receiving Waters

**Receiving Waters Table**

Pennsylvania Pipeline Project

Southeast Region

Siltation Impairment Highlighted

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Conestoga River | Chester | West Nantmeal | WARM WATER FISHES | WWF | Yes | Agriculture- Nutrients; Other- Nutrients; Other- Organic Enrichment/Low D.O.; Source Uknown- Pathogens | Yes | Nutrients; Organic Enrichment/Low D.O. |
| UNT to South Branch French Creek | Chester | West Nantmeal | EXCEPTIONAL VALUE | EV | Yes | Source Unknown- Pathogens | No | N/A |
| South Branch French Creek | Chester | West Nantmeal | EXCEPTIONAL VALUE | EV | Yes | Source Unknown- Pathogens | No | N/A |
| UNT to Marsh Creek | Chester | West Nantmeal | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | East Nantmeal | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Upper East Branch Brandywine Creek | Chester | Wallace | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | Wallace | WARM WATER FISHES | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| Marsh Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Black Horse Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Black Horse Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Shamona Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Shamona Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Upper East Branch Brandywine Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | No | N/A |
| UNT to Valley Creek | Chester | Uwchlan | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Valley Creek | Chester | West Whiteland | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Valley Creek | Chester | West Whiteland | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| East Branch Chester Creek | Chester | West Whiteland | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| East Branch Chester Creek | Chester | West Goshen | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Chester | West Goshen | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Chester | West Goshen | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Chester Creek | Chester | Westtown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Chester | Westtown | HIGH QUALITY-TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Ridley Creek | Delaware | Thornbury | HIGH QUALITY-TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Chester Creek | Delaware | Thornbury | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Delaware | Edgmont | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Delaware | Edgmont | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| Rocky Run | Delaware | Middletown | HIGH QUALITY-COLD WATER FISHES | HQ | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Agriculture - Cause Unknown | No | N/A |
| UNT to Rocky Run | Delaware | Middletown | HIGH QUALITY-COLD WATER FISHES | HQ | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Agriculture - Cause Unknown | No | N/A |
| UNT to Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation | No | N/A |
| Chrome Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Crum Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Crum Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Delaware | Aston | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Aston | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Aston | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Delaware River | Delaware | Aston | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Aston | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Brookhaven | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Baldwin Run | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**

Pennsylvania Pipeline Project

Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Chester Creek | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Delaware River | Delaware | Chester | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Upper Chichester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Delaware River | Delaware | Upper Chichester | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

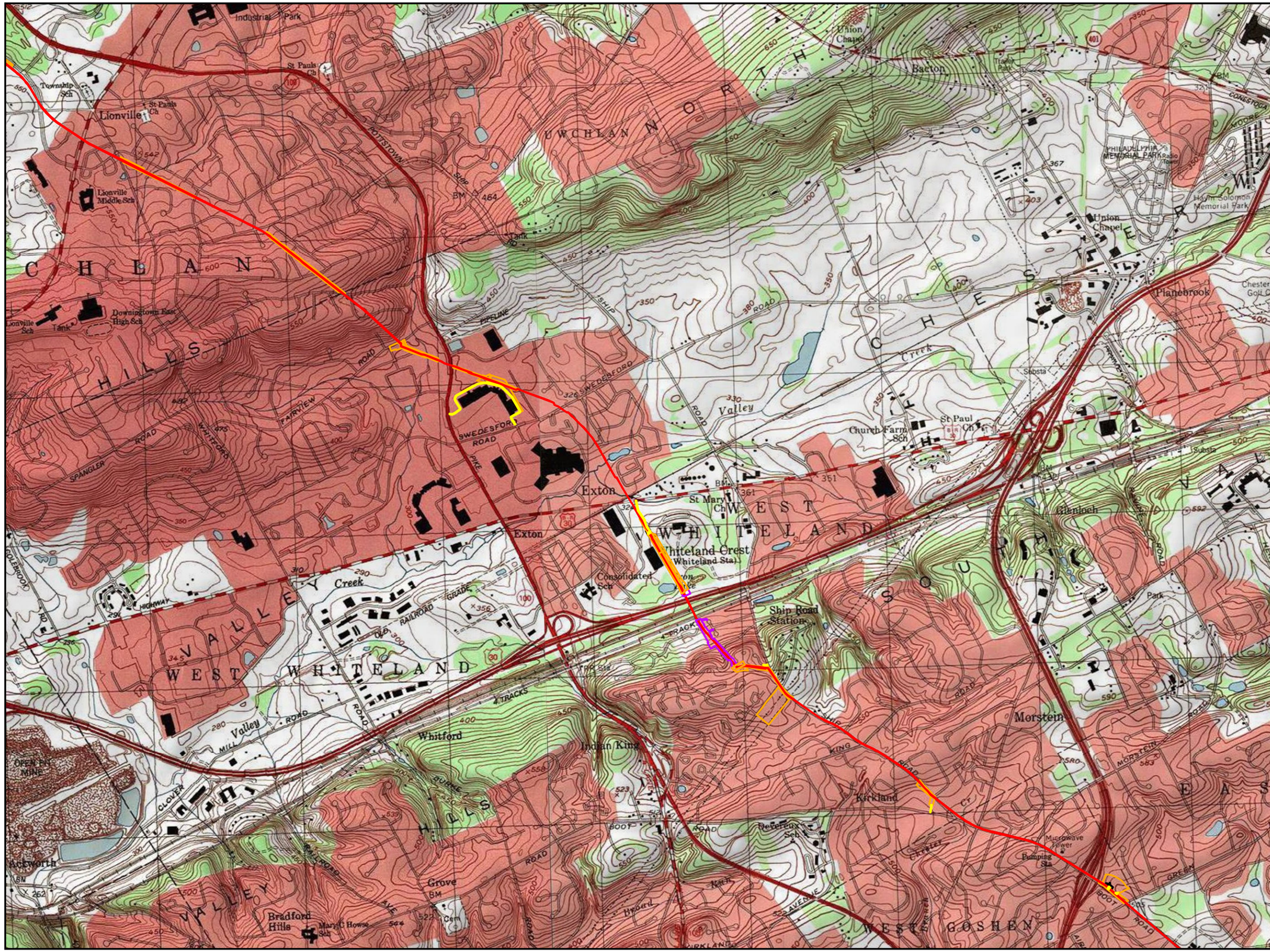
**Recieving Wetlands**
**Pennsylvania Pipeline Project**
**South-East Region**

| Municipality | Receiving Water | Number of Wetlands | Number of EV Wetlands (Classification) |
|---|---|---|---|
| **CHESTER COUNTY** | | | |
| West Nantmeal | UNT to South Branch French Creek | 9 | 7 (EV Stream) |
| West Nantmeal | UNT to Marsh Creek | 1 | 0 |
| East Nantmeal | UNT to Marsh Creek | 2 | 0 |
| Wallace | UNT to Marsh Creek | 6 | 0 |
| Upper Uwchlan | UNT to Marsh Creek | 16 | 0 |
| Upper Uwchlan | UNT to Black Horse Creek | 4 | 2 (Wild Trout/Bog Turtle) |
| Uwchlan | UNT to Shamona Creek | 5 | 1 (Wild Trout) |
| West Whiteland | UNT to Valley Creek | 17 | 0 |
| West Whiteland | UNT to Chester Creek | 2 | 0 |
| West Goshen | UNT to Chester Creek | 1 | 0 |
| East Goshen | UNT to Chester Creek | 2 | 0 |
| Westtown | UNT to Chester Creek | 1 | 0 |
| **DELAWARE COUNTY** | | | |
| Edgmont | UNT to Chester Creek | 6 | 0 |
| Middletown | UNT to Chester Creek | 18 | 2 (PuWS) |
| Middletown | UNT to Rocky Run | 4 | 1 (Wild Trout) |
| Middletown | UNT to Chrome Creek | 1 | |
| Aston | UNT to Chester Creek | 1 | 0 |
| Aston | UNT to Baldwin Run | 3 | 0 |
| Chester | UNT to Baldwin Run | 12 | 0 |
| Chester | UNT to Chester Creek | 2 | 0 |
| Upper Chichester | UNT to Baldwin Run | 14 | 0 |

Revised for Major Modification

ATTACHMENT 1:

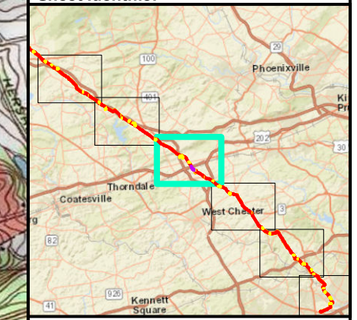
USGS Location Maps




## Legend

- Access Road
- Major Modification
- Limit of Disturbance
- Alignment Centerline
- Block Valve/Station

**Sheet Identifier**




N

Feet: 0 1,000 2,000

Meters: 0 300 600

**PROJECT LOCATION MAP**
**ATTACHMENT 1-3**
**PENNSYLVANIA PIPELINE PROJECT**
**NOVEMBER 12, 2016 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY,**
**PENNSYLVANIA**

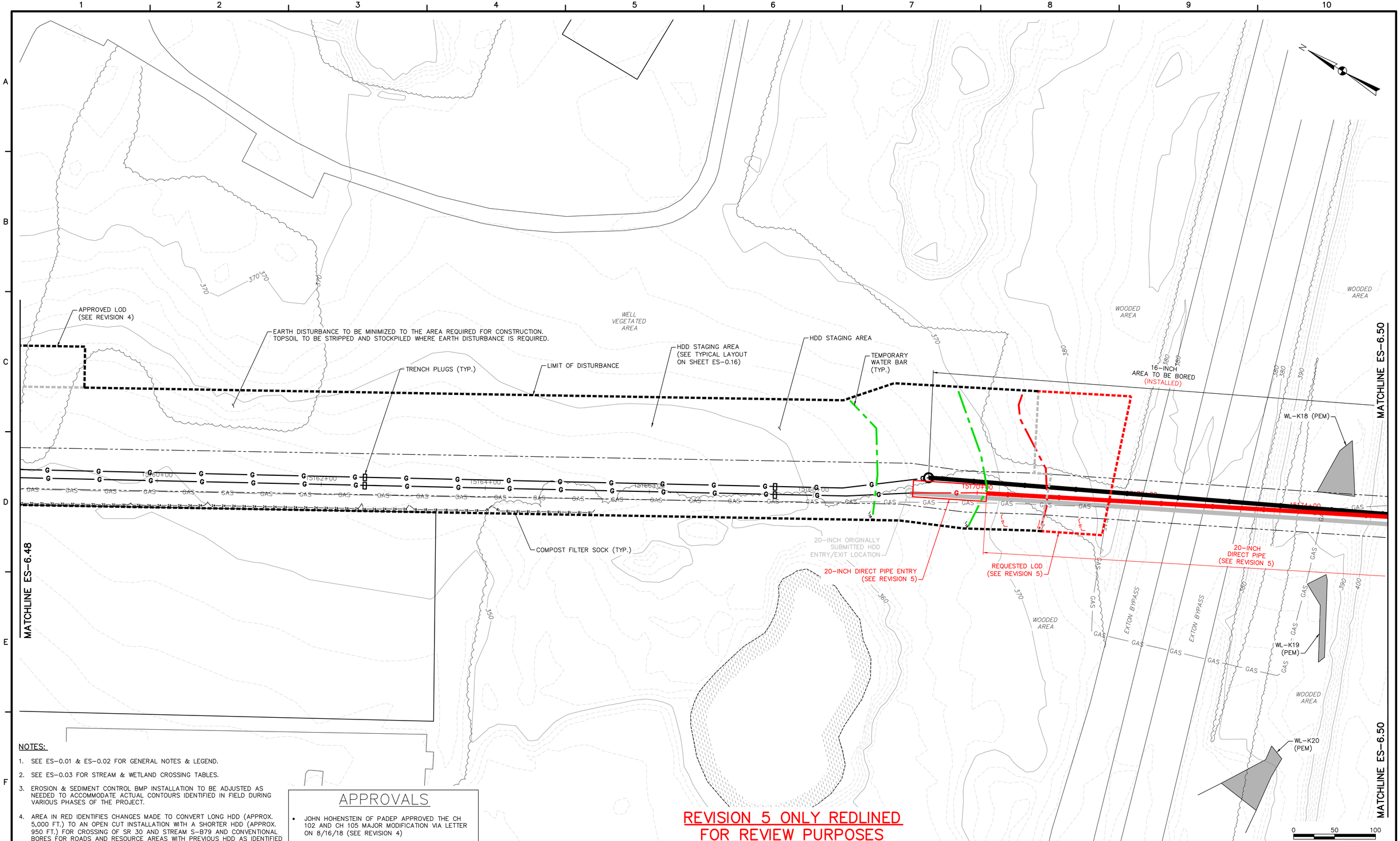
TETRA TECH

Notes:
1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
2) Quadrangles being displayed are Downingtown, Malvern

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPE\ESCGP\PENNPIPELINE_LI\SADRIVE_USGS_ESCGP_OPT3.MXD 05/01/19 TT

ATTACHMENT 2:

E&S Plan Sheets




NOTES:

1. SEE ES-0.01 & ES-0.02 FOR GENERAL NOTES & LEGEND.
2. SEE ES-0.03 FOR STREAM & WETLAND CROSSING TABLES.
3. EROSION & SEDIMENT CONTROL BMP INSTALLATION TO BE ADJUSTED AS NEEDED TO ACCOMMODATE ACTUAL CONTOURS IDENTIFIED IN FIELD DURING VARIOUS PHASES OF THE PROJECT.
4. AREA IN RED IDENTIFIES CHANGES MADE TO CONVERT LONG HDD (APPROX. 5,000 FT.) TO AN OPEN CUT INSTALLATION WITH A SHORTER HDD (APPROX. 950 FT.) FOR CROSSING OF SR 30 AND STREAM S-B79 AND CONVENTIONAL BORES FOR ROADS AND RESOURCE AREAS WITH PREVIOUS HDD AS IDENTIFIED ON PLAN.

APPROVALS

- JOHN HOHENSTEIN OF PADEP APPROVED THE CH 102 AND CH 105 MAJOR MODIFICATION VIA LETTER ON 8/16/18 (SEE REVISION 4)

REVISION 5 ONLY REDLINED
FOR REVIEW PURPOSES


TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040


REVISIONS

| NO. | BY | DATE | REMARKS |
|---|---|---|---|
| 1 | RS | 3/28/17 | INCORPORATED THE SPECIAL CONDITIONS SET FORTH IN DEP'S CHAPTER 102 AND CHAPTER 105 PERMITS |
| 2 | RS | 5/25/17 | DRAWINGS PROVIDED TO FIELD |
| 3 | RS | 8/18/17 | CONVERT HDD TO OPEN CUT |
| 4 | RS | 1/25/18 | FLEXBOR & LOD MODIFICATION |
| 5 | RS | 4/25/19 | LOD MODIFICATION AND 20" BORE CHANGE |

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT F. SIMCIK
ENGINEER
072364425-E
6/6/19

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT
CONSTRUCTION SPREAD 6

1-20" & 1-16" WELDED STEEL NATURAL GAS PIPELINES

CHESTER COUNTY CONSERVATION DISTRICT
EROSION & SEDIMENT CONTROL &
SITE RESTORATION PLAN
SHEET 49 OF 74

| | |
|---|---|
| DATE: | 2/6/17 |
| PROJECT NO.: | 112C05958 |
| DESIGNED BY: | JB |
| DRAWN BY: | BH |
| CHECKED BY: | RS |

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ES-6.49
SHEET 6.49 OF 99

R:_Marcellus Shale Projects\Sunoco\5958 – Penn Pipeline Project\17 – Chester\E&S\Lisa Drive – Option 3\E&S\5958ES006.49 – opt 3.dwg PIT NICHOLE.NAJESKI 5/5/2019 11:40:55 AM

MATCHLINE ES-6.49

WOODED AREA

WELL VEGETATED AREA

WOODED AREA

MICHELE DRIVE

LYNETREE DRIVE

LISA DRIVE

16-INCH AREA TO BE BORED (INSTALLED)

SURVEYED BUILDINGS

15176+00

15178+00

15184+00

15186+00

15188+00

15192+00

PEM WL-K21

20-INCH DIRECT PIPE (SEE REVISION 3)

20-INCH DIRECT PIPE EXIT (SEE REVISION 3)

REQUESTED LOD (SEE REVISION 3)

TRENCH PLUGS (TYP.)

LIMIT OF DISTURBANCE

HDD STAGING AREA (SEE TYPICAL LAYOUT ON SHEET ES-0.16)

HDD STAGING AREA

COMPOST FILTER SOCK (TYP.)

EARTH DISTURBANCE TO BE MINIMIZED TO THE AREA REQUIRED FOR CONSTRUCTION. TOPSOIL TO BE STRIPPED AND STOCKPILED WHERE EARTH DISTURBANCE IS REQUIRED.

20-INCH ORIGINALLY SUBMITTED HDD ENTRY/EXIT LOCATION

MATCHLINE ES-6.51

WELL VEGETATED AREA

TALL PINES DRIVE

GAS

0 50 100

SCALE IN FEET

NOTES:

1. SEE ES-0.01 & ES-0.02 FOR GENERAL NOTES & LEGEND.
2. SEE ES-0.03 FOR STREAM & WETLAND CROSSING TABLES.
3. EROSION & SEDIMENT CONTROL BMP INSTALLATION TO BE ADJUSTED AS NEEDED TO ACCOMMODATE ACTUAL CONTOURS IDENTIFIED IN FIELD DURING VARIOUS PHASES OF THE PROJECT.


TETRA TECH

www.tetratech.com

661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040


REVISIONS

| NO. | BY | DATE | REMARKS |
|---|---|---|---|
| 1 | RS | 3/28/17 | INCORPORATED THE SPECIAL CONDITIONS SET FORTH IN DEP'S CHAPTER 102 AND CHAPTER 105 PERMITS |
| 2 | RS | 5/25/17 | DRAWINGS PROVIDED TO FIELD |
| 3 | RS | 4/25/19 | LOD MODIFICATION, AR'S ADDED, AND 20" BORE CHANGE |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ROBERT F. SIMCIK 5/6/17

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT
CONSTRUCTION SPREAD 6

1-20" & 1-16" WELDED STEEL NATURAL GAS PIPELINES

CHESTER COUNTY CONSERVATION DISTRICT
EROSION & SEDIMENT CONTROL &
SITE RESTORATION PLAN
SHEET 50 OF 74

| | |
|---|---|
| DATE: | 2/6/17 |
| PROJECT NO.: | 112C05958 |
| DESIGNED BY: | JB |
| DRAWN BY: | BH |
| CHECKED BY: | RS |

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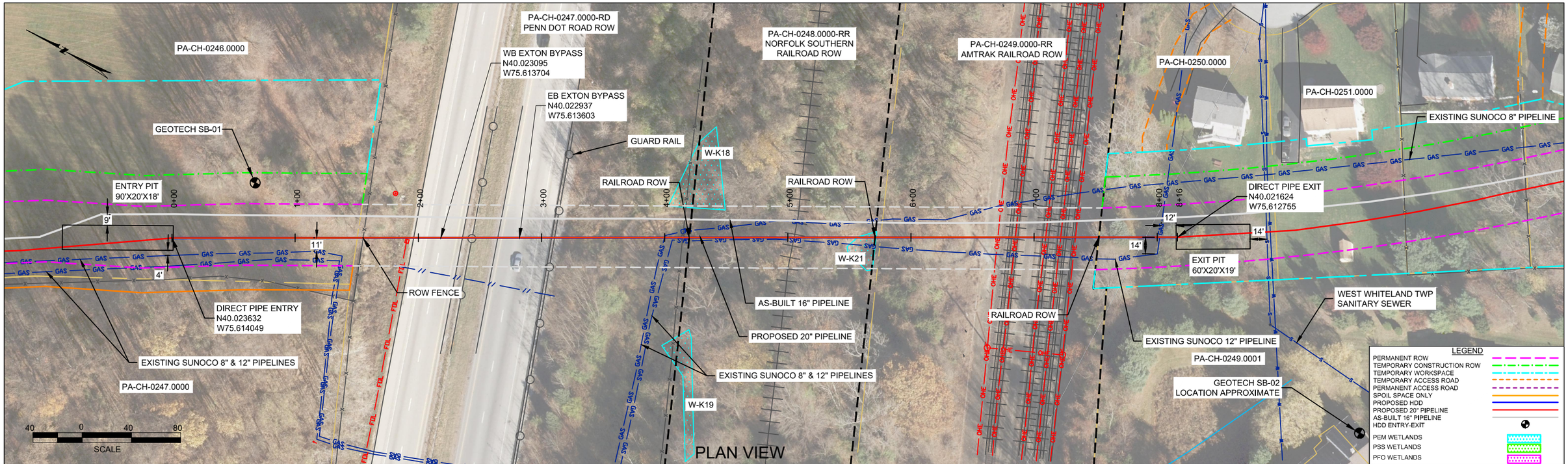
ES-6.50

SHEET 6.50 OF 99

R:_Marcellus Shale Projects\Sunoco\5958 – Penn Pipeline Project\17 – Chester\E&S\Lisa Drive – Option 3\E&S\5958ES006.50 – opt 3.dwg PIT BEN.HOPPE 5/10/2019 7:41:49 PM

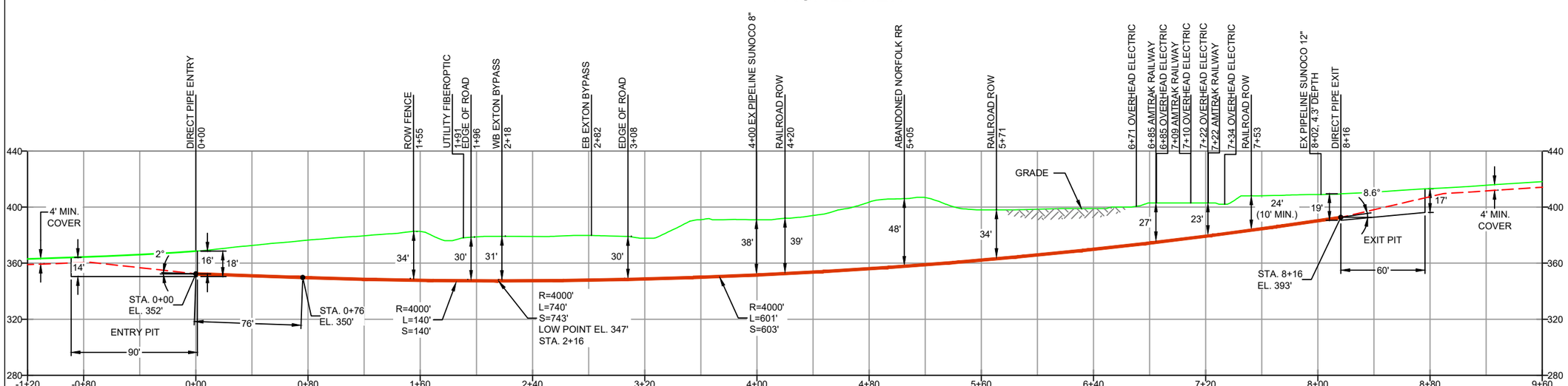
ATTACHMENT 3:

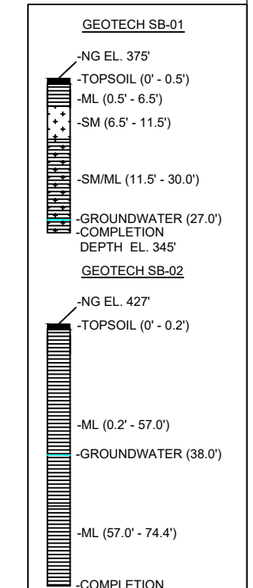
HDD Plans, Profiles and Auger Bore Drawings




CHESTER COUNTY, PA - UPPER UWCHLAN TOWNSHIP

## PROFILE VIEW




NOTE: REFER TO TEST BORING LOG S3-0400 FOR COMPLETE SOIL MATERIAL DESCRIPTION

### CONSTRUCTION NOTES

1. 20" PIPE WILL BE INSTALLED INTO A SINGLE WELDED STEEL CASING (48" OD, 0.750" WT, X-52) USING DIRECT PIPE METHOD.
2. 20" WELDED STEEL PIPE: 20" OD x 0.456" WT, X-65, API-5L, PSL2, ERW, BFW, DRL
   HORIZONTAL PIPE LENGTH (L) = 816'
   PIPE LENGTH (S) = 819'
   COATING: 14-16 MILS FBE WITH 40 MILS MIN. ARO (POWERCRETE R95)
3. 20" DESIGN PRESSURE: 1480 PSIG
   CONDUCT 4-HOUR PRE-INSTALLATION HYDROTEST OF PIPE STRING TO MINIMUM 1850 PSIG.
4. PIPE / AMBIENT TEMPERATURE MUST BE NO LESS THAN 30°F DURING PULLBACK WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER.
5. THE COATING ON THE CARRIER PIPE SHALL BE INSPECTED IMMEDIATELY PRIOR TO ITS INSTALLATION AND ALL DAMAGED COATING SHALL BE REPAIRED IN ACCORDANCE WITH SUNOCO'S PIPELINE COATING SPECIFICATIONS.
6. INSTALL CATHODIC PROTECTION TEST LEADS AS SPECIFIED ON THE ALIGNMENT SHEETS OR SUNOCO CORROSION TECHNICIAN.
7. PIPELINE WARNING MARKERS SHALL BE INSTALLED ON BOTH SIDES OF ALL ROAD, RAILWAY, AND STREAM CROSSINGS.
8. WELDED JOINTS INSIDE R.O.W. SHALL BE 100% X-RAYED.
9. CONTRACTOR WILL MAINTAIN A MINIMUM 4' OF COVER TO THE TOP OF PIPE USING FIELD BENDS.
10. CONTRACTOR WILL MAINTAIN A MINIMUM 24" OF COVER FROM ALL EXISTING UTILITIES.
11. CONTRACTOR WILL MAINTAIN A MINIMUM 5' OF COVER FROM BOTTOM OF STREAMS.
12. CONTRACTOR SHALL FIELD VERIFY DEPTH OF ALL EXISTING UTILITIES SHOWN OR NOT SHOWN ON THIS DRAWING.
13. IN ADDITION TO THE SITE-SPECIFIC INFORMATION PROVIDED IN THIS DRAWING, GENERAL REQUIREMENTS INCLUDED IN ALIGNMENT SHEETS, PERMITS AND APPROVAL FROM FEDERAL, STATE AND LOCAL AGENCIES ALSO APPLY.
14. SUNOCO PIPELINE, L.P.'S HORIZONTAL DIRECTIONAL DRILL INADVERTENT RETURN CONTINGENCY PLAN WILL BE IMPLEMENTED AT ALL TIMES.
15. SUNOCO PIPELINE, L.P.'S EROSION AND SEDIMENTATION CONTROL PLAN WILL BE IMPLEMENTED AT ALL TIMES.

### NOTES

1. ALL COORDINATES SHOWN ARE IN LATITUDE AND LONGITUDE. ALL MSL ELEVATIONS ARE NAD83
2. STATIONING IS BASED ON HORIZONTAL DISTANCES.
3. ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES SHOWN IN PLOT PLAN OR PROFILE. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP, FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES. CONTACT ONE CALL AT 811 PRIOR TO DIGGING.
5. SUNOCO EMERGENCY HOTLINE NUMBER IS #1-800-786-7440.

### REF. DRAWING

| DWG NO | | DWG NO | DESCRIPTION |
|---|---|---|---|
| ES-6.49 | TO | ES-6.50 | EROSION & SEDIMENT PLAN |
| SHEET 33 | TO | SHEET 34 | AERIAL SITE PLAN |

### REVISIONS

| NO. | DESCRIPTION | BY | DATE | CHK | DATE | APP | DATE |
|---|---|---|---|---|---|---|---|
| 0 | ISSUED FOR CONSTRUCTION | MRS | 05/03/19 | RMB | 05/03/19 | AMC | 05/03/19 |

Sunoco Logistics Partners L.P.

TETRA TECH ROONEY
(303) 792-5911

SUNOCO PIPELINE, L.P.

DIRECT PIPE
EXTON BYPASS / AMTRAK RAILWAY
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=80'

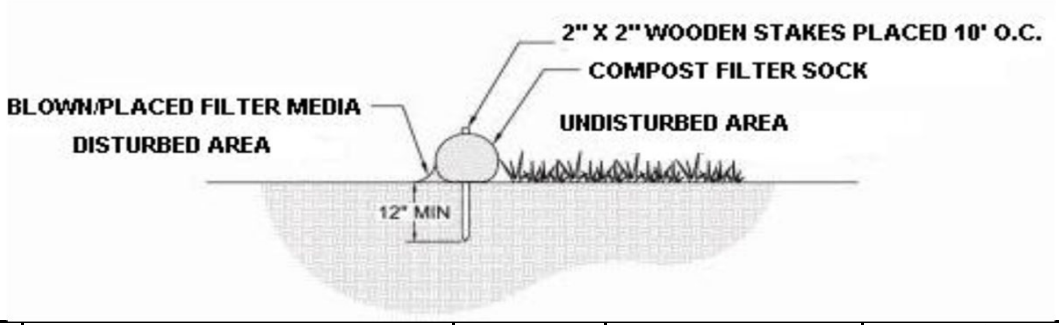
DWG. NO.: PA-CH-0249.0000-RR

ATTACHMENT 4:

Design Calculations and Construction Details

**STANDARD E&S WORKSHEET #1**
**Compost Filter Socks**

PROJECT NAME: Pennsylvania Pipeline Project
LOCATION: HDD 400 Major Modification _ Lisa Dr., Chester County
PREPARED BY: Emily Zapinski DATE: 4/30/2019
CHECKED BY: Robert Simcik DATE: 5/2/2019



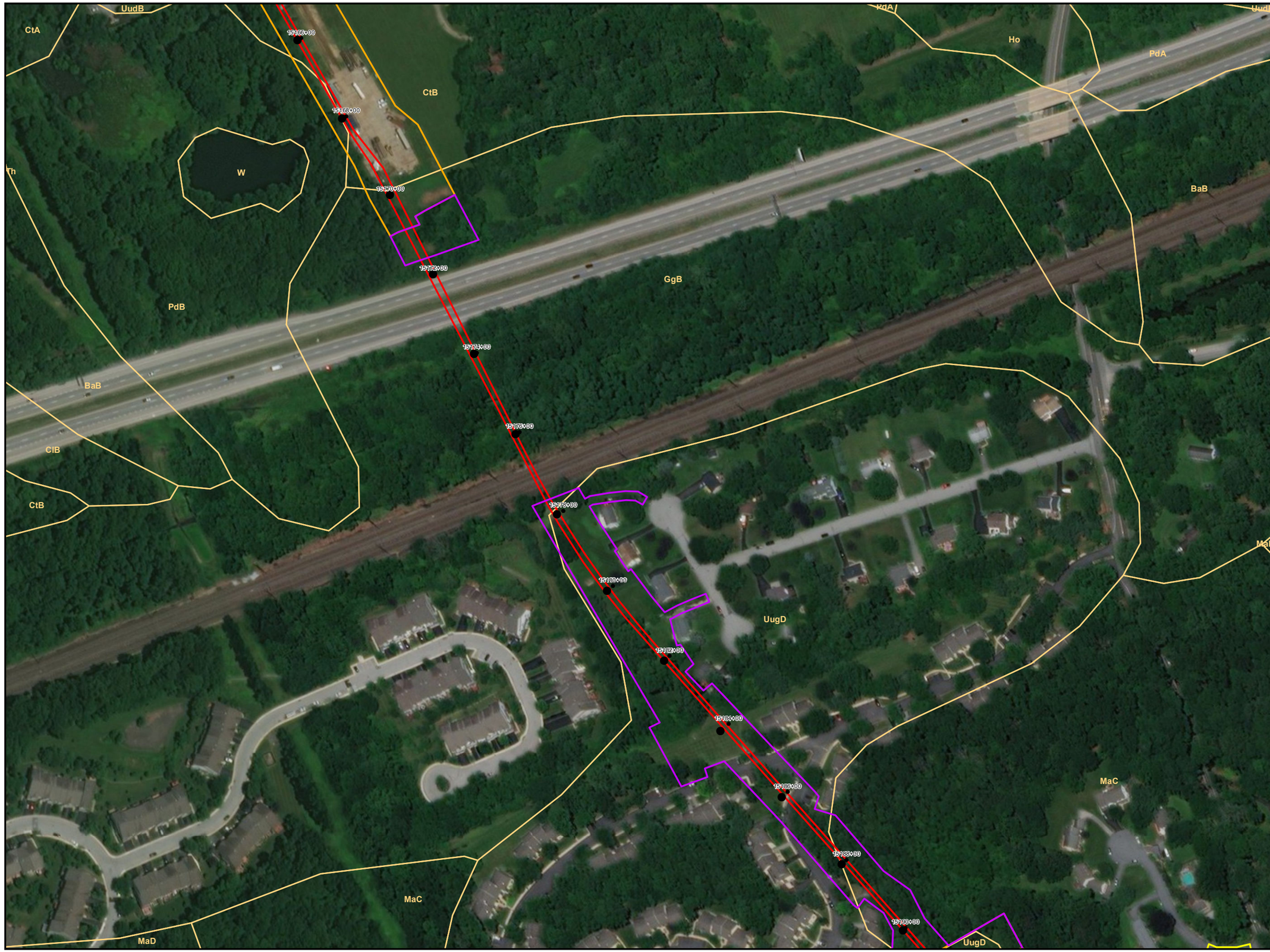

| SOCK NO. | Dia. In. | LOCATION | SLOPE PERCENT | SLOPE LENGTH ABOVE BARRIER (FT) | ELEVATION CHANGE ACROSS FULL SLOPE LENGTH (FT) |
|---|---|---|---|---|---|
| 1 | 12 | 15170+50 | 8.0 | 50 | 4 |
| 2 | 12 | 15171 | 7.5 | 40 | 3 |
| 3 | 12 | 15178 | 5.3 | 75 | 4 |
| 4 | 12 | 15178 (driveway) | 4.0 | 100 | 4 |
| 5 | 12 | 15179 | 8.0 | 50 | 4 |
| 6 | 12 | 15180 | 7.5 | 80 | 6 |
| 7 | 12 | 15181 (driveway) | 8.0 | 100 | 8 |
| 8 | 12 | 15182 | 10.8 | 65 | 7 |
| 9 | 12 | 15182+50 | 13.3 | 30 | 4 |
| 10 | 12 | 15183 to 15184+50 | 20.0 | 35 | 7 |
| 11 | 12 | 15185 | 16.7 | 60 | 10 |
| 12 | 12 | 15186 | 14.7 | 75 | 11 |
| 13 | 12 | 15186+50 | 18.0 | 100 | 18 |
| 14 | 12 | 15187 | 12.5 | 40 | 5 |
| 15 | 12 | 15187+50 | 10.0 | 80 | 8 |
| 16 | 12 | 15188+50 to 15189 | 10.0 | 40 | 4 |
| 17 | 18 | 15189 to 15190+50 | 12.5 | 160 | 20 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

ATTACHMENT 5:

Limiting Soil Characteristics Table, Soil Descriptions,

Soil and Geological Maps, KARST Plan

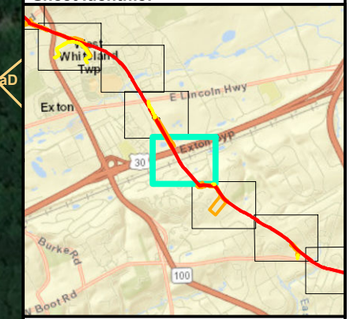
Soils Maps




## Legend

- Stationing
- Access Road
- Limit of Disturbance
- Block Valve/Station
- Natural Resources Conservation Service (NRCS) Soils & Code

**Sheet Identifier**




N

0 100 200 Feet

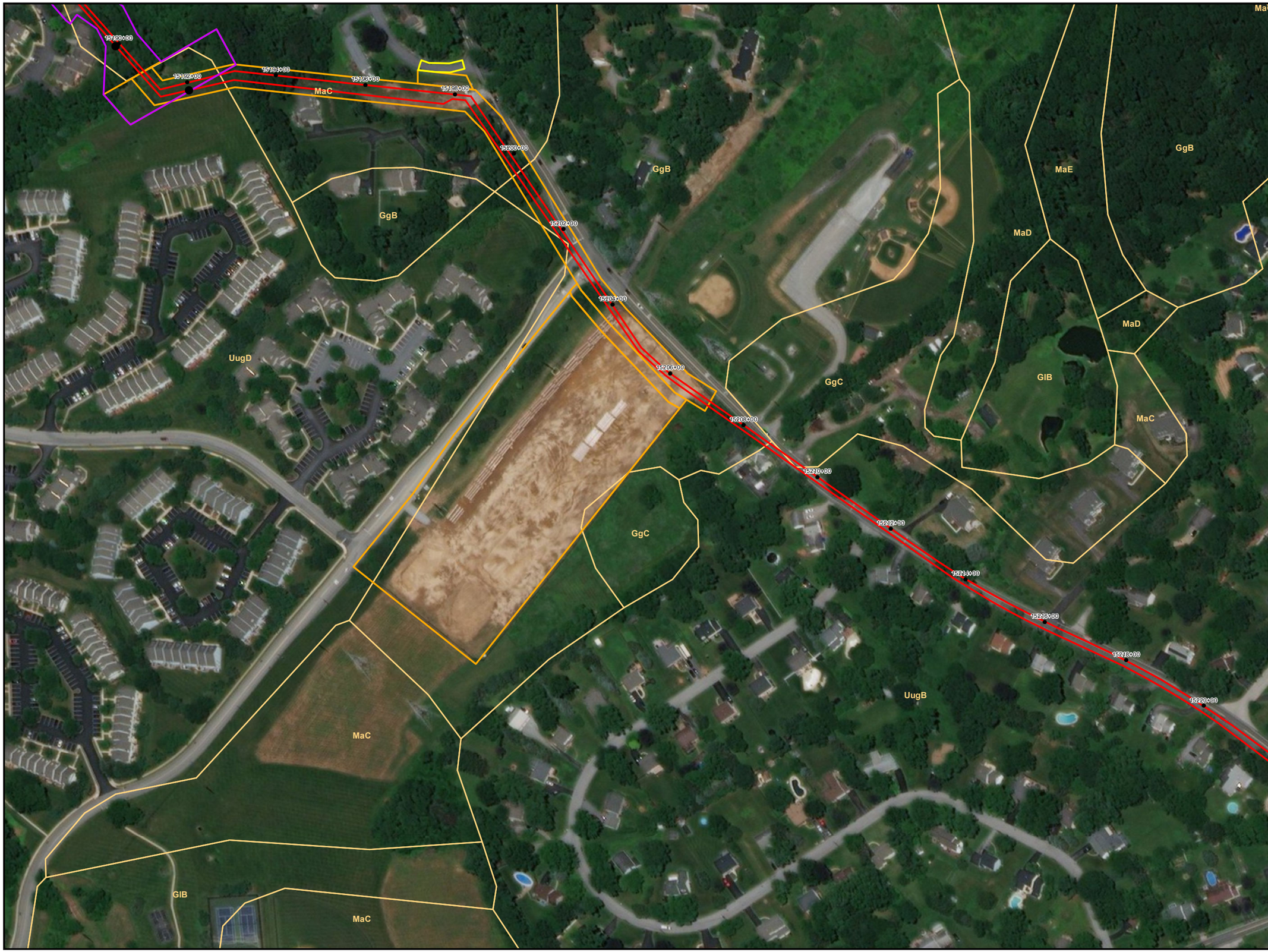
0 30.48 60.96 Meters

**NRCS SOILS MAP**
**ATTATCHMENT 5-29**
**PENNSYLVANIA PIPELINE PROJECT**
**NOVEMBER 12. 2016 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY, PA**

TETRA TECH

Notes:
Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).

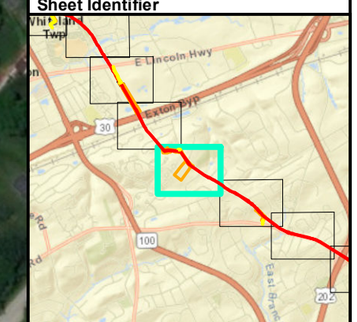
PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP ESC\GP\PENNPIPELINE_LI\SADRIVE_SOILS_ESCGP_OPT3.MXD 05/01/19 TT




## Legend

- Stationing
- Access Road
- Limit of Disturbance
- Block Valve/Station
- Natural Resources Conservation Service (NRCS) Soils & Code

**Sheet Identifier**




N

Feet: 0 100 200

Meters: 0 30.48 60.96

**NRCS SOILS MAP**
**ATTATCHMENT 5-30**
**PENNSYLVANIA PIPELINE PROJECT**
**NOVEMBER 12. 2016 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY, PA**

TETRA TECH

Notes:
Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).

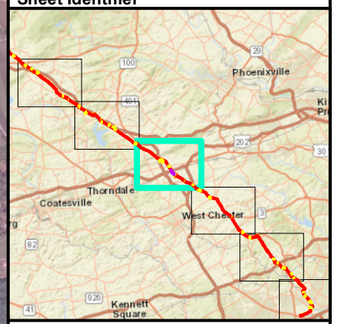
PGH: P:\GIS\SUNOCO\WARINER EAST 2\MXD\PPP ESC\GP\PENNPIPELINE_LISADRIVE_SOILS_ESCGP_OPT3.MXD 05/01/19 TT

Formations Maps

## Legend

- Access Road
- Major Modification
- Limit of Disturbance
- Alignment Centerline
- Block Valve/Station
- Glenarm Wissahickon Formation (Xgw)
- Antietam and Harpers Formations undivided (Cah)
- Banded mafic gneiss (gga)
- Chickies Formation (Cch)
- Conestoga Formation (OCc)
- Elbrook Formation (Ce)
- Felsic and intermediate gneiss (fgh)
- Felsic and intermediate gneiss (ggd)
- Felsic gneiss (fgp)
- Kinzers Formation (Ck)
- Ledger Formation (Cl)
- Metadiabase (md)
- Octoraro Formation (Xo)
- Peters Creek Schist (Xpc)
- Ultramafic rocks (Xu)
- Vintage Formation (Cv)

**Sheet Identifier**




N

Feet: 0 1,000 2,000

Meters: 0 300 600

**GEOLOGIC UNIT MAP**
**ATTACHMENT 5-3**
**PENNSYLVANIA PIPELINE PROJECT**
**NOVEMBER 12, 2016 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY,**
**PENNSYLVANIA**

TETRA TECH

Notes:
Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2013 ESRI and its data suppliers).

FGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PP ESCGP\PENN\PIPELINE_LIS\ADRIVE_GEOLOGY_ESCGP_OPT3.MXD 05/01/19 TT

ATTACHMENT 12:

Geohazard Evaluation

TETRA TECH

# MEMO

| | |
|---|---|
| ***To:*** | Rob Simcik, PE, Tetra Tech |
| ***Cc:*** | Megan Carson, Tetra Tech |
| ***From:*** | Bill Smith, PE, Tetra Tech |
| ***Date:*** | 5/13/2019 |
| ***Subject:*** | **PPP HDD S3-0400 – Exton Bypass/Lisa Drive Major Modification Geohazard Evaluation** |

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
WILLIAM C. SMITH
ENGINEER
038102E

5/13/19

Tetra Tech performed a geotechnical review of the proposed HDD S3-0400 – Lisa Drive modification using publicly available information to identify areas of potential geologic hazards along the proposed amended alignment. References included the following:

- PASDA, LiDAR topography, 2006 (UTM NAD83 Zone 17 Feet).
- PASDA, Karst features, PADCNR, 2007.
- PADCNR Scans of USGS Landslide Inventory Maps for PA. PADCNR 8/29/2017.
- NCRS Soil Survey for Chester County, PA, Web Soil Survey.
- Chester County Multi-Jurisdictional Hazard Mitigation Plan, 2015. Chester County Department of Emergency Services, October 2015.
- PADEP (2018), Arsenic in Drinking Water - Information for Consumers. https://www.dep.pa.gov/Citizens/My-Water/PublicDrinkingWater/Pages/Arsenic-in-Drinking-Water.aspx
- PADEP (2016), Technology Enhanced Naturally Occurring Radioactive Materials (TENORM) Study Report. http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5815&DocName=01%20PENNSYLVANIA%20DEPARTMENT%20OF%20ENVIRONMENTAL%20PROTECTION%20TENORM%20STUDY%20REPORT%20REV%201.PDF%20
- US Geological Survey (2006). Arsenic in Coal. Fact Sheet 2005-3152
- US Geological Survey (2013). Arsenic Concentrations, Related Environmental Factors, and the Predicted Probability of Elevated Arsenic in Groundwater in Pennsylvania. Scientific Investigations Report 2012-5257.

Figure 1 depicts the pipeline right-of-way and the 600' study corridor for the geohazard evaluation.

A separate coal and mining review was conducted and is included as Attachment A.

Tetra Tech, Inc.
661 Andersen Drive, Pittsburgh, PA 15220-2700
Tel 412.921.7090 Fax 412.921.4040 www.tetratech.com

## USGS Landslide Inventory Review

The Major Modification alignment does not intersect any areas of old landslides or active or recently active landslides as designated by USGS. The Chester County Multi-Jurisdictional Hazard Mitigation Plan indicates that landslides in Chester County are unlikely given its topography.

## Topographic Review for Recent Landslides

Recent PASDA LiDAR topography was reviewed for evidence of suspected landslides or earthflow. The Major Modification alignment does not intersect any suspected landslides based on topographic review.

## Steep Slopes

Steep slopes (greater than 3 horizontal to 1 vertical) were evaluated along the pipeline alignment. There are no areas of steep slopes.

## Soil Type Review

The soil types were assessed to ascertain which types intersected the pipeline and access roads. Each soil type and the corresponding Soil Slippage Potential, as designated by NCRS, are listed below. The soil slippage potential is the hazard that a mass of soil will slip when vegetation is removed, soil water is at or near saturation, and other normal practices are applied.

Soils along the Lisa Drive Major Modification include:

| Soil Symbol | Map Unit Name | Slippage Rating |
|---|---|---|
| CtB | Conestoga silt loam, 3 to 8 percent slopes | NR |
| GgB | Glenelg silt loam, 3 to 8 percent slopes | NR |
| MaC | Manor loam, 8 to 15 percent slopes | NR |
| PdB | Penlaw silt loam, 3 to 8 percent slopes | NR |
| UugD | Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes | NR |

NR – Not Rated

Soil types are overlaid on the alignment on Figure 1. There are no soils that have a high soil slippage rating along the pipeline LOD.

## Karst/Sinkhole Formations

There are no PA DCNR karst features in the major modification LOD; however, there are karst features in the vicinity of the northern portion of the modification which lies in the Conestoga Formation (Figure 1) which is known to contain karst features. Crossing this karst area of the LOD will be accomplished via open cut trenching and utilizing a direct pipe bore under the bypass and railroad. Beyond the direct pipe bore, pipe installation will be via open cut trenching.

These installation techniques mitigate, to the extent possible, the risk of environmental impact from the presence of karst formations.

## Coal and Mining Review

The coal and mining review is provided in Attachment A and summarized here.

There are no coal seams or coal bearing units in Chester County. Research of available published information indicates no deep, underground or surface mining has occurred or is permitted along the modification route.

In the Piedmont physiographic province, dark shales, sulfide mineralized areas, fractured rocks and rocks with little calcareous material have the potential to produce acidic discharges; however, according to PGS (2005), the formations crossed by the project are not noted as acid-producing.

If black shales are encountered during excavation for the project, the potential impact from acid producing minerals is expected to be minimal due to the shallow excavation and most of these shallow areas would not contain pollution-forming minerals as the material is expected to be highly weathered. BMPs will be used to mitigate potential impacts from encountering acid-producing rock formations.

## Radiation

Most soils and rocks contain low-levels of naturally occurring radioactive material (NORM). This material can be concentrated through physical or chemical processing resulting in technologically enhanced NORM called TENORM. Examples of TENORM containing materials include fire brick, water and wastewater treatment residuals, coal ash and decorative polished rock commonly used in building or home construction. The three primary naturally radioactive elements are potassium, thorium, and uranium. Both potassium and thorium are typically found in insoluble minerals and unlikely to present any issues. Uranium is common in marine, organic-rich, black shales, which are the primary radioactive mineral bearing formations, but sometimes occurs in non-marine, organic-rich, black shales.

Formations designated by the PADEP that pose a high radioactive risk include the Antes Formation (Utica), Mandata Formation, Marcellus Formation, Burket Member of the Harrell Formation, and Lockatong Formation. None of these formations are found near the surface in southwestern Pennsylvania or the project area, and this project will not involve Marcellus/Utica drill cuttings or flowback fluids.

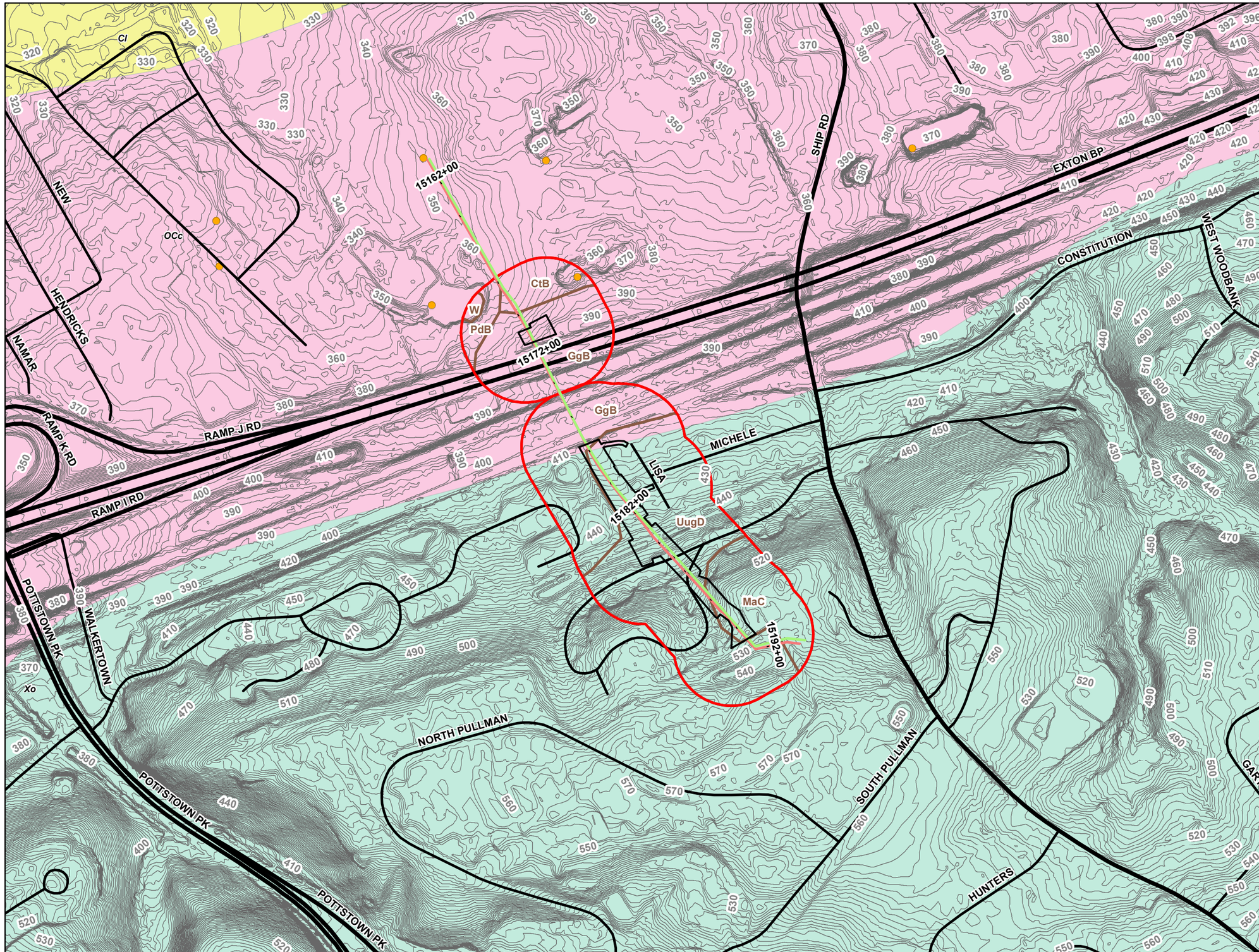
## Arsenic

Arsenic occurs naturally in trace amounts in soil, water, rocks, including coal (within the pyrite and organic portions), and can be in mine drainage. While coal and associated trace mineral Arsenic, is prevalent throughout southwest Pennsylvania and the project area, the project is not crossing any known mining waste areas which may have elevated levels of arsenic.

## Conclusions

Based on this geohazard evaluation, the HDD S3-0400 – Exton Bypass/Lisa Drive Major Modification does not intersect any known or suspected landslide areas or steep slopes but does intersect an area of karst geology. The direct pipe bore and open cut trenching pipe installation techniques will mitigate, to the extent possible, the risk of environmental impact from the presence of karst formations.

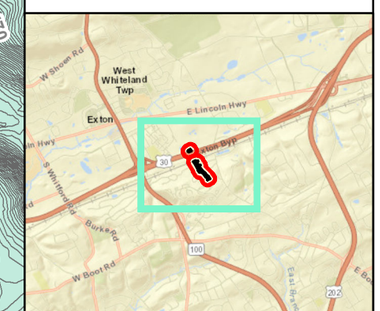
PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\LISADRIVE_OPT3_GEOHAZARD.MXD 05/13/19 PD




## Legend

- PA State Road
- PA Local Road
- 16in Centerline
- 20in Centerline
- DCNR Karst Feature
- Limit of Disturbance
- 300ft Buffer
- Soil Boundary
- Slope 3:1 to 2:1
- Slope>2:1
- Cambrian Ledger Formation (Cl)
- Ordovician and Cambrian Conestoga Formation (OCc)
- Lower Paleozoic Octoraro Formation (Xo)
- Cove Underlain by Clay Layer, USGS
- Active or Recently Active Landslide, USGS
- Old Landslide, USGS
- Suspected Landslide Area, Topographic Review
- 2ft Contour
- 0+00 Pipe Station

**Sheet Identifier**




N

Feet: 0 250 500

Meters: 0 76.2 152.4

**FIGURE 1**
**GEOHAZARD EVALUATION**
**PENNSYLVANIA PIPELINE PROJECT**
**EXTON BYPASS/LISA DRIVE**
**MAJOR MODIFICATION**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY,**
**PENNSYLVANIA**

TETRA TECH

PASDA LIDAR TOPOGRAPHY, 2008
(UTM NAD83 ZONE 17 FEET).

**Attachment A**

**Coal and Mining Review**

**PPP HDD S3-0400 – Exton Bypass/Lisa Drive Major Modification**

May 9, 2019

Sunoco Pipeline L.P.
535 Fritztown Road
Sinking Spring, PA 19608

**Subject: Pennsylvania Pipeline Project- Exton Bypass/Lisa Drive HDD Major Modification Acid-Forming Formations, Coal, and Mining Review Chester County, Pennsylvania**

Tetra Tech, Inc. (Tetra Tech) has prepared this review for Sunoco Pipeline L.P. (SPLP) to evaluate the potential for acid-forming materials or mining along the proposed Exton Bypass/Lisa Drive HDD Major Modification Project located in West Whiteland Township, Chester County, Pennsylvania.

The purpose of this modification is for a change in installation method for the 20-inch diameter pipeline from an HDD to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, Norfolk Southern Railroad, and wetland WL-K21. The remaining 1300 feet will be installed via open trench installation. Construction activities will involve tree removal, clearing and grubbing within the ROW, trenching, conventional bore, pipe installation, and site restoration.

**Site Description**

The project area crosses the Piedmont Lowland and Upland Section of the Piedmont Province. Bedrock underlying the modification project area consists of Middle Cambrian to Early Ordovician, Conestoga Formation and Lower Paleozoic Octoraro Formation. In Chester County, the Conestoga Formation includes alternating layers of limestone and dolomite. The Octoraro Formation is a phyllite that contains schist, horneblend gneiss, and granites.

**Coal and Mining Conditions**

There are no coal seams or coal bearing units in Chester County, refer to attached DCNR Map 11, Distribution of Pennsylvania Coals. Research of available published information indicates no deep, underground or surface mining has occurred or is permitted for the modification route (eMap).

**Evaluation of Potential of Encountering Acid-Producing Formations**

In the Piedmont physiographic province, some sulfide mineralization material has the potential to produce acidic discharges, particularly in the Pickering Gneiss (PGS, 2005). Acidic discharges are the result of down-dip drainage of ground water that has intersected and reacted with the sulfide-bearing minerals. However, acidic drainage may not always occur within those units.

If coal or black shales are encountered during excavation for the project, the potential impact from acid producing minerals is expected to be minimal due to the shallow excavation for the pipeline trench (less than 7 feet). It is our opinion that most of these shallow areas would not contain pollution-forming minerals as the material is expected to be highly weathered and the majority of the pollution-forming minerals leached from the material due to years of weathering cycles. The low risk of acid drainage from shallow weathered material is also noted in PADEP's *How to Avoid and Handle Acid-Producing Rock Formations Encountered during Well Site Development*.

Tetra Tech, Inc.
661 Andersen Drive, Pittsburgh, PA 15220
Tel 412.921.7090 Fax 412.921.4040 www.tetratech.com

No coal-bearing rocks or AMD discharges are noted within the project area on eMAP. According to PGS (2005), these formations are not noted as acid-producing.

**Measures to Prevent or Mitigate Acidic Discharges**
If the trench excavation encounters an acidic discharge, changes to the volume or chemistry are not anticipated. The trenching would not increase or decrease the volume of acidic discharges because the volume is controlled by precipitation and hydro-geologic parameters. The chemistry of acidic discharges is not anticipated to change due to the shallow excavation into weathered material.

Several measures will be implemented to reduce the potential and mitigate for pollution from trench excavation activities that encounter coal, black shale, or acidic discharges. These measures are as follows:

- When coal, black shale, or other acid-forming material is encountered during the excavation, the excavated material will be covered with tarps, mats, or blankets. Water is to be directed away from the temporary stockpiled material and the trench until the material is returned to the trench.
- If water accumulates in the trench within the areas of excavated acid-forming material, use a field pH meter to test the pH of the water. If the pH is between 6.0 to 9.0 standard units, inclusive, pump water that accumulates in the trench through a filter bag and slowly discharge to a well vegetated area. If the water pH is not within 6.0 to 9.0 range, collect the water and transfer to an approved treatment facility.
- Backfill the trench with the removed material and conduct alkaline addition by following PADEP's *How to Avoid and Handle Acid-Producing Rock Formations Encountered during Well Site Development*. Fact Sheet 5600-FS-DEP4284.
- Additional trench plugs may be needed to limit water encountering the coal material along the sides of the trench. Trench plugs to seal off the acid-forming material should consist of clay.
- Perform immediate stabilization of the pipe ROW after installation of the pipe by returning the area to original topographic grade.
- Prepare the disturbed area for permanent seeding with the use of lime and fertilizer. It is recommended to test the soil in areas of past surface/strip mines, or where coal or black shale are near the surface to determine the optimum liming rate. In the absence of testing, apply at 6 tons/acre. Limestone is applied to neutralize the acidity in soil. Blending of soils is recommended to mix potentially acidic materials with materials that have buffering capacity.
- Immediately mulch and seed all disturbed areas with the temporary and/or permanent seed mixture. PADEP and Penn State University have identified seed mixes that are more suited to acidic conditions and should be applied when acid-forming materials are near the surface.
- Monitor the areas until the disturbed areas are stabilized and a uniform 70-percent perennial vegetative cover is established.
- If acid-forming material is to be hauled offsite, waste materials are to be disposed of at an approved DEP waste site (permitted coal refuse area or landfill).

TETRA TECH

**Closing**

If you have any questions or comments, please feel free to contact me at 412-921-8051 or heather.trexler@tetratech.com.

Sincerely,

Heather Trexler

Heather Trexler, P.G.
Project Manager, Energy and Natural Resources Department

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
HEATHER ANNE TREXLER
GEOLOGIST
PG004798

Enclosures

**References**

Pennsylvania Department of Conservation and Natural Resources. 2019. Pennsylvania Geologic Data Exploration (PaGEODE) http://www.gis.dcnr.state.pa.us/geology/index.html

Pennsylvania Department of Environmental Protection. 2019. eMapPA http://www.depgis.state.pa.us/emappa/

Pennsylvania Department of Environmental Protection (PADEP). 2014. How to avoid and handle acid-producing rock formations encountered during well site development. Fact Sheet 5600-FS-DEP4284

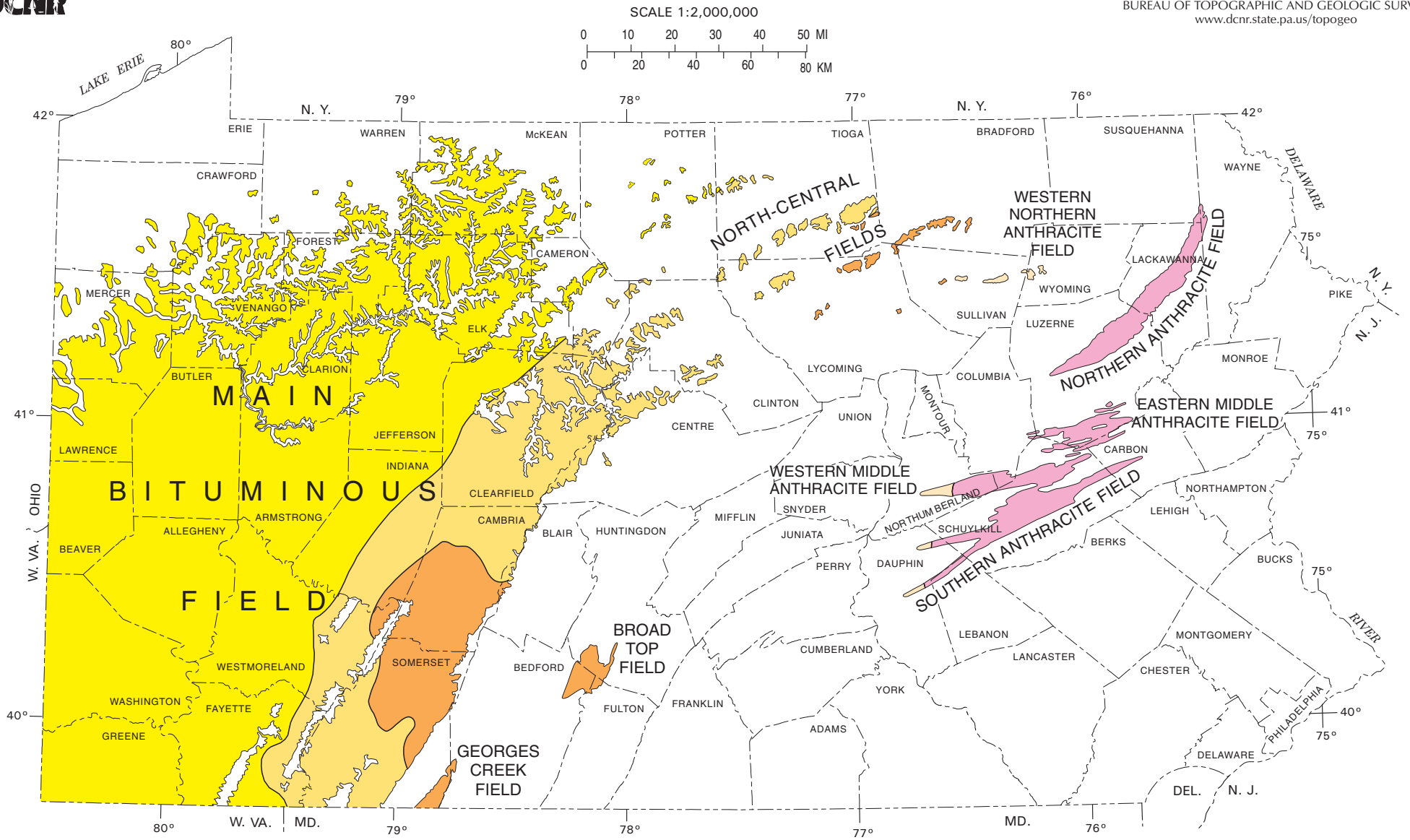
Pennsylvania Geologic Society (PGS). 2005. Geologic units containing potentially significant acid-producing sulfide minerals. Pennsylvania Geological Survey. 4th Ser. Open-File Report OFMI 05-01.1.

# Figures

MAP 11

# DISTRIBUTION OF PENNSYLVANIA COALS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF
CONSERVATION AND NATURAL RESOURCES
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY
www.dcnr.state.pa.us/topogeo




## EXPLANATION

BITUMINOUS FIELDS

- High-volatile bituminous coal
- Medium-volatile bituminous coal
- Low-volatile bituminous coal

ANTHRACITE FIELDS

- Semi-anthracite
- Anthracite

*Prepared by Bureau of Topographic and Geologic Survey.*
*Third Edition, Revised, 2000; Third Printing, 2008.*

2200–MP–DCNR0855
Printed on Recycled Paper

# 4. ACT 14 NOTIFICATIONS AND RECEIPTS

TETRA TECH

PITT-05-19-008
May 6, 2019
Project Number 212C-PB-00037

Chester County
313 West Market Street, Suite 6202
West Chester, Pennsylvania 19380

Reference: Sunoco Pipeline, L.P. (SPLP), Pennsylvania Pipeline Project
HDD S3-0400
Chapter 102 Permit No. ESG0100015001 – Major Modification
Chapter 105 Permit No. E23-524 – Minor Addendum

Dear Commissioners:

This municipal notice, under the requirements of Acts 14, 67, 68, and 127, is to inform you that our client, Sunoco Pipeline, L.P. (SPLP), is submitting an amendment to the coverage under the Erosion and Sediment Control General Permit (ESCGP-3) for Earth Disturbance Associated with Oil and Gas Exploration, Production, Processing or Treatment Operations or Transmission Facilities and the coverage under Chapter 105 Joint Permit for Water Obstruction and Encroachment.

Project Name: Pennsylvania Pipeline Project
HDD S3-0400 – Lisa Drive

Applicant Name: Sunoco Pipeline, L.P.
535 Fritztown Road
Sinking Spring, PA 19608

Project Description: This modification is being requested for a for a change in installation method for the 20-inch diameter pipeline from a Horizontal Directional Drill (HDD) to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, Norfolk Southern Railroad, and wetland WL-K21. The remaining 1300 feet will be installed via open trench installation. The modification includes a request for an additional 3.99 acres of LOD in upland areas.

Site Location: The Major Amendment is located in West Whiteland Township, Chester County.

Enclosed is a copy of the Notice of Intent (NOI) application for an ESCGP-3 and Location Map of the proposed changes. Please submit any comments concerning this project within 30 days from date of receipt of this letter to:

Pennsylvania Department of Environmental Protection (PA DEP)
2 East Main Street
Norristown, PA 19401
Phone: (484) 250-5900

Should you have questions regarding this correspondence, please do not hesitate to contact me at 412.921.8163 or via e-mail at Robert.Simcik@tetratech.com.

Sincerely,

Robert F. Simcik, P.E.
E&S Task Manager

RFS/clm

Enclosure: Site Location Maps; Notice of Intent
cc: File 212IC-PB-00037

Tetra Tech
661 Andersen Drive, Suite 200, Pittsburgh, PA 15220-2700
Tel 412.921.7090 Fax 412.921.4040 www.tetratech.com

May 7,2019

Dear Customer:

The following is the proof-of-delivery for tracking number **775146789624**.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Receptionist/Front Desk |
| **Signed for by:** | T.RYCKMAN | **Delivery location:** | 313 WEST MARKET STREET<br>WEST CHESTER, PA 19380 |
| **Service type:** | FedEx Priority Overnight | **Delivery date:** | May 7, 2019 10:30 |
| **Special Handling:** | Deliver Weekday<br>Adult Signature Required | | |

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 775146789624 | **Ship date:** | May 6, 2019 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
Commissioners
Chester County
313 West Market Street
Suite 6202
WEST CHESTER, PA 19380 US

**Shipper:**
ADMIN OFFICE
Tetra Tech, Inc.
Foster Plaza Building 7
661 Andersen Drive
Pittsburgh, PA 15220 US

**Reference** 212IC-BF-00037.500
**Purchase order number:** Simcik/Morris

Thank you for choosing FedEx.

TETRA TECH

PITT-05-19-007
May 6, 2019
Project Number 212C-PB-00037

West Whiteland Township
101 Commerce Drive
Exton, Pennsylvania 19341

Reference: Sunoco Pipeline, L.P. (SPLP), Pennsylvania Pipeline Project
HDD S3-0400
Chapter 102 Permit No. ESG0100015001 – Major Modification
Chapter 105 Permit No. E23-524 – Minor Addendum

Township Supervisors:

This municipal notice, under the requirements of Acts 14, 67, 68, and 127, is to inform you that our client, Sunoco Pipeline, L.P. (SPLP), is submitting an amendment to the coverage under the Erosion and Sediment Control General Permit (ESCGP-3) for Earth Disturbance Associated with Oil and Gas Exploration, Production, Processing or Treatment Operations or Transmission Facilities and the coverage under Chapter 105 Joint Permit for Water Obstruction and Encroachment.

Project Name: Pennsylvania Pipeline Project
HDD S3-0400 – Lisa Drive

Applicant Name: Sunoco Pipeline, L.P.
535 Fritztown Road
Sinking Spring, PA 19608

Project Description: This modification is being requested for a for a change in installation method for the 20-inch diameter pipeline from a Horizontal Directional Drill (HDD) to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, Norfolk Southern Railroad, and wetland WL-K21. The remaining 1300 feet will be installed via open trench installation.The modification includes a request for an additional 3.99 acres of LOD in upland areas.

Site Location: The Major Amendment is located in West Whiteland Township, Chester County.

Enclosed is a copy of the Notice of Intent (NOI) application for an ESCGP-3 and Location Map of the proposed changes. Please submit any comments concerning this project within 30 days from date of receipt of this letter to:

Pennsylvania Department of Environmental Protection (PA DEP)
2 East Main Street
Norristown, PA 19401
Phone: (484) 250-5900

Should you have questions regarding this correspondence, please do not hesitate to contact me at 412.921.8163 or via e-mail at Robert.Simcik@tetratech.com.

Sincerely,

Robert F. Simcik, P.E.
E&S Task Manager

RFS/clm

Enclosure: Site Location Maps; Notice of Intent
cc: File 212IC-PB-00037

Tetra Tech
661 Andersen Drive, Suite 200, Pittsburgh, PA 15220-2700
Tel 412.921.7090 Fax 412.921.4040 www.tetratech.com

May 7,2019

Dear Customer:

The following is the proof-of-delivery for tracking number **775147036672**.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Receptionist/Front Desk |
| **Signed for by:** | M.POPOLIZIO | **Delivery location:** | 101 COMMERCE DR<br>EXTON, PA 19341 |
| **Service type:** | FedEx Priority Overnight | **Delivery date:** | May 7, 2019 09:07 |
| **Special Handling:** | Deliver Weekday<br>Adult Signature Required | | |

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 775147036672 | **Ship date:** | May 6, 2019 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
SUPERVISORS
WEST WHITELAND TOWNSHIP
101 COMMERCE DRIVE
EXTON, PA 19341 US

**Shipper:**
ADMIN OFFICE
Tetra Tech, Inc.
Foster Plaza Building 7
661 Andersen Drive, Suite 200
Pittsburgh, PA 15220 US

**Reference** 212IC-BF-00037.500
**Purchase order number:** SIMCIK/MORRIS

Thank you for choosing FedEx.

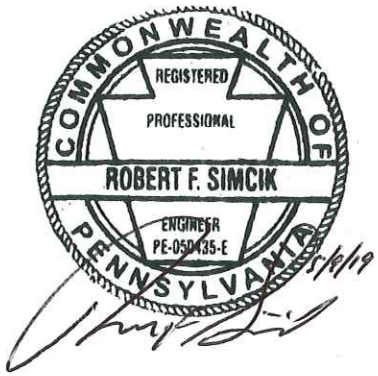
# 5. ACT 167 VERIFICATION REPORT

**ACT 167 STORMWATER CONSISTENCY VERIFICATION REPORT**

SUNOCO PENNSYLVANIA PIPELINE PROJECT

CHESTER COUNTY, PENNSYLVANIA

HDD S3-0400 Major Modification



# ACT 167 STORMWATER CONSISTENCY VERIFICATION REPORT FOR CHESTER COUNTY

## 1.0 INTRODUCTION

Tetra Tech, Inc. (Tt) has prepared this Act 167 Stormwater Consistency Verification Report. The report verifies consistency between the provisions of the Chester Countywide Act 167 Stormwater Management Plan and the Pennsylvania Pipeline Project. The HDD S3-0400 Major Modification is located within West Whiteland Township. The pipeline will traverse through ten townships in Chester County: East Goshen, East Nantmeal, East Whiteland, Elverson, Upper Uwchlan, Uwchlan, Wallace, West Goshen, West Nantmeal, West Whiteland, and Westtown Townships. The County of Chester developed the Countywide Act 167 Stormwater Management Plan, which was adopted in July 2013. Elverson, West Nantmeal, Wallace, East Nantmeal, Upper Uwchlan, Uwchlan, West Whiteland, East Whiteland, East Goshen, West Goshen, and Westtown Townships have all adopted the Chester Countywide Act 167 Stormwater Management Plan. Parts of Elverson and West Nantmeal Townships lie within the Conestoga Creek Watershed Act 167 Plan area, and parts of West Whiteland, West Goshen, East Goshen, and Westtown Townships lie within the Chester Creek Watershed Act 167 Plan area. The Chester Countywide Act 167 Stormwater Management Plan supersedes and replaces the individual Watershed Act 167 Plans; however, certain provisions of those watershed plans still apply.

## 2.0 PROJECT DESCRIPTION

Sunoco Pipeline, L.P. (SPLP) proposes to construct and operate the Pennsylvania Pipeline Project that would expand existing pipeline systems to provide natural gas liquid (NGL). The project involves the installation of approximately two parallel pipelines within a 306.8-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, Pennsylvania (PA) to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306.8 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the initial line for approximately 255.8 miles. The majority of the new ROW will be co-located adjacent to existing utility corridors, including approximately 230 miles of pipeline that will be co-located in the existing SPLP Mariner East pipeline system. The 20-inch pipeline will be installed first, followed by the 16-inch line. Any temporary stabilization required will be implemented in accordance with this Erosion and Sediment (E&S) Plan. Both pipelines will be installed within the same limit of disturbance (LOD) and in the same construction period. Construction activities will involve the installation of access roads, block valve pads, tree removal, clearing and grubbing within the right of way, trenching, pipe installation, and site restoration. The total LOD will be 185 acres in Chester County.

The HDD S3-0400 Major Modification consists of a change in installation method for the 20-inch diameter pipeline. This permit modification is being requested for a change in installation method for the 20-inch diameter pipeline from an HDD to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, Norfolk Southern Railroad, and wetland WL-K21. There will be no additional Limits of Disturbance (LOD) requested within the wetland and the change in installation method will not result in any loss of wetland area impacts are considered minor and temporary. The change in installation method does require additional temporary work space therefore includes a request for an additional 3.99 acres of LOD in upland areas.

Fifty feet will be maintained as permanent ROW. In addition, temporary use areas or extra workspaces will be required at some stream and road/railroad crossings; these will typically expand the construction ROW by 25 feet where needed. Construction activities will involve the installation of 3 permanent access roads, 3 temporary access roads, 3 block valve pads, tree removal, clearing and grubbing within the ROW, trenching, pipe installation, and site restoration. There are no access roads or block valves associated with HDD S3-0400 Major Modification.

In Chester County, Pennsylvania, the Pennsylvania Pipeline Project traverses 23.6 linear miles through the municipalities of East Goshen, East Nantmeal, East Whiteland, Elverson, Upper Uwchlan, Uwchlan, Wallace, West Goshen, West Nantmeal, West Whiteland, and Westtown and spans the Downingtown, Elverson, Pottstown, Wagontown, Malvern, West Chester, and Media USGS Quadrangles. A USGS location map showing the proposed alignment can be found in Attachment 1 of the E&S report. Past and present land use of the project area and surrounding area is agricultural and forested land. Future land use will be a maintained vegetated natural gas pipeline ROW and agricultural land.

The project area surface water runoff drains to surface waters and unnamed tributaries (UNTs) designated as high quality (HQ), trout stock fisheries (TSF), warm water fisheries (WWF), and cold water fisheries (CWF) under PA Code 25 Chapter 93 including UNT to Conestoga River (WWF), South Branch French Creek (HQ-TSF), UNT to South Branch French Creek (HQ-TSF), UNT to Marsh Creek (HQ-TSF), Marsh Creek (HQ-TSF), Black Horse Creek (HQ-TSF), UNT to Black Horse Creek (HQ-TSF), Shamona Creek (HQ-TSF), UNT to Shamona Creek (HQ-TSF), UNT to Upper East Branch Brandywine Creek (HQ-TSF), UNT to Valley Creek (CWF), Valley Creek (CWF), East Branch Chester Creek (TSF), UNT to Ridley Creek (HQ-TSF), and UNT to Chester Creek (TSF). The HDD S3-0400 Major Modification area surface water runoff drains to UNT to Valley Creek (CWF).

The E&S plan contains Antidegradation Best Available Combination of Technologies (ABACT) best management practices (BMPs) to maintain the designated use of the receiving waters. The basic BMPs that are anticipated to be employed during the construction activities include:

- Minimizing disturbances to site areas, especially those currently covered with pavement or vegetation.
- Minimizing the time that soil is exposed.
- Preventing the runoff from flowing across disturbed areas (divert the flow to vegetated areas).
- Stabilizing disturbed soils as soon as possible.
- Slowing down the runoff flowing across the site.
- Removing sediment from surface water runoff before it leaves the site.

## 3.0 SITE RESTORATION

Following completion of pipeline installation and trench backfilling, the pipeline right of way, associated workspaces, and temporary access roads shall be returned to the general grade present prior to pipeline installation in order to maintain preconstruction drainage patterns. After completion of major construction work, topsoil that was stockpiled during construction will be placed along the ROW. Grounds disturbed by any of the operations necessary to complete the work for this project are to be permanently seeded, or if specified, sodded, unless occupied by structures, paved or designated as a permanent access road. Disturbed areas, which are at final grade, shall be seeded and mulched as soon as practical. The permanent seed mixture will restore disturbed areas to a meadow in good condition or better. As a result

of restoring the right of way, workspaces, and temporary access roads to a meadow condition, there will be no increase in stormwater runoff rates or volume attributed to those areas.

The Major Modification LOD will maintain pre-construction drainage pattern and be restored to meadow in good condition or better. Within Chester County, all disturbed areas within the pipeline right of way, additional temporary workspaces, and temporary access roads will be restored to a meadow in good condition or better. The pre-construction drainage patterns surrounding the project will be maintained for the areas of the project within the township. As a result of restoring the pipeline right of way, additional temporary workspaces, and temporary access roads to a meadow condition and maintaining pre-construction drainage patterns in accordance with 25 Pa Code § 102.8(n), there will be no increase in stormwater runoff rate or volume attributed to these locations, and a quantitative stormwater analysis is not required for the pipeline ROW. Where an existing lawn condition exists and the property owner specifies, the area will be restored to a lawn condition instead of meadow.

## 4.0 STORMWATER MANAGEMENT

The construction and restoration practices for the proposed Major Modification have been designed to meet the provisions of the County-Wide Act 167 Stormwater Management Plan for Chester County, Pennsylvania, as well as PADEP Chapter 102 regulations. In general, the pre-construction drainage patterns surrounding the project will be maintained, and all disturbed areas within the pipeline ROW will be restored to a meadow in good condition, with the exception of proposed permanent features, existing permanent features within the right of way, and lawn in residential areas where the landowner has required that lawn cover be reestablished. As a result of restoring the ROW to a meadow condition or lawn, the project will not result in increased stormwater runoff rate or volume for the pipeline corridor.

The Chester County land use ordinance requires that all existing conditions be evaluated as meadow. This project is not in compliance with the requirements of evaluating existing conditions as meadow. Instead, existing conditions were evaluated as is, per PADEP Chapter 102 regulations. The project is not in compliance with the requirements of the Chester County Act 167 ordinance for the areas which do not have permanent facilities proposed. The increase in runoff that would result in the calculations from assuming a meadow to lawn conversion in residential areas has not been detained. An actual increase in runoff rate and volume will not be realized in these areas, however, because the existing and proposed conditions are both lawn cover. The restoration of the ROW to lawn in some residential areas prevents the ability to meet the requirements of the criteria outlined in the Chester County Act 167 plan due to landowner constraints. Approximately 25 percent of the project's limit of disturbance was determined to be existing residential lawn areas that have the potential to be restored to lawn.

The PCSM plan and narrative for the project comply with 25 Pa. Code § 102.8 to preserve the integrity of stream channels and maintain and protect the physical, biological, and chemical qualities of the receiving stream while minimizing any increase in stormwater runoff and volume, impervious areas, land clearing, and grading. The project also protects the existing drainage features and vegetation to the maximum extent possible. The project is in compliance with Section 13 of Chester County's Act 167 Plan because the maximum rate of stormwater runoff is no greater after development than prior to development activities. In addition, the quantity, velocity and direction of resulting stormwater runoff has been managed in a manner which otherwise adequately protects health and property from possible injury.

## 5.0 ACT 167 COMPLIANCE

For the proposed Major Modification, the pre-construction drainage patterns surrounding the project will be maintained, the LOD will be minimized to the extent practicable, and all disturbed areas will be restored to a meadow in good condition. Stormwater management best management practices will be used to ensure that the post-development runoff volume and post-development peak discharge rates do not increase. The channel protection standards have been achieved by eliminating the increase in the post-development runoff volume. The water quality standards have been met by minimizing disturbance, maintaining trees and woodlands where possible, maintaining pre-construction drainage patterns to the extent practicable, minimizing soil disturbance and replacing topsoil. By following the requirements of PADEP's 25 Pa Code § 102.8(n) and Chester County's approved Act 167 Stormwater Management Plan, the Sunoco Pipeline project meets the criteria for Chester County.

# 6. PNDI

# 1. PROJECT INFORMATION

Project Name: **Lisa Lane Crossing Method Change**
Date of Review: **5/2/2019 04:57:47 PM**
Project Category: **Energy Storage, Production, and Transfer, Energy Transfer, Pipeline (e.g., gas, oil) -- NEW (construction of new line in a new location)**
Project Area: **8.61 acres**
County(s): **Chester**
Township/Municipality(s): **WEST WHITELAND**
ZIP Code: **19341; 19380**
Quadrangle Name(s): **MALVERN**
Watersheds HUC 8: **Brandywine-Christina**
Watersheds HUC 12: **Valley Creek**
Decimal Degrees: **40.024988, -75.614843**
Degrees Minutes Seconds: **40° 1' 29.9564" N, 75° 36' 53.4358" W**

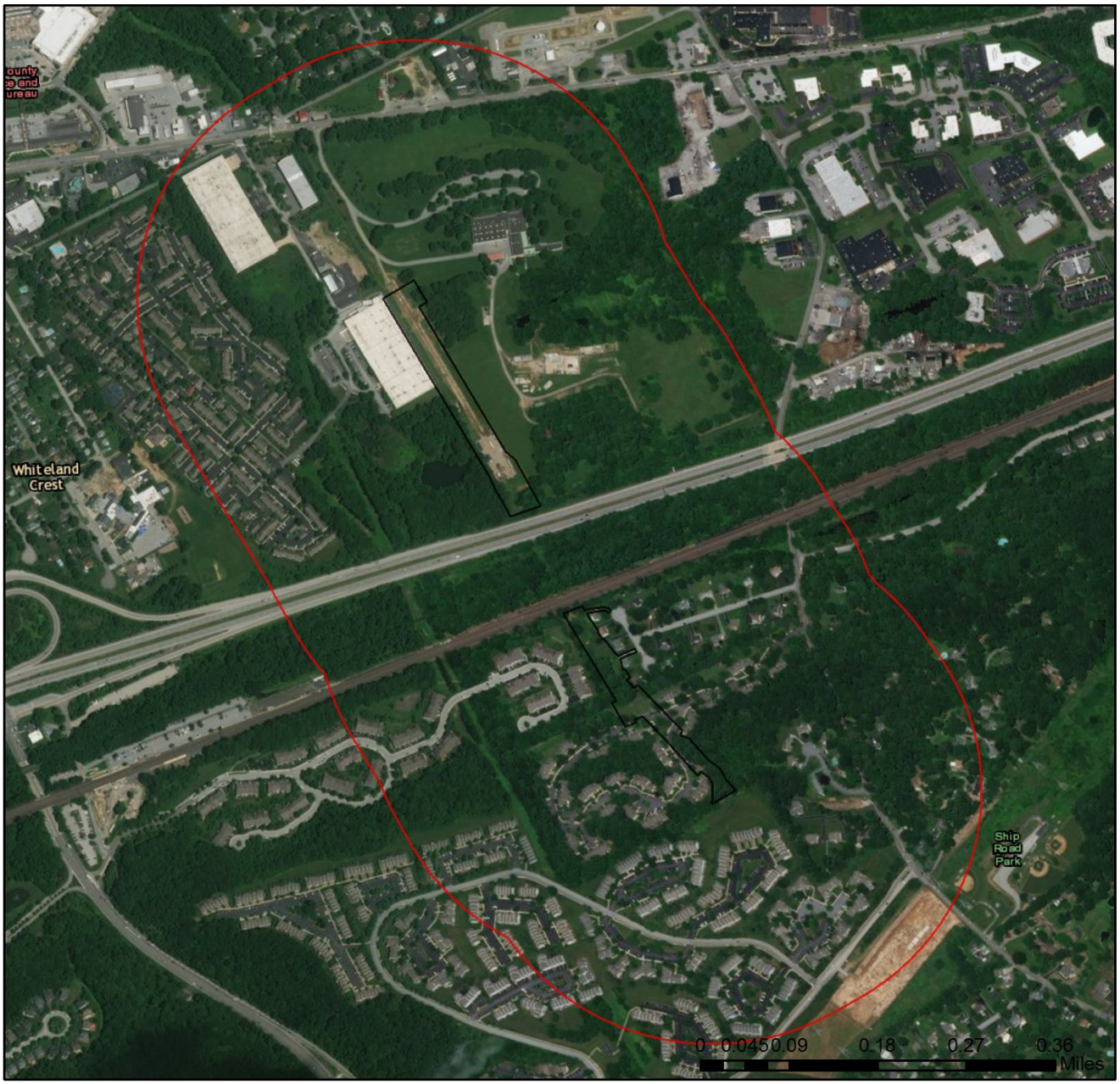
# 2. SEARCH RESULTS

| Agency | Results | Response |
|---|---|---|
| PA Game Commission | **Conservation Measure** | **No Further Review Required, See Agency Comments** |
| 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 |

Pennsylvania Natural Diversity Inventory (PNDI) records indicate that while threatened and endangered and/or special concern species and resources are in the project vicinity and that recommended Conservation Measures should be implemented in their entirety to avoid and minimize impacts to these species, no further coordination is required with the jurisdictional agencies. If a DEP permit is required for this project, DEP has the discretion to incorporate one or more Conservation Measures into its permit. This response does not reflect potential agency concerns regarding potential impacts to other ecological resources, such as wetlands.

Note that regardless of PNDI search results, projects requiring a Chapter 105 DEP individual permit or GP 5, 6, 7, 8, 9 or 11 must comply with the bog turtle habitat screening requirements of the PASPGP.

# Lisa Lane Crossing Method Change

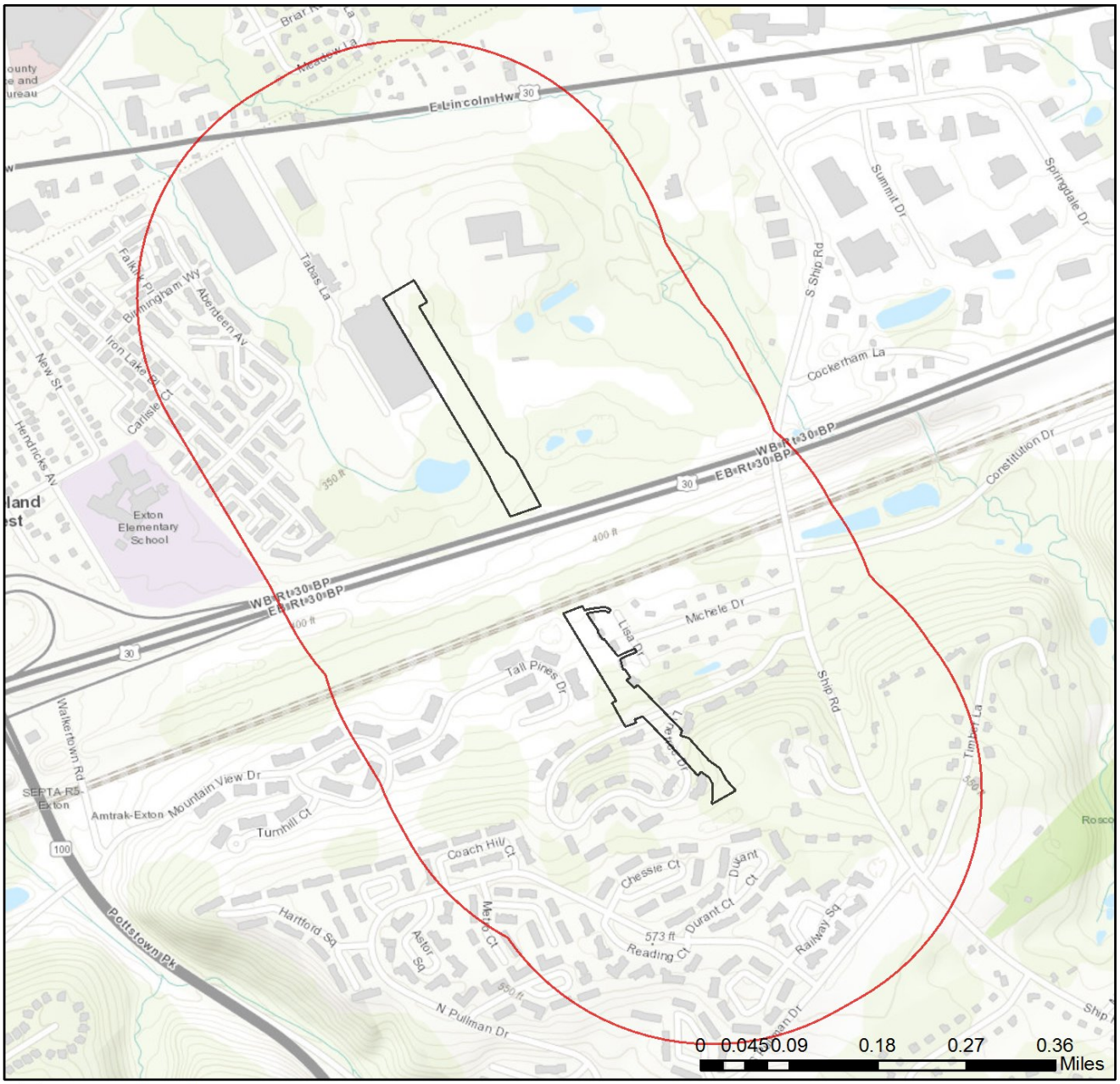



Project Boundary

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

# Lisa Lane Crossing Method Change




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,

# RESPONSE TO QUESTION(S) ASKED

**Q1:** The proposed project is in the range of the Indiana bat. Describe how the project will affect bat habitat (forests, woodlots and trees) and indicate what measures will be taken in consideration of this. Round acreages up to the nearest acre (e.g., 0.2 acres = 1 acre).
**Your answer is:** The project will affect 1 to 39 acres of forests, woodlots and trees.

**Q2:** Is tree removal, tree cutting or forest clearing of 40 acres or more necessary to implement all aspects of this project?
**Your answer is:** Yes

## 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:

Conservation Measure: Potential impacts to state and federally listed species which are under the jurisdiction of both the Pennsylvania Game Commission (PGC) and the U.S. Fish and Wildlife Service may occur as a result of this project. As a result, the PGC defers comments on potential impacts to federally listed species to the U.S. Fish and Wildlife Service. No further coordination with the Pennsylvania Game Commission is required at this time.

### 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: PAT GREEN
Company/Business Name: TETRA TECH
Address: 301 ELLICOTT STREET
City, State, Zip: BUFFALO, NY, 14203
Phone: (716) 541 9217 Fax: (716) 849-9420
Email: PAT.GREEN@TETRATECH.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.

applicant/project proponent signature

MAY 3rd 2019
date

# 7. POST-CONSTRUCTION STORMWATER MANAGEMENT AND SITE RESTORATION PLAN

# Site Restoration and Post-Construction Stormwater Management Plan

# Pennsylvania Pipeline Project - South East Region: Spread 6

## Major Modification-HDD S3-0400

May 2019

**Prepared for:**
Sunoco Logistics, L.P.
525 Fritztown Road
Sinking Spring, PA 19608

**Prepared by:**
Tetra Tech, Inc.
661 Andersen Drive
Pittsburgh, PA 15220

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT F. SIMCIK
ENGINEER
PE-050435-E

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1 USGS Location Map

2 Soils Map, Soil Descriptions, Geologic Formations Map, Sinkhole Repair Plan

3 Construction Details

4 Stormwater Calculations

5 Infiltration test results

6. PCSM Plan Drawings

7 Geosystems Correspondence

# LIST OF ACRONYMS

| ACRONYM | MEANING |
|---|---|
| % CCE | Calcium carbonate equivalent |
| % ENV | Effective neutralizing value |
| ABACT | Antidegradation Best Available Combination of Technologies |
| BMP | Best Management Practice |
| E&SC | Erosion and Sediment Control |
| EV | Exceptional value |
| HDD | Horizontal directional drilling |

| | |
|---|---|
| HDPE | High-density polyethylene |
| HQ | High quality |
| NGL | Natural gas liquids |
| PA | Pennsylvania |
| PADEP | Pennsylvania Department of Environmental Protection |
| PASDA | Pennsylvania Spatial Data Access |
| PCSM | Post-Construction Stormwater Management |
| PIs | Pure live seed |
| ROW | Right of way |
| SPPP | Sunoco Pennsylvanian Pipeline Project |
| SR | Site Restoration |
| TSF | Trout stock fisheries |
| Tt | Tetra Tech, Inc. |
| UNT | Unnamed tributary |
| WWF | Warm water fisheries |

# 1.0 INTRODUCTION

Tetra Tech, Inc. (Tt) has prepared this Site Restoration and Post-Construction Stormwater Management (PCSM) Plan (Plan) for Sunoco Pipeline, L.P. (SPLP) – Pennsylvania Pipeline Project, South East Region: Spread 6. The Plan addresses activities associated with the Sunoco Pennsylvania Pipeline Project (SPPP) installation. Spread 6 (South East Region) of this project is located in Chester and Delaware Counties, Pennsylvania (PA). The plan addresses activities associated with a major modification to the Sunoco Pennsylvania Pipeline Project (SPPP) installation. The HDD S3-0400 modification is located in West Whiteland, Chester County. Site location maps are provided in Attachment 1.

# 2.0 SITE DESCRIPTION

Sunoco Pipeline, L.P. (SPLP) proposes to construct and operate the Pennsylvania Pipeline Project that would expand existing pipeline systems to provide natural gas liquid (NGL). The project involves the installation of approximately two parallel pipelines within a 306.8-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, Pennsylvania (PA) to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306.8 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the initial line for approximately 255.8 miles. The majority of the new ROW will be co-located adjacent to existing utility corridors, including approximately 230 miles of pipeline that will be co-located in the existing SPLP Mariner East pipeline system. The 20-inch pipeline will be installed first, followed by the 16-inch line. Any temporary stabilization required will be implemented in accordance with this Erosion and Sediment (E&S) Plan. Both pipelines will be installed within the same limit of disturbance (LOD) and in the same construction period. This SR and Post Construction Stormwater Management Plan specifically relates to impacts associated with the South East Region, Construction Spread 6.

Fifty feet will be maintained as permanent ROW. In addition, temporary use areas or extra workspaces will be required at some stream and road/railroad crossings; these will typically expand the construction ROW by 25 feet where needed. Construction activities will involve tree removal, clearing and grubbing within the ROW, trenching, pipe installation, and SR. The total LOD in the South East Region will be approximately 287 acres. Acres disturbed by county will be as follows: Chester County with 185 acres disturbed, and Delaware County with 102 acres disturbed.

The HDD S3-0400 Major Modification consists of a change in installation method for the 20-inch diameter pipeline. This permit modification is being requested for a change in installation method for the 20-inch diameter pipeline from an HDD to a Direct Pipe Bore and open trench installation. The direct pipe bore will go under the Exton Bypass (State Route 30), the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, Norfolk Southern Railroad, and wetland WL-K21. The remaining 1300 feet will be installed via open trench installation. There will be no additional Limits of Disturbance (LOD) requested within the wetland and the change in installation method will not result in any loss of wetland area impacts are considered minor and temporary. The change in installation method does require additional temporary work space therefore includes a request for an additional 3.99 acres of LOD in upland areas.

Past and present land use of the project area and surrounding area is agricultural and forested land. Future land use will be a maintained vegetated natural gas pipeline ROW and agricultural land and forested land. Relevant topographic features including streams, streets, pipelines, structures, utility lines, fences, paving and other significant items along the gas line alignment are indicated on the plans, where applicable.

## 2.1 TOPOGRAPHY

The work zone is located on ground of varying elevations. Site elevations vary from 23 feet (Chester Creek in Delaware County) to 741 feet (western border of Chester County) above mean sea level based on the Pennsylvania Spatial Data Access (PASDA). The construction plans show the topography of the site and the surrounding area.

## 2.2 GEOLOGY AND SOILS

The soils and geologic formations surrounding the site are shown on the figures provided in Attachment 2. Attachment 2 also provides soil descriptions and properties of the soils found at the site. In general, the following actions will be taken to counteract soil limitations:

1. Erodible Soils - Prompt stabilization practices will be implemented to minimize the risk of erosion. PCSM facilities have been designed to minimize point-source discharges which increase the likelihood of downstream erosion.

2. Cut Banks Caves - Almost all Pennsylvania soils are susceptible to caving of cut banks. Cut slopes will be stabilized as soon as possible with seed and mulch to prevent sliding. Slopes are designed to not exceed 2H:1V.

3. Corrosive to Concrete or Steel Pipe - Pipes to be used on site shall be either HDPE or coated steel.

4. High Water Table - A seasonal high groundwater determination was conducted at the proposed block valve sites. PCSM facilities that infiltrate have been designed to maintain a 20" separation from the seasonal high groundwater table.

5. Low Strength - Most of Pennsylvania soils (73%) have relatively low strength. Precautions will be taken to prevent slope failures due to improper construction practices. Soils will be evaluated during construction of block valve sites and PCSM facilities to determine whether additional measures will need to be taken.

6. Piping Tendencies -Piping is the erosion by percolating waters or seepage in layer of subsoil resulting in caving and the formation of tunnels or pipes thorough which the soluble or granular material is removed. Where necessary, anti-seep collars will be used to prevent piping.

7. Poor Topsoil -Soil amendments will be added to site soils to promote vegetative growth.

8. Potentially Hydric -A wetland delineation has been performed to determine the presence of wetlands.

9. Potential Sinkhole - Should a sinkhole be encountered during construction, repair should be done under the direct observation and supervision of a professional geologist or licensed geotechnical engineer. Site specific sinkhole repairs should be developed on a case by case basis. Block valves located within karst

topography have been identified, and infiltration practices have been designed to minimize the risk of sinkholes.

To prevent sediment from leaving the site, stabilization practices will be implemented in disturbed areas as soon as practical. Geologic formations or soil conditions that may have the potential to cause pollution after earth disturbance were not observed during field activities. Infiltration tests are being performed and results are being evaluated for the design of the proposed post construction stormwater BMPs.

## 2.3 SURFACE WATER HYDROLOGY

The receiving waters for the HDD S3-0400 Major Modification LOD are UNTs to Valley Creek, which is designated as CWF in Pa. Code 25 Chapter 93. Descriptions of the Primary Receiving Waters can be found in Table 1.

The plan contains Antidegradation Best Available Combination of Technologies (ABACT) BMPs to maintain the designated use of the receiving waters and prevent additional siltation from polluting the streams. The locations of the receiving waters relative to the project area can be seen on the USGS location map in Attachment 1.

# 3.0 SITE RESTORATION PRACTICES

Section 3.0 addresses restoration of the mainline pipeline, temporary workspaces, temporary access roads, and the block valve sites which will be vegetated. Following completion of pipeline installation and trench backfilling, the pipeline ROW, associated workspaces, and temporary access roads shall be returned to the general grade present prior to pipeline installation in order to maintain preconstruction drainage patterns. After completion of major construction work, topsoil that was stockpiled during construction will be placed along the ROW. Grounds disturbed by any of the operations necessary to complete the work for this project within the ROW are to be permanently seeded, or if specified, sodded, unless occupied by structures, paved, or designated as a permanent access road. Disturbed areas, which are at final grade, shall be seeded and mulched once final grades are achieved. The permanent seed mixture will restore disturbed areas to a meadow in good condition or better. If seeding cannot be completed within a 4 day period due to weather conditions, the disturbed area will be mulched with straw at the rate of 3 tons per acre. This straw will be anchored using a method described in Section 3.4.

## 3.1 BMP DESCRIPTION AND CONSTRUCTION SEQUENCE

A generalized construction sequence is provided below. The construction sequence is intended to provide a general course of action to conform to the applicable regulatory agency requirements for restoration and post-construction stormwater management of the site. Necessary steps for proper and complete execution of work pertaining to this plan, whether specifically mentioned or not, are to be performed by the contractor. The contractor will comply with all requirements listed in this section. The contractor may be required to alter controls based on the effectiveness of controls or differing conditions encountered in the field. The appropriate county conservation district and DEP shall be contacted and must approve any deviation to the authorized plans.

A pre-construction meeting is required prior to the start of any construction activity. The Pennsylvania Department of Environmental Protection (PADEP) or applicable county conservation district, contractors, the landowner, appropriate municipal officials, and the plan preparer must be invited to this meeting at least 7 days in advance.

**General Construction Sequence**

1. Grade surface to finished grade elevations as soon as practicable following completion of pipe installation.

2. Surface roughening will be utilized to rough the soil surface with horizontal depressions for the purpose of reducing runoff velocity, increasing infiltration, aiding the establishment of vegetation, and reducing erosion. Surface roughening should be applied to slopes 3H:1V or steeper unless a stable rock face is provided or it can be shown that there is not a potential for sediment pollution to surface waters. For roughened surfaces

within 50 feet of a surface water, and where blanketing of seeded areas is proposed as the means to achieving permanent stabilization, spray-on type blankets are recommended. Surface roughening shall be accomplished using dozers affixed with grouser tracked equipment. Dozers shall run up and down the slopes leaving horizontal grooves perpendicular to the slope. Dozer blades shall be raised and not used during surface roughening. Where compaction does occur, contractor shall scarifiy the soil or provide additional roughening such as deep ripping or chisel ripping to restore the area to a minimal compacted state. In areas of proposed infiltration, soils shall be amended to 2' below grade. See Soil Amendment and Restoration construction sequence below.

3. Place topsoil from topsoil stockpiles as the upper layer of backfill. Topsoil shall not be placed when the subgrade is frozen or when it is excessively wet or dry and shall not be handled when in a frozen or muddy condition.

4. Remove gravel and geotextile from the temporary access roads and scarify the soil. Refer to step 2 of this sequence to address compaction at access roads. After addressing compaction concerns, place topsoil that was stripped prior to installation of the access roads.

5. Immediately seed and mulch disturbed areas in accordance with the permanent seeding schedule once final grade is established and topsoil is placed.

6. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70-percent perennial vegetative cover is established. Regrade and revegetate areas disturbed during the removal of the erosion and sediment controls.

**Permanent Seeding**

Site preparation and establishment of permanent cover in areas other than lawns will be conducted according to the following guidelines:

| SITE CONDITIONS | NURSE CROP | SEED MIXTURE (SELECT ONE MIXTURE) |
|---|---|---|
| **SLOPES AND BANKS (NOT MOWED)**<br>WELL-DRAINED<br>VARIABLE DRAINAGE | <br>1 PLUS<br>1 PLUS | <br>3, 5, 8, OR 12 (1)<br>3 OR 7 |
| **SLOPES AND BANKS (MOWED)**<br>WELL-DRAINED<br>**SLOPES AND BANKS (GRAZED/HAY)**<br>WELL-DRAINED | 1 PLUS<br><br>1 PLUS | 2 OR 10<br><br>2,3, OR 13 |
| **GULLIES AND ERODED AREAS** | 1 PLUS | 3, 5, 7, OR 12 (1) |
| **EROSION CONTROL FACILITIES (BMPS)**<br>SOD WATERWAYS, SPILLWAYS, FREQUENT WATER FLOW AREAS<br>DRAINAGE DITCHES | 1 PLUS | 2, 3, OR 4 |

| SITE CONDITIONS | NURSE CROP | SEED MIXTURE (SELECT ONE MIXTURE) |
|---|---|---|
| SHALLOW, LESS THAN THREE FEET DEEP | 1 PLUS | 2, 3, OR 4 |
| DEEP, NOT MOWED | 1 PLUS | 5 OR 7 |
| POND BANKS, DIKES, LEVEES, DAMS, DIVERSION CHANNELS, AND OCCASIONAL WATER FLOW AREAS | | |
| MOWED AREAS | 1 PLUS | 2 OR 3 |
| NON-MOWED AREAS | 1 PLUS | 5 OR 7 |
| FOR HAY OR SILAGE ON DIVERSION CHANNELS AND OCCASIONAL WATER FLOW AREAS | 1 PLUS | 3 OR 13 |
| **HIGHWAYS** | | |
| NON-MOWED AREAS | | |
| WELL-DRAINED | 1 PLUS | 5, 7, 8, OR 10 |
| VARIABLE DRAINED | 1 PLUS | 3 OR 7 |
| POORLY DRAINED | 1 PLUS | 3 |
| AREAS MOWED SEVERAL TIMES PER YEAR | 1 PLUS | 2, 3, OR 10 |
| **UTILITY ROW** | | |
| WELL-DRAINED | 1 PLUS | 5, 8, OR 12 (1) |
| VARIABLE DRAINED | 1 PLUS | 3 OR 7 |
| WELL-DRAINED AREAS FOR GRAZING/HAY | 1 PLUS | 2, 3, OR 13 |
| **EFFLUENT DISPOSAL AREAS** | 1 PLUS | 3 OR 4 |
| **SANITARY LANDFILLS** | 1 PLUS | 3, 5, 7, 11 (1), OR 12 (1) |
| **SURFACE MINES** | | |
| SPOILS, MINE WASTES, FLY ASH, SLAG, SETTLING BASIN RESIDUES AND OTHER SEVERELY DISTURBED AREAS (LIME TO SOIL TEST) | 1 PLUS | 3, 4, 5, 7, 8, 11 (1) OR 12(1) |
| SEVERELY DISTURBED AREAS FOR GRAZING/HAY | 1 PLUS | 3 OR 13 |
| **LAWN** | 1 PLUS | PENNDOT Formula B |

| RECOMMENDED SEED MIXTURES | | | |
|---|---|---|---|
| **MIXTURE NO.** | **SPECIES** | **SEEDING RATES – PLS (1)** | |
| | | MOST SITES | ADVERSE SITES (8) |
| 1 (2) | spring oats (spring), or 64 96 | 64 | 96 |
| | annual ryegrass (spring or fall), or | 10 | 15 |
| | winter wheat (fall), or | 90 | 120 |
| | winter rye (fall) | 56 | 112 |
| 2 (3) | tall fescue, or 75 | 60 | 75 |
| | fine fescue, or 40 | 35 | 40 |
| | kentucky bluegrass, plus 25 30 | 25 | 30 |
| | redtop(4), or | 3 | 3 |
| | perennial ryegrass | 15 | 20 |
| 3 | birdsfoot trefoil, plus 6 10 | 6 | 10 |
| | tall fescue | 30 | 35 |
| 4 | birdsfoot trefoil, plus | 6 | 10 |
| | reed canarygrass | 10 | 15 |
| 5 (5) | Big Bluestem, plus | 10 | 15 |
| | tall fescue, or | 20 | 25 |
| | perennial ryegrass | 20 | 25 |

| RECOMMENDED SEED MIXTURES | | | |
|---|---|---|---|
| **MIXTURE NO.** | **SPECIES** | **SEEDING RATES – PLS (1)** | |
| | | MOST SITES | ADVERSE SITES (8) |
| 6 (5,6) | Big Bluestem, plus | 10 | 15 |
| | annual ryegrass | 20 | 25 |
| 7 (5) | birdsfoot trefoil, plus | 20 | 30 |
| | Big Bluestem, plus | 20 | 30 |
| | tall fescue | 20 | 25 |
| 8 | flatpea, plus | 20 | 30 |
| | tall fescue, or | 20 | 30 |
| | perennial ryegrass | 20 | 25 |
| 9 | Not applicable to project | N/A | N/A |
| 10 | tall fescue, plus | 40 | 60 |
| | fine fescue | 10 | 15 |
| 11 | deertongue, plus | 15 | 20 |
| | birdsfoot trefoil | 6 | 10 |
| 12(7) | switchgrass, or | 15 | 20 |
| | big bluestem, plus | 15 | 20 |
| | birdsfoot trefoil | 6 | 10 |
| 13 | orchardgrass, or | 20 | 30 |
| | smooth bromegrass, plus | 25 | 35 |
| | birdsfoot trefoil | 6 | 10 |

1. Pure live seed (pls) is the product of the percentage of pure seed times percentage germination divided by 100. For example, to secure the actual planting rate for switchgrass, divide 12 pounds pls shown on the seed tag. Thus, if the pls content of a given seed lot is 35 percent, divide 12 pls by 0.35 to obtain 34.3 pounds of seed required to plant one-acre. All mixtures in this table are shown in terms of pls.

2. If high-quality seed is used, for most sites seed spring oats at a rate of two bushels per acre, winter wheat at 11.5 bushels per acre, and winter rye at one bushel per acre. If germination is below 90 percent, increase these suggested seeding rates by 0.5 bushel per acre.

3. This mixture is suitable for frequent mowing. Do not cut shorter than 4 inches.

4. Keep seeding rate to that recommended in table. These species have many seeds per pound and are very competitive. To seed small quantities of small seeds such as weeping lovegrass and redtop, dilute with dry sawdust, sand, rice hulls, buckwheat hulls, etc.

5. Use for highway slopes and similar sites where the desired species after establishment is Big Bluestem.

6. Use only in extreme southeastern or extreme southwestern PA. Serecia lespedeza is not well adapted to most of PA.

7. Do not mow shorter than 9 to 10 inches.

8. If liming, fertilization, and preparation of seedbed are properly done and if care is taken to drill and cover the seed (or mulch applied), the rate for "most sites" should suffice. However, on eroded or coarse and poorly prepared seedbeds, particularly if the soil is very acidic or infertile, the rate for "adverse sites" should be used.

9. For seed mixtures 11 and 12, only use spring oats or weeping lovegrass (included in mix) as nurse crop.

In lawn areas, permanent cover will be established using the following PENNDOT seed mixture:

| **PENNDOT FORMULA B** | | | | |
|---|---|---|---|---|
| **Seeding Rate** | 3 lbs. per 1,000 square feet | | | |
| **Species** | **% by Weight** | **Purity %** | **Minimum % Germination** | **Maximum % Weed Seed** |
| **Kentucky Bluegrass** | 50 | 98 | 80 | 0.20 |
| **Perennial Rye** | 20 | 98 | 90 | 0.15 |
| **Red Fescue** | 30 | 98 | 85 | 0.15 |

**Liming Rates**

Minimum 6 tons per acre at 100% effective neutralizing value (% ENV), unless the soil test determines that a lesser amount is needed. To determine the actual amount of regular lime to apply, divide the amount called for by the soil test by the % ENV for the product used. For example, if 6 tons per acre is needed and the %ENV for the lime used is 88%, divide 6 by 0.88 resulting in 6.8 tons needing to be applied. For dolomitic lime, which has a significant amount of magnesium in it, divide the amount called for by the soil test by the % calcium carbonate equivalent (% CCE) listed for the product instead of the % ENV. The % CCE may be above 100% which accounts for the fact that magnesium has a greater effect per pound than the calcium in regular lime. Note: When a soil test requires more than 8,000 pounds of lime per acre, the lime must be mixed into the top 6 inches of soil.

**Fertilization Rates**

Apply 10-20-20 at 600 pounds/acre, if top dressed or 1,000 pounds/ac, if incorporated, unless the soil test determines that the rate can be less than these minimums.

| SOIL AMENDMENT APPLICATION RATE EQUIVALENTS | | | | |
|---|---|---|---|---|
| Soil Amendment | Per Acre | Per 1,000 sq. ft. | Per 1,000 sq. yds. | |
| AGRICULTURAL LIME | 6 TONS | 240 LBS. | 240 LBS. | or as per soil test; may not be required in agricultural fields |
| 10-20-20 FERTILIZER | 1,000 LBS. | 25 LBS. | 25 LBS. | or as per soil test; may not be required in agricultural fields |

**Temporary Seeding**

Temporary grass cover will be established in the following areas where soil stockpiles are exposed for a period greater than 4 days. The seed mixture for temporary cover will consist of 100% annual ryegrass. Seed will be applied at the rate of 40 pounds per acre or as recommended by a local recognized seed supplier approved by the Owner's representative. Prior to seeding, apply 1 ton of agricultural grade limestone per acre plus 10-10-10 fertilizer at the rate of 500 pounds per acre and work into the soil.

**Mulching**

The purpose of mulch is to reduce runoff and erosion, prevent surface compaction or crusting, conserve moisture, aid in establishing plant cover, and control weeds. Mulch will be applied on any area subject to erosion or that has unfavorable conditions for plant establishment and growth. The practice may be used alone or in conjunction with other structural and vegetative conservation practices such as waterways, ponds, sedimentation traps, or critical area planting. On sediment-producing areas where the period of exposure is less than 2 months, mulch materials will be applied according to the following guidelines:

1. Straw mulch will be applied at the rate of 3 tons per acre. Chemically treated or salted straw is not acceptable as mulch.

2. Straw mulch will be anchored immediately after application by at least one of the following methods:

   A. "Crimped" into the soil using tractor-drawn equipment (straight-bladed coulter or similar).

      This method is limited to slopes no steeper than 3:1. Machinery should be operated on the contour. (Crimping of hay or straw by running it over with tracked machinery is not recommended.)

   B. Asphalt, either emulsified or cut-back, containing no solvents or other diluting agents toxic to plant or animal life, uniformly applied at the rate of 31 gallons per 1,000 square feet.

C. Synthetic binders (chemical binders) may be used as recommended by the manufacturer to anchor mulch provided that sufficient documentation is provided to show that it is non-toxic to native plant and animal species.

D. Lightweight plastic, fiber, or paper nets may be stapled over the mulch according to the manufacturer's recommendations.

Mulched areas will be checked periodically and after each runoff event (e.g., rain, snowmelt, etc.) for damage until the desired purpose of the mulching is achieved. Damaged portions of the mulch or tie-down material will be repaired upon discovery.

## 3.2 MATERIAL RECYCLING AND DISPOSAL

The operator will remove from the site, recycle, or dispose of all building materials and wastes in accordance with PADEP's solid waste management regulations at 25 Pennsylvania Code 260.1 et seq., 271.1 et seq., and 287.1 et seq. The contractor will not illegally bury, dump, or discharge building material or wastes at the site. Excess material brought into the site areas to facilitate construction access will be completely removed prior to rough grading and final surface stabilization. Expected construction wastes during site restoration will consist of packaging material and sediment cleaned from E&SC BMPs. Packaging from materials brought on site will be disposed of by a licensed hauler. Sediment removed from BMPs will either be spread in a protected area to dry and then recycled as fill material prior to permanent seeding or disposed of off-site. In cases where disposal is necessary, waste materials will be disposed of at an approved PADEP waste site.

## 3.3 THERMAL IMPACTS

Thermal impacts are most commonly associated with urbanization (i.e., increased impervious surfaces) that results in heated stormwater runoff flowing into receiving waters where it mixes, and potentially increases the base temperature of the surface water in streams. However, another contributing factor for stream temperature is solar exposure (radiant energy input) to the surface water, typically ponded, standing waters. The amount of heat transferred, and the degree of thermal pollution is of importance for fisheries management and the ecological integrity of receiving waters. Among the attributes that determine the contribution of solar energy to thermal impacts are the presence of riparian vegetation, as well as stream width, depth, flow regime (perennial, intermittent, ephemeral), and orientation.

Thermal impacts have been minimized by limiting the disturbed area to the maximum extent practicable. By minimizing the extent of the disturbed area, vegetative clearing, including forested areas, has been minimized. Vegetated block valve sites will be restored to a meadow in good condition or better, and no impervious surface will be created at those sites. Following installation of the pipelines, existing grades along the pipeline right of way, additional temporary workspaces, and temporary access roads will be restored, permanent seeding will

occur as soon as practicable to facilitate vegetative growth during germinating months, and the addition/creation of impervious surfaces in riparian areas has been avoided. By returning these areas to their existing grades, stormwater is unlikely to pond in these locations therefore minimizing the potential for ponded water to result in significant contributions to thermal impacts in receiving waters. In addition, thermal impacts will be minimized during site restoration by facilitating permanent seeding as soon as practicable to encourage vegetative growth. Although shade cover will be reduced in areas that were previously forested, there is no anticipated adverse effect to the receiving watersheds because the project will only clear a narrow corridor of vegetation within each respective watershed. The Project does not have thermal impacts. Specifically, thermal impacts will be avoided by implementing the following:

- Siting parallel to and overlapping with existing ROWs to minimize vegetation clearing at stream crossings;
- Reducing the construction ROW width and additional temporary workspaces at stream crossings;
- No grubbing, grading, or clearing of trees will occur within 50 feet of the top of stream bank until pipeline construction/installation is ready to proceed through that area.
- Restoring (seeding) disturbed areas/ROW as soon as practicable and /or directing runoff to vegetated areas to reduce the temperature of runoff prior to discharge into the streams; and,
- Restoring the stream banks and seeding/planting as soon as practicable to facilitate vegetative growth along the stream channel.

## 3.4 RIPARIAN FOREST BUFFERS

The receiving waters for the HDD S3-0400 Major Modification LOD is a UNT to Valley Creek, which is designated as CWF in Pa. Code 25 Chapter 93. Since the LOD is not located in a special protection watershed the Riparian Forest Buffer requirements is not applicable.

## 3.5 INSPECTION AND MAINTENANCE PROCEDURES

Seeded areas will be inspected weekly and after each runoff event for bare spots, washouts, and healthy growth. Necessary repairs will be made immediately. Mulched areas will be checked periodically and after severe storms for damage until the desired purpose of the mulching is achieved. Damaged portions of the mulch or tie-down material will be repaired upon discovery.

All sedimentation control measures will remain in place until the disturbed areas are stabilized and a uniform 70-percent perennial vegetative cover is established. Any area not achieving a 70-percent vegetative cover will be reseeded and mulched within 24 hours of detection. If BMPs are found to be inoperative or ineffective during an inspection, PADEP should be contacted within 24 hours, followed by submission of a written noncompliance report to PADEP within 5 days of the initial contact.

**Long-Term Maintenance**

Long-term maintenance of the pipeline ROW will include periodic visual inspections for sufficient vegetative growth and cover. Insufficient vegetative cover is defined as any area not achieving a uniform 70-percent perennial vegetative cover. Bare spots and areas with insufficient vegetative cover will be reseeded and mulched within 24 hours of discovery. The ROW will be inspected for signs of erosion, especially on steep slopes. Corrective measures will be taken, as needed. If there is evidence of trench settling, the area will be regraded to maintain pre-construction drainage patterns, mulched, and seeded. A written report is required for each inspection and for each repair or maintenance activity, and the report should specify how to access the site. SPLP is responsible for maintaining the ROW under the provisions of this permit.

## 3.6 ANTIDEGRADATION REQUIREMENTS

The HDD S3-0400 Major Modification LOD is not located in a special protection watershed; therefore, the antidegradation analysis is not required.

## 3.7 STORMWATER RUNOFF ANALYSIS

The pre-construction drainage patterns surrounding the project will be maintained. All disturbed areas within the HDD S3-0400 Major Modification LOD will be restored to a meadow in good condition or lawn where required by landowners. As a result of restoring the pipeline ROW and associated workspaces associated with the Major Modification to a meadow in good condition and maintaining pre-construction drainage patterns, there will be no increase in stormwater runoff rate or volume attributed to those areas. There are no proposed permanent access roads or block valves associated with this Major Modification.

All disturbed areas within the pipeline right of way, additional temporary workspaces, and temporary access roads will be restored to a meadow in good condition or better or a lawn condition. The pre-construction drainage patterns surrounding the project will be maintained for the areas of the project covered under this section. As a result of restoring the pipeline right of way, additional temporary workspaces, and temporary access roads to a meadow condition and maintaining pre-construction drainage patterns in accordance with 25 Pa Code § 102.8(n), there will be no increase in stormwater runoff rate or volume attributed to these locations, and a quantitative stormwater analysis is not required.

The proposed mainline pipeline will be restored in accordance with 102.8(n) and meet the requirements outlined in §§ 102.8(b), (c), (e), (f), (h), (i), (l), and (m).

In accordance with § 102.8(b), the following principles have been incorporated into the project design in accordance with the numbering in § 102.8(b): (1) The integrity of stream channels and the physical, biological, and chemical qualities of the receiving waters will remain unchanged. The site restoration principles will protect the existing and designated uses of the receiving waters. BMPs will be maintained until the site achieves

stabilization during site restoration to ensure that runoff which leaves the project site will have no short-term adverse effects on the physical, biological, or chemical qualities of downstream receiving waters. The permanent seed mixture will restore the majority of the right of way to a meadow condition. Those areas which are not restored to a meadow condition will be restored to a lawn condition or forest. As a result of restoring the pipeline right of way as specified in the restoration plan, there will be no long-term effects to the physical, biological, or chemical qualities of downstream receiving waters. (2) The mainline pipeline will be restored to original grade so flow paths will not be altered. The right of way will be restored to achieve a meadow in good condition or better, with the exception of areas that will be returned to lawn or forest. In addition, the pipeline right of way accounts for only a narrow corridor of development within each drainage area to the nearest receiving water. As a result, post-development runoff rates to the nearest receiving water will not increase. (3) The right of way will be restored to a meadow in good condition or better in most areas, with the exception of specified locations where the right of way will be restored to the equivalent of its predevelopment land cover (lawn or forest). As a result, any potential increase in stormwater runoff volume has been minimized to the maximum extent practicable. (4) There are no proposed, permanent impervious features associated with the mainline pipeline. Temporary access roads will be restored to a vegetated condition following installation of the pipeline. (5) Existing drainage features and vegetation will be protected by restoring the project area back to its original grade. As a result, drainage features and existing vegetation surrounding the project area will be preserved. (6) Land clearing and grading will be minimized because the project area has been limited to the area required to safely install the natural gas pipelines. The pipeline right of way will be returned to original grade following installation of the pipelines. (7) Soil compaction will be minimized by utilizing travel lanes within the pipeline right of way. Following construction, areas that have been compacted will be scarified or ripped, or soil amendments will be incorporated prior to backfilling topsoil and seeding. After initiating restoration, vehicular traffic will be restricted to prevent soil compaction. (8) As demonstrated in 102.8(2) and 102.8(3), potential increases in post development stormwater runoff has been minimized to the maximum extent practicable utilizing nonstructural restoration BMPs.

In accordance with § 102.8(c), the mainline Site Restoration and Post Construction Stormwater Management Plan has been planned and designed and will be implemented in consistency with the E&S Plan.

In accordance with § 102.8(e), the Site Restoration and Post Construction Stormwater Management Plan has been prepared by Robert F. Simcik, P.E. who is trained and experienced in PCSM design methods and techniques applicable to the size and scope of the proposed pipeline project.

In accordance with § 102.8(f), the Site Restoration and Post Construction Stormwater Management Plan contains drawings and a narrative consistent with the requirements of Chapter 102. The Plan has been designed to minimize the threat to human health, safety, and the environment to the greatest extent practicable. The Plan includes the required information as outlined in § 102.8(f)(1) through § 102.8(f)(15).

In accordance with § 102.8(h), nondischarge alternatives for Special Protection waters are evaluated in the Antidegradation section of the Site Restoration and Post Construction Stormwater Management Plan. The Plan includes ABACT BMPs where nondischarge alternatives do not exist for the project.

In accordance with § 102.8(i), the applicant has submitted the Site Restoration and Post Construction Stormwater Management Plan to the applicable county conservation districts and Department of Environmental Protection for review and approval. Upon complaint or site inspection, the Plan will be available for subsequent review and inspection by the reviewing agencies.

In accordance with § 102.8(l), the permittee will include with the notice of termination "Record Drawings" with a final certification statement from a licensed professional, which reads as follows:

"I (name) do hereby certify pursuant to the penalties of 18 Pa.C.S.A. § 4904 to the best of my knowledge, information and belief, that the accompanying record drawings accurately reflect the as-built conditions, are true and correct, and are in conformance with Chapter 102 of the rules and regulations of the Department of Environmental Protection and that the project site was constructed in accordance with the approved PCSM Plan, all approved plan changes and accepted construction practices."

In accordance with § 102.8(m), the Site Restoration and Post Construction Stormwater Management Plan identifies that the permittee shall be responsible for long-term operation and maintenance of PCSM BMPs associated with permanent surface sites. However, there are no PCSM BMPs proposed as part of the mainline pipeline.

There are no proposed permanent gravel access roads and block valve pads in the South East Region.

# 4.0 POST-CONSTRUCTION STORMWATER MANAGEMENT ANALYSIS

The construction and restoration practices for the proposed major modification have been designed to meet the provisions PADEP Chapter 102 regulations. No new impervious area is proposed with the Major Modification. In general, the pre-construction drainage patterns surrounding the project will be maintained, and all disturbed areas within the pipeline ROW will be restored to a meadow in good condition. As a result of restoring all disturbed areas within the pipeline ROW to a meadow condition, the project will not result in increased stormwater runoff rate or volume.

## 4.1 BMP DESCRIPTION NARRATIVE AND CONSTRUCTION SEQUENCE

There are no proposed PCSM BMPs for the HDD S3-0400 Major Modification.

## 4.2 MATERIAL RECYCLING AND DISPOSAL

The operator will remove from the site, recycle, or dispose of all building materials and wastes in accordance with PADEP's solid waste management regulations at 25 Pennsylvania Code 260.1 et seq., 271.1 et seq., and 287.1 et seq. The contractor will not illegally bury, dump, or discharge building material or wastes at the site. Excess material brought into the site areas to facilitate construction access will be completely removed prior to rough grading and final surface stabilization. In cases where disposal is necessary, waste materials will be disposed of at an approved PADEP waste site.

## 4.3 THERMAL IMPACTS

Thermal impacts are most commonly associated with urbanization (i.e., increased impervious surfaces) that results in heated stormwater runoff flowing into receiving waters where it mixes, and potentially increases the base temperature of the surface water in streams. However, another contributing factor for stream temperature is solar exposure (radiant energy input) to the surface water, typically ponded, standing waters. The amount of heat transferred, and the degree of thermal pollution is of importance for fisheries management and the ecological integrity of receiving waters. Among the attributes that determine the contribution of solar energy to thermal impacts are the presence of riparian vegetation, as well as stream width, depth, flow regime (perennial, intermittent, ephemeral), and orientation.

## 4.4 RIPARIAN FOREST BUFFERS

The receiving waters for the HDD S3-0400 Major Modification LOD is a UNT to Valley Creek, which is designated as CWF in Pa. Code 25 Chapter 93. Since the LOD is not located in a special protection watershed the Riparian Forest Buffer requirements is not applicable.

## 4.5 INSPECTION AND MAINTENANCE PROCEDURES

Long-term maintenance of the pipeline ROW will include periodic visual inspections for sufficient vegetative growth and cover. Insufficient vegetative cover is defined as any area not achieving a uniform 70-percent perennial vegetative cover. Bare spots and areas with insufficient vegetative cover will be reseeded and mulched within 24 hours of discovery. The ROW will be inspected for signs of erosion, especially on steep slopes. Corrective measures will be taken, as needed. If there is evidence of trench settling, the area will be regraded to maintain pre-construction drainage patterns, mulched, and seeded. A written report is required for each inspection and for each repair or maintenance activity, and the report should specify how to access the site. SPLP is responsible for maintaining the ROW under the provisions of this permit.

Inspection and maintenance procedures for permanent post-construction stormwater management facilities and stormwater conveyance BMPs are summarized below. If any post-construction stormwater management facilities are constructed prior to stabilization of upslope contributory drainage areas, inspections shall occur weekly and after runoff events until the surrounding area achieves stabilization. Sites located within karst terrain require more frequent long-term inspections, as specified in the Sinkhole Repair Plan in Attachment 2.

## 4.6 ANTIDEGRADATION REQUIREMENTS

The HDD S3-0400 Major Modification LOD is not located in a special protection watershed; therefore, the antidegradation analysis is not required.

## 4.7 STORMWATER RUNOFF ANALYSIS

The pre-construction drainage patterns surrounding the project will be maintained. All disturbed areas within the HDD S3-0400 Major Modification LOD will be restored to a meadow in good condition or lawn where required by landowners. As a result of restoring the pipeline ROW and associated workspaces associated with the Major Modification to a meadow in good condition and maintaining pre-construction drainage patterns, there will be no increase in stormwater runoff rate or volume attributed to those areas.

# 5.0 REFERENCES

Erosion and Sediment Pollution Control Program Manual, Commonwealth of Pennsylvania, Department of Environmental Protection, Office of Water Management, March 2012.

Stormwater Management for Construction Activities - Developing Pollution Prevention Plans and Best Management Practices, United States Environmental Protection Agency, Office of Water, 1993.

Pennsylvania Stormwater Best Management Practices Manual, Pennsylvania Department of Environmental Protection, Bureau of Watershed Management, December 2006.

Downingtown, Elverson, Pottstown, Washington, Malvern, West Chester, and Media Quadrangles, Pennsylvania – Chester County, Geological Survey, United States Department of Interior.

Soil Survey of Chester County, Pennsylvania, United States Department of Agriculture, Soil Conservation Service.

County-wide Act 167 Stormwater Management Plan for Chester County, PA. Chester Creek Act 167 Plan – Volume I and Volume II. Conestoga River Act 167 Plan. Ridley Creek Act 167 Plan.

DCNR, 2016. *Invasive Plants in Pennsylvania, Crown Vetch,* Coronilla varia. Accessed October 25, 2016. http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_010284.pdf.

**Receiving Waters Table**

Pennsylvania Pipeline Project

Southeast Region

Siltation Impairment Highlighted

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Conestoga River | Chester | West Nantmeal | WARM WATER FISHES | WWF | Yes | Agriculture- Nutrients; Other- Nutrients; Other- Organic Enrichment/Low D.O.; Source Uknown- Pathogens | Yes | Nutrients; Organic Enrichment/Low D.O. |
| UNT to South Branch French Creek | Chester | West Nantmeal | EXCEPTIONAL VALUE | EV | Yes | Source Unknown- Pathogens | No | N/A |
| South Branch French Creek | Chester | West Nantmeal | EXCEPTIONAL VALUE | EV | Yes | Source Unknown- Pathogens | No | N/A |
| UNT to Marsh Creek | Chester | West Nantmeal | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | East Nantmeal | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Upper East Branch Brandywine Creek | Chester | Wallace | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | Wallace | WARM WATER FISHES | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Marsh Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| Marsh Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Black Horse Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Black Horse Creek | Chester | Upper Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Shamona Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Shamona Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| UNT to Upper East Branch Brandywine Creek | Chester | Uwchlan | HIGH QUALITY-TROUT STOCKING | HQ | No | N/A | No | N/A |
| UNT to Valley Creek | Chester | Uwchlan | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Valley Creek | Chester | West Whiteland | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| Valley Creek | Chester | West Whiteland | COLD WATER FISHES | CWF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation | Yes | Cause Uknown; Pesticides; Nutrients; Siltation; Organic Enrichment/Low D.O.; Suspended Solids |
| East Branch Chester Creek | Chester | West Whiteland | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| East Branch Chester Creek | Chester | West Goshen | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Chester | West Goshen | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Chester | West Goshen | HIGH QUALITY-TROUT STOCKING | HQ | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Chester Creek | Chester | Westtown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Chester | Westtown | HIGH QUALITY-TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Ridley Creek | Delaware | Thornbury | HIGH QUALITY-TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Chester Creek | Delaware | Thornbury | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Delaware | Edgmont | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |
| UNT to Ridley Creek | Delaware | Edgmont | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Siltation ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Cause Unknow | No | N/A |
| UNT to Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers-Water/Flow Variability; Urban Runoff/Storm Sewers-Siltation; Habitat Modification- Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| Rocky Run | Delaware | Middletown | HIGH QUALITY-COLD WATER FISHES | HQ | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Agriculture - Cause Unknown | No | N/A |
| UNT to Rocky Run | Delaware | Middletown | HIGH QUALITY-COLD WATER FISHES | HQ | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Agriculture - Cause Unknown | No | N/A |
| UNT to Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation | No | N/A |
| Chrome Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Crum Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Crum Run | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Middletown | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Chester Creek | Delaware | Aston | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Aston | TROUT STOCKING | TSF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Aston | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**
Pennsylvania Pipeline Project
Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Delaware River | Delaware | Aston | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Aston | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Chester Creek | Delaware | Brookhaven | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| Baldwin Run | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

**Receiving Waters Table**

Pennsylvania Pipeline Project

Southeast Region

| Stream Name | County | Township | Chapter 93 Designated Use (Existing Use, if applicable) | Chapter 93 Code | Impaired | Impairment | TMDL | TMDL Limits |
|---|---|---|---|---|---|---|---|---|
| UNT to Chester Creek | Delaware | Chester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Delaware River | Delaware | Chester | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Baldwin Run | Delaware | Upper Chichester | WARM WATER FISHES | WWF | Yes | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |
| UNT to Delaware River | Delaware | Upper Chichester | WARM WATER FISHES | WWF | No | Urban Runoff/Storm Sewers - Cause Unknown ; Urban Runoff/Storm Sewers - Water/Flow Variability ; Urban Runoff/Storm Sewers - Siltation ; Habitat Modification - Other Habitat Alterations | No | N/A |

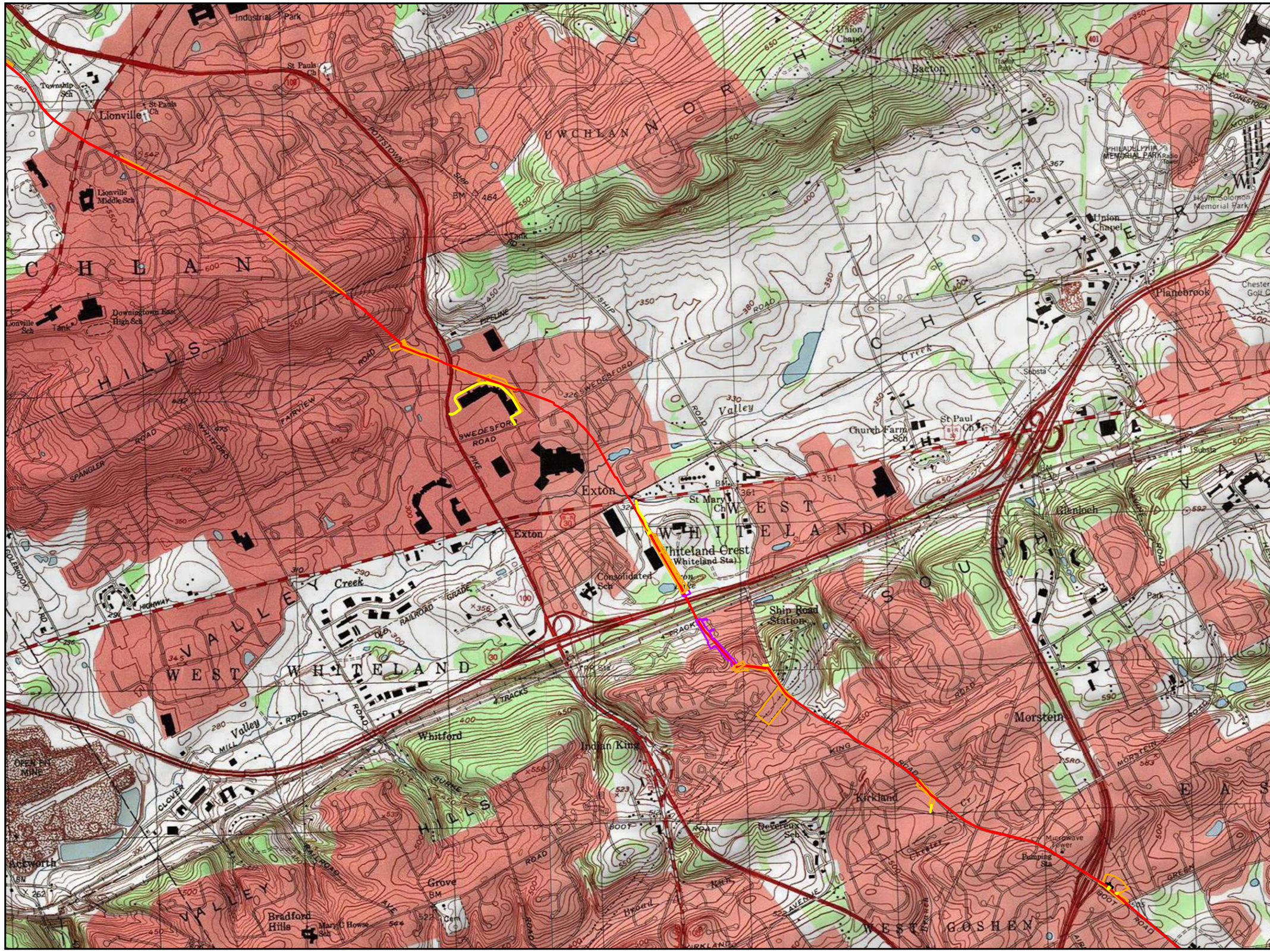
**Recieving Wetlands**
**Pennsylvania Pipeline Project**
**South-East Region**

| Municipality | Receiving Water | Number of Wetlands | Number of EV Wetlands (Classification) |
|---|---|---|---|
| **CHESTER COUNTY** | | | |
| West Nantmeal | UNT to South Branch French Creek | 9 | 7 (EV Stream) |
| West Nantmeal | UNT to Marsh Creek | 1 | 0 |
| East Nantmeal | UNT to Marsh Creek | 2 | 0 |
| Wallace | UNT to Marsh Creek | 6 | 0 |
| Upper Uwchlan | UNT to Marsh Creek | 16 | 0 |
| Upper Uwchlan | UNT to Black Horse Creek | 4 | 2 (Wild Trout/Bog Turtle) |
| Uwchlan | UNT to Shamona Creek | 5 | 1 (Wild Trout) |
| West Whiteland | UNT to Valley Creek | 17 | 0 |
| West Whiteland | UNT to Chester Creek | 2 | 0 |
| West Goshen | UNT to Chester Creek | 1 | 0 |
| East Goshen | UNT to Chester Creek | 2 | 0 |
| Westtown | UNT to Chester Creek | 1 | 0 |
| **DELAWARE COUNTY** | | | |
| Edgmont | UNT to Chester Creek | 6 | 0 |
| Middletown | UNT to Chester Creek | 18 | 2 (PuWS) |
| Middletown | UNT to Rocky Run | 4 | 1 (Wild Trout) |
| Middletown | UNT to Chrome Creek | 1 | |
| Aston | UNT to Chester Creek | 1 | 0 |
| Aston | UNT to Baldwin Run | 3 | 0 |
| Chester | UNT to Baldwin Run | 12 | 0 |
| Chester | UNT to Chester Creek | 2 | 0 |
| Upper Chichester | UNT to Baldwin Run | 14 | 0 |

Revised for Major Modification

ATTACHMENT 1:

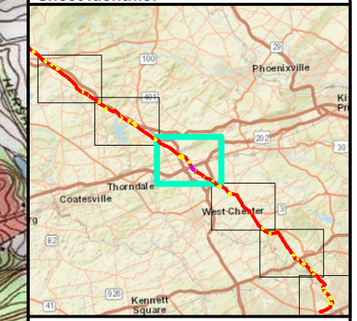
USGS Location Maps




## Legend

- Access Road
- Major Modification
- Limit of Disturbance
- Alignment Centerline
- Block Valve/Station

**Sheet Identifier**




N

Feet: 0 1,000 2,000

Meters: 0 300 600

**PROJECT LOCATION MAP**
**ATTACHMENT 1-3**
**PENNSYLVANIA PIPELINE PROJECT**
**NOVEMBER 12, 2016 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY,**
**PENNSYLVANIA**

TETRA TECH

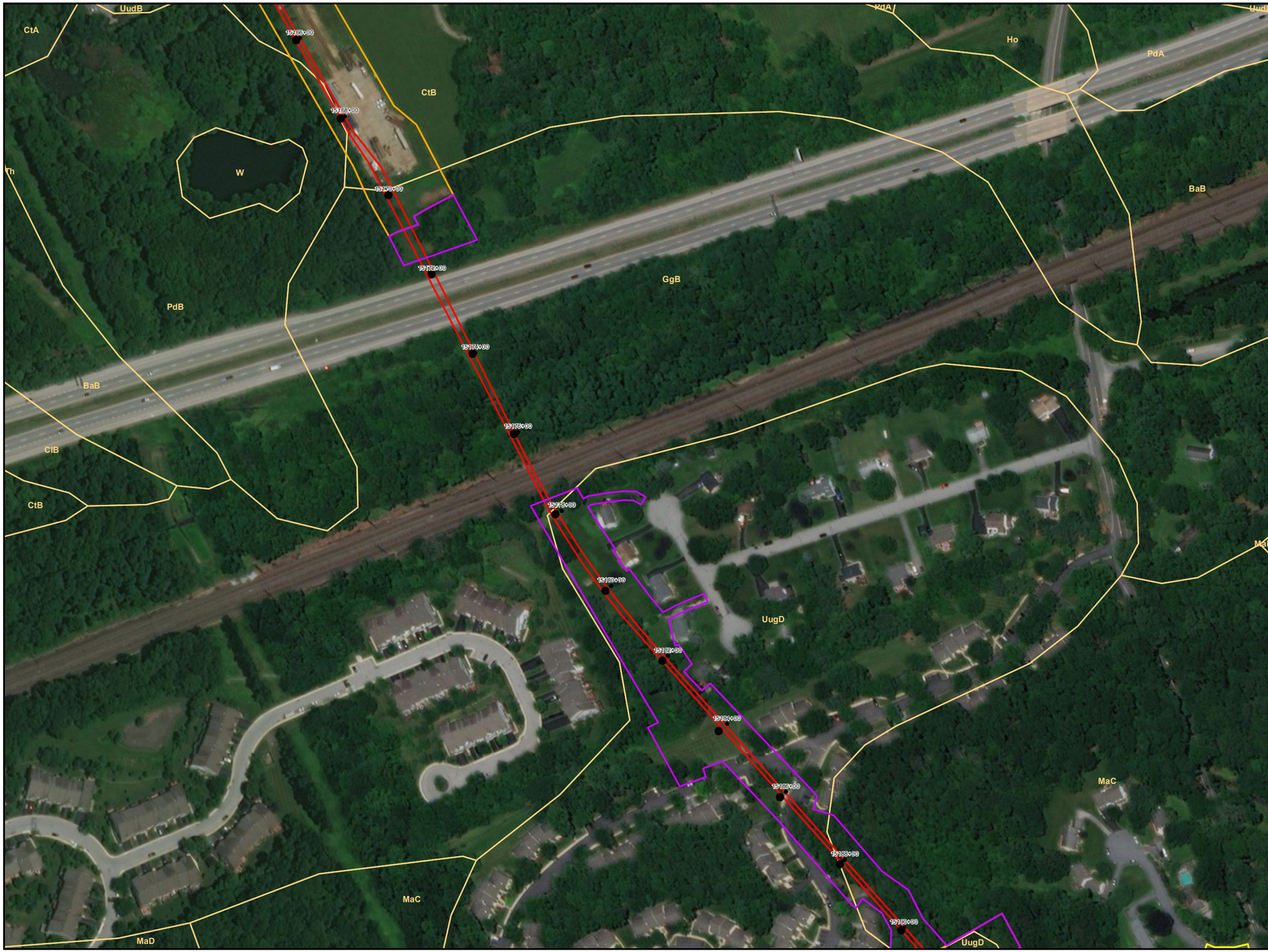
Notes:
1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
2) Quadrangles being displayed are Downingtown, Malvern

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPE\ESCGP\PENNPIPELINE_LISADRIVE_USGS_ESCGP_OPT3.MXD 05/01/19 TT

ATTACHMENT 2:

Limiting Soil Characteristics Table, Soil Descriptions,

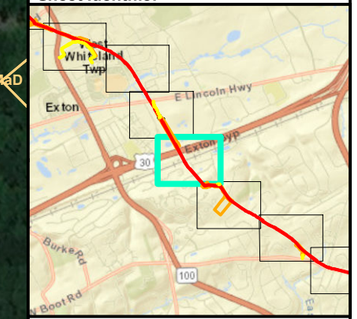
Soil and Geological Maps, KARST Plan




## Legend

- Stationing
- Access Road
- Limit of Disturbance
- Block Valve/Station
- Natural Resources Conservation Service (NRCS) Soils & Code

**Sheet Identifier**

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Feet: 0 100 200

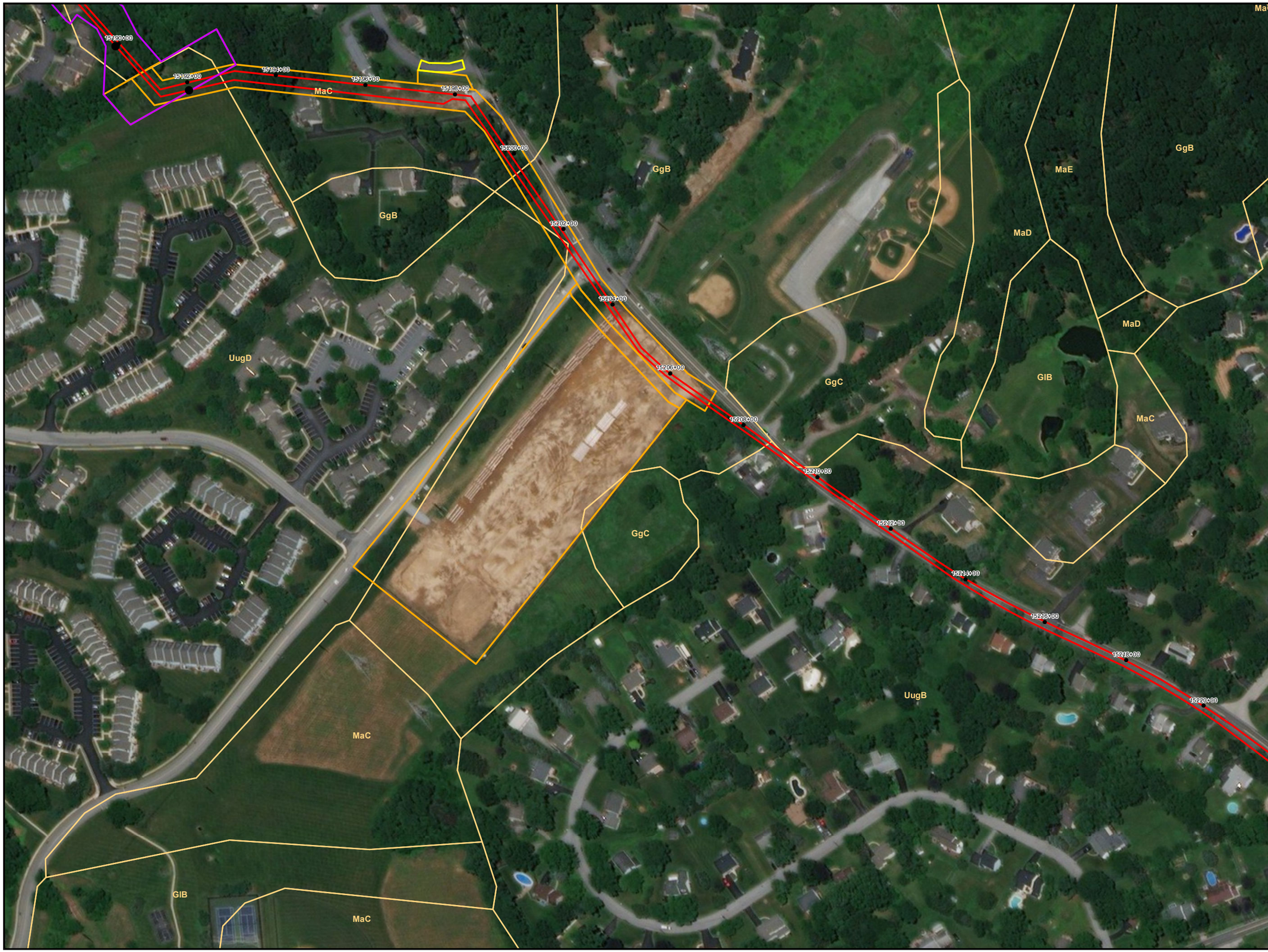
Meters: 0 30.48 60.96

**NRCS SOILS MAP ATTATCHMENT 2-29 PENNSYLVANIA PIPELINE PROJECT NOVEMBER 12. 2016 ALIGNMENT SUNOCO LOGISTICS, L.P. CHESTER COUNTY, PA**

TETRA TECH

Notes:
Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).

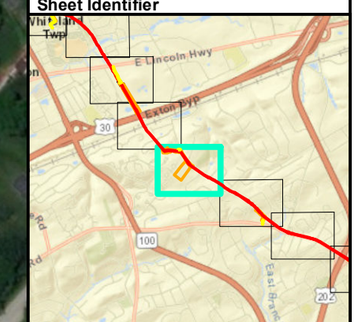
PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP ESC\GP\PENNPIPELINE_LI\SADRIVE_SOILS_ESCGP_OPT3.MXD 05/01/19 TT




## Legend

- Stationing
- Access Road
- Limit of Disturbance
- Block Valve/Station
- Natural Resources Conservation Service (NRCS) Soils & Code

**Sheet Identifier**




N

Feet: 0 100 200

Meters: 0 30.48 60.96

**NRCS SOILS MAP**
**ATTATCHMENT 2-30**
**PENNSYLVANIA PIPELINE PROJECT**
**NOVEMBER 12. 2016 ALIGNMENT**
**SUNOCO LOGISTICS, L.P. CHESTER COUNTY, PA**

TETRA TECH

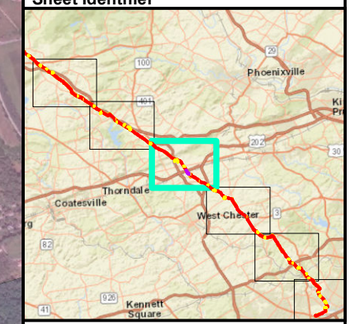
Notes:
Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).

PGH P:\GIS\SUNOCO\WARINER EAST 2\MXD\PPP ESC\GP\PENNPIPELINE_LISADRIVE_SOILS_ESCGP_OPT3.MXD 05/01/19 TT

## Legend

- Access Road
- Major Modification
- Limit of Disturbance
- Alignment Centerline
- Block Valve/Station
- Glenarm Wissahickon Formation (Xgw)
- Antietam and Harpers Formations undivided (Cah)
- Banded mafic gneiss (gga)
- Chickies Formation (Cch)
- Conestoga Formation (OCc)
- Elbrook Formation (Ce)
- Felsic and intermediate gneiss (fgh)
- Felsic and intermediate gneiss (ggd)
- Felsic gneiss (fgp)
- Kinzers Formation (Ck)
- Ledger Formation (Cl)
- Metadiabase (md)
- Octoraro Formation (Xo)
- Peters Creek Schist (Xpc)
- Ultramafic rocks (Xu)
- Vintage Formation (Cv)

**Sheet Identifier**




N

Feet: 0 1,000 2,000

Meters: 0 300 600

**GEOLOGIC UNIT MAP**
**ATTACHMENT 2-3**
**PENNSYLVANIA PIPELINE PROJECT**
**NOVEMBER 12, 2016 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY,**
**PENNSYLVANIA**

TETRA TECH

Notes:
Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2013 ESRI and its data suppliers).

FGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PP ESCGP\PENN\PIPELINE_LIS\ADRIVE_GEOLOGY_ESCGP_OPT3.MXD 05/01/19 TT

# 9. NOV'S

**SUNOCO PIPELINE L.P.**
**COMPLIANCE HISTORY**

| Permit Number | HDD/Bore ID | Township | County | Status | Incident Date | Date Resolved |
|---|---|---|---|---|---|---|
| E21-449<br>ESG030015002 | PA-CU-0062.0000-WX-HDD | Lower Frankford | Cumberland | Resolved | 2/28/2018 6:00 | 2/27/2018 0:00 |
| E38-194<br>ESG030015002 | PA-LE-0055.0000-RD-HDD | West Cornwall | Lebanon | Resolved | 3/16/2018 6:00 | 6/9/2018 0:00 |
| E07-459<br>ESG030015002 | PA-BL-0001.0094-WX-HDD | Frankstown | Blair | Resolved | 3/16/2018 6:00 | Drilling resumed on 3/31/2018. |
| E07-459<br>ESG030015002 | HDD PA-BL-0122.0000-WX | Frankstown | Blair | Resolved | 3/19/2018 6:00 | HDD abandoned for Direct Pipe Method following submission of a Minor Mod. 4/22/2018 |
| E31-234<br>ESG030015002 | PA-HU-0106.0000-RD-HDD | Shirley | Huntingdon | Resolved | 3/26/2018 6:00 | 4/9/2018 0:00 |
| E50-258,<br>ESG0300015002 | PA-PE-0002.0000-RD-HDD | Toboyne | Perry | Resolved | 3/29/2018 0:00 | 4/3/2018 0:00 |
| E07-459<br>ESG030015002 | PA-BL-0001.0094-WX-HDD | Frankstown | Blair | Resolved | 4/6/2018 6:00 | Restart approved. Setup changes on 4/20/2018 and ream resumed on 4/21/2018. |
| E07-459<br>ESG030015002 | PA-BL-0001.0048-RR-HDD | Blair | Blair | Resolved | 4/10/2018 6:00 | Restart approval received on 5/25/2018. |
| E38-194<br>ESG030015002 | PA-LE-0055.0000-RD-HDD | West Cornwall | Lebanon | Resolved | 4/20/2018 6:00 | 8/21/2018 0:00 |
| E23-524<br>ESG0100015001 | PA-DE-0100.0000-RR-HDD | Middletown | Delaware | Resolved | 5/3/2018 6:00 | IR(s) were contained and cleaned up on the dates that they occurred (4/18/18, 4/19/18(emerged with in containment), and 4/20/18. Restoration of this area was completed on 10/19/18. |
| E11-352<br>ESG0500015001 | PA-CA-0023.0000-RD-HDD | Jackson | Cambria | Resolved | 5/8/2018 16:30 | 5/8/2018 20:00:00 PM |
| E11-352<br>ESG0500015001 | PA-CA-0016.0000-RD | Jackson | Cambria | Resolved | 5/15/2018 6:00 | 1/7/2019 restoration |
| E63-674<br>ESG0500015001 | PA-WA1-0127.0000-RD | Nottingham | Washington | Resolved | 5/15/2018 0:00 | 9/1/2018 0:00 |
| E38-194<br>ESG030015002 | PA-LE-0055.0000-RD-HDD | West Cornwall | Lebanon | Resolved | 6/1/2018 6:00 | 8/21/2018 0:00 |
| E38-194<br>ESG030015002 | PA-LE-0055.0000-RD-HDD | West Cornwall | Lebanon | Resolved | 6/11/2018 6:00 | 8/21/2018 0:00 |
| E23-524<br>ESG0100015001 | PA-DE-0104.0008-WX-HDD | Middletown | Delaware | Resolved | 6/14/2018 6:00 | 6/10/2018 0:00 |
| E07-459<br>ESG030015002 | PA-BL-0001.0048-RR-HDD | Blair | Blair | Resolved | 6/15/2018 6:00 | 7/6/2018 0:00 |
| E65-973<br>ESG0500015001 | PA-WM1-0023.0000-RD-HDD | West Newton | Westmoreland | Resolved | 6/19/2018 6:00 | 6/18/2019 1830 |
| E11-352<br>ESG0500015001 | PA-CA-0023.0000-RD-HDD | Jackson | Cambria | Resolved | 6/21/2018 0:00 | 6/21/2018 0:00 |

**SUNOCO PIPELINE L.P.**
**COMPLIANCE HISTORY**

| Permit Number | HDD/Bore ID | Township | County | Status | Incident Date | Date Resolved |
|---|---|---|---|---|---|---|
| E38-194<br>ESG030015002 | PA-LE-0055.0000-RD-HDD | West Cornwall | Lebanon | Resolved | 6/28/2018 6:00 | 8/21/2018 0:00 |
| E06-701<br>ESG0300015002 | PA-BR-0181.0000-RD-HDD | Caernarvon | Berks | Resolved | 6/28/2018 6:00 | 7/31/2019 0:00 |
| E63-674<br>ESG0500015001 | PA-WA-0127.0000-RR-HDD | Nottingham | Washington | Resolved | 5/29/2018 6:00 | 5/25/2018 0:00 |
| E21-449<br>ESG030015002 | PA-CU-0136.0002-WX | Middlesex | Cumberland | Resolved | 7/7/2018 6:00 | 8/1/2018 0:00 |
| E63-674<br>ESG0500015001 | PA-WA-0119.0000-RD-HDD | North Strabane | Washington | Resolved | 7/16/2018 6:00 | 7/30/18 with completion of anomaly repair. No drilling was occurring when this instance occurred. |
| E23-524<br>ESG0100015001 | PA-DE-0100.0000-RR-16 | Middletown | Delaware | Restoration Pending | 7/18/2018 23:00 | IR was contained and cleaned up on 7/14/18. Currently waiting on soil approval from PADEP to complete restoration of wetland WL-I1. |
| E11-352<br>ESG0500015001 | PA-CA-0016.0000-RD | Jackson | Cambria | Resolved | 7/23/2018 23:00 | Stream impact ended on 07/22/2018. 7/25/2018 17:00:00 PM recovery of the turbid water from the spring house was completed. |
| E21-449<br>ESG0300015002 | PA-CU-0136.0002-WX | Middlesex | Cumberland | Resolved | 7/24/2018 23:00 | 7/25/2018 0:00 |
| E23-524<br>ESG0100015001 | PA-DE-0100.0000-RR-16 | Middletown | Delaware | Resolved | 7/24/2018 23:00 | IR was contained and cleaned up on 7/20/18 at each location. Restoration of storm drain outlet containment area was completed on 10/6/18. |
| E23-524<br>ESG0100015001 | PA-DE-0100.0000-RR-16 | Middletown | Delaware | Resolved | 7/30/2018 23:00 | IR was contained and cleaned up on 7/30/18. Upland restoration completed on 10/19/18. Storm drain outlet restoration completed on 10/6/18. Parking lot restoration completed on 11/2/18. |
| E23-524<br>ESG0100015001 | PA-DE-0104.0008-WX-HDD<br>(or possibly PA-DE-0104.0015-RD-HDD?) | Aston | Delaware | Resolved | 8/8/2018 23:00 | Repairs were made on 7/9/18 |
| E63-674<br>ESG0500015001 | PA-WA1-0127.0000-RD | Nottingham | Washington | Resolved | 8/12/2018 23:00 | 8/30/2018 0:00 |
| E11-352<br>ESG0500015001 | PA-CA-0069.0000-RD | Munster | Cambria | Resolved | 8/12/2018 23:00 | Remediation of the 08/03/2018 IR site was completed on 08/03/2018. Remediation of the 08/04 IR site was completed in 08/06/2018. |
| E38-194<br>ESG0300015002 | PA-LE-0055.0000-RD | West Cornwall | Lebanon | Resolved | 8/15/2018 23:00 | 8/21/2018 0:00 |
| E23-524<br>ESG0100015001 | PA-DE-0100.0000-RR-16 | Middletown | Delaware | Resolved | 8/28/2018 23:00 | IR was contained and cleaned up on 8/22/18 and 8/26/18. Upland restoration was completed on 10/19/18. |

**SUNOCO PIPELINE L.P.**
**COMPLIANCE HISTORY**

| Permit Number | HDD/Bore ID | Township | County | Status | Incident Date | Date Resolved |
|---|---|---|---|---|---|---|
| E11-352<br>ESG0500015001 | PA-CA-0023.0000-RD | Jackson | Cambria | Resolved | 8/25/2018 0:00 | IR containment and recovery completed on 08/25/2018. Relief well drilled on 09/23 as indicated on the restart procedures issued by PADEP. |
| E21-449<br>ESG0300015002 | PA-CU-0136.0002-WX | Middlesex | Cumberland | Resolved | 9/13/2018 23:00 | 9/3/2018 0:00 |
| E06-701<br>ESG0300015002 | PA-BR-0181.0000-RD | Caernarvon | Berks | Resolved | 9/16/2018 23:00 | 9/18/2018 0:00 |
| E11-352<br>ESG0500015001 | PA-CA-0016.0000-RD-HDD | Munster | Cambria | Resolved | 9/17/2018 23:00 | 10/25/2018 0:00 |
| E11-352<br>ESG0500015001 | PA-CA-0016.0000-RD-HDD | Jackson | Cambria | Resolved | 9/17/2018 23:00 | Drilling fluid recovery completed on 09/14 following 09/12 IR. IR recovery completed on 09/15 IR event. Relief well completed on 10/07/2018. |
| E06-701<br>ESG0300015002 | PA-BR-0181.0000-RD-HDD | Caernarvon | Berks | Resolved | 9/17/2018 23:00 | 1/15/119 |
| E07-459<br>ESG0300015002 | PA-BL-0126.0000-RD-HDD | Woodbury | Blair | Resolved | 10/2/2018 23:00 | Restart Report submitted on 10/4/2018 with DEP approval on 10/6/2018. |
| E07-459<br>ESG0300015002 | PA-BL-0126.0000-RD-HDD | Woodbury | Blair | Resolved | 10/8/2018 23:00 | Restart Report submitted on 10/8/2018 with DEP approval on 10/9/2018. |
| E07-459<br>ESG0300015002 | PA-BL-0126.0000-RD-HDD | Woodbury | Blair | Resolved | 10/10/2018 23:00 | Bore hole grouted on 10/11/2018. |
| E07-459<br>ESG0300015002 | PA-BL-0126.0000-RD | Woodbury | Blair | Resolved | 10/15/2018 23:00 | 12/23/2018 0:00 |
| E07-459<br>ESG030015002 | PA-BL-0001.0078-WX-FlexBore | Blair | Blair | Resolved | 10/17/2018 23:00 | Restart approval received on 10/26/2018. |
| PAG103570 | Not Applicable | Multiple | Cumberland, Huntingdon, Juniata | Pending Resolution | 10/22/2018 23:00 | Pending Resolution |

# 10. AQUATIC RESOURCE REPORT

**Excerpts from the originally approved documents**

# Aquatic Resource Report
# for the
# Pennsylvania Pipeline Project, Southeast Region
# Chester County,
# Pennsylvania

Prepared By:

Tetra Tech, Inc.

For

Sunoco Pipeline, LP

525 Fritztown Road

Sinking Spring, PA

August 2015

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# ACRONYMS

| | |
|---|---|
| 1987 Manual | Corps of Engineers Wetland Delineation Manual |
| Corps Regional Supplement | Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region |
| CWF | Cold Water Fishes |
| EV | Exceptional Value |
| FAC | Facultative |
| FACU | Facultative Upland |
| FACW | Facultative Wetland |
| GIS | Geographic Information Systems |
| GPS | Global Positioning System |
| HQ-TSF | High Quality Trout Stocking |
| NRCS | Natural Resources Conservation Service |
| NWI | National Wetlands Inventory |
| OBL | Obligate |
| PEM | Palustrine Emergent |
| PFO | Palustrine Forested |
| Project | Southeast Region, Pennsylvania Pipeline Project |
| PSS | Palustrine Scrub Shrub |
| ROW | Right-of-Way |
| SF | Square Feet |
| SPLP | Sunoco Pipeline, LP |
| TSF | Trout Stocking |
| UNT | Unnamed Tributary |
| UPL | Upland |
| USACE | United States Army Corps of Engineers |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |

# 1.0 INTRODUCTION

This Aquatic Resource Report for Chester County, located within the Southeast Region of the Pennsylvania Pipeline Project (Project) has been prepared by Tetra Tech, Inc. on behalf of Sunoco Pipeline, LP (SPLP). Wetland areas were delineated on site using methodology enumerated in the United States Army Corps of Engineers (USACE) Wetland Delineation Manual (Environmental Laboratory, 1987) (1987 Manual), as amended by the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, April 2012 (Corps Regional Supplement).

The subject of this report is a wetland delineation and stream identification field investigation for a proposed natural gas pipeline right-of-way (ROW), associated access roads, and workspaces located across southern Pennsylvania.

The Project study area drains to South Branch French Creek and its unnamed tributaries (UNT) which are listed as an Exceptional Value (EV), as designated in Chapter 93 of Title 25 of the PA Code. The study area drains to Valley Creek and its UNTs which are listed as Cold Water Fishes (CWF), as designated in Chapter 93 of Title 25 of the PA Code. The study area drains to Marsh Creek and its UNTs, Black Horse Creek and its UNTs, and Shamona Creek and its UNTs which are listed as High Quality Trout Stocking (HQ-TSF), as designated in Chapter 93 of Title 25 of the PA Code. The study area drains to East Branch Chester Creek and its UNTs, Chester Creek and its UNTs which are listed as Trout Stocking (TSF), as designated in Chapter 93 of Title 25 of the PA Code.

The content of this report presents the methodology, results, and conclusions of wetland delineation and stream identification activities completed for the proposed Project.

# 2.0 METHODOLOGY

USACE requires the use of the procedures enumerated in the *1987 Manual* (Environmental Laboratory, 1987) and the *Corps Regional Supplement* (Environmental Laboratory, 2012) for making jurisdictional determinations. According to the *1987 Manual*, an area is defined as a wetland if, under normal circumstances, it meets all three of the following criteria:

1. Predominance of hydrophytic vegetation (plants which are adapted for life in saturated soil conditions);
2. Hydric soils (soils which were formed under water, or in saturated conditions); and
3. Wetland hydrology (or the presence of inundated or saturated soils at some time during the growing season).

Wetlands identified in the field were classified in accordance with the U.S. Fish and Wildlife Service's (USFWS) *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979). Wetland classifications are as follows: palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO). Dominant vegetation was identified and classified according to The National Wetland Plant List: 2014 Update of Wetland Ratings (Lichvar, 2014). Plant classifications are as follows:

*Obligate (OBL)* - essentially always found in wetlands; estimated probability >99%

*Facultative Wetland (FACW)* - usually found in wetlands; estimated probability 67%-99%

*Facultative (FAC)* - equally likely to occur in wetlands and non-wetlands;
estimated probability 34%-66%

*Facultative Upland (FACU)* - usually occurs in non-wetlands; estimated probability 1%-33%

*Upland (UPL)* - essentially always found in non-wetlands; estimated probability >99%

The field investigations for the proposed pipeline Project were performed during numerous field visits from November 2013 through July 2015. The study area was preliminarily limited to a 200-foot wide corridor along a proposed center line. Once the proposed pipeline ROW, access roads, and workspaces were finalized any additional areas that extended beyond the preliminary study area were investigated for potential wetlands and streams. The final study area is illustrated on the project mapping. Preliminary site reconnaissance of the study area was conducted through a

review of available Geographic Information Systems (GIS) resources. Existing information reviewed included the following:

- USGS topographic mapping (Figures 1-1 to 1-6)
- Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey (Figure 2-1 to 2-6)
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Mapping(Figure 3-1 to 3-6)

The delineation consisted of establishment of the wetland/upland margin with flagging hung at intervals that accurately depicted the outline of the boundary. The individual flags were then located using a Global Positioning System (GPS) receiver and later added to the project area mapping. Wetland flagging was limited to the bounds of the investigated study area and wetlands are shown as closed or partially closed systems on the detail map (Figure 4-1 to 4-50).

Data concerning soils, hydrology, and vegetation were collected and recorded on USACE Wetland Determination Data Forms at wetlands and upland point locations associated with wetlands, which are provided in Appendix A. Photographs depicting wetland topography and vegetation are included in Appendix B. Stream data sheets detailing stream characteristics are provided in Appendix C. Appendix D contains photographs of streams located within the study area. Appendix E provides a list of hydric soils known to occur within the counties of the study area. Resumes of project personnel are included in Appendix F.

# 3.0 RESULTS

The field investigations identified 51 areas within the proposed Pennsylvania Pipeline Project study area that met the wetland criteria outlined in the 1987 Manual, as amended by the Corps Regional Supplement. Additionally, 66 streams were identified within the Project study area. A narrative summary of field data collected for these systems is presented below. The detail maps provided as Figures 4-1 to 4-50 illustrate the wetland and watercourse locations in relation to the project LOD and study area.

## 3.1 WETLAND IDENTIFICATION AND DELINEATION

Hydric soils and soils with hydric components are often associated with wetlands. A review of the NRCS Soil Survey and hydric soil list (Appendix E) indicated that there are 32 soils mapped within the study area classified as hydric or containing hydric components. These soils can be found in Table 2, Mapped Hydric Soils in Study Area. The NRCS soil survey maps are included as Figures 2-1 to 2-6. Confirmation of the soil mapping units was not performed during this site evaluation.

NWI mapped wetlands and corresponding field delineated wetlands for the Project are listed in Table 3.

Based on field evidence and best professional judgment, it was determined that 51 wetlands are present within the study area. The areas demonstrated the presence of all three wetland parameters required by the 1987 Manual and the Regional Supplement. The vegetative community was dominated by hydrophytic plant species or had a prevalence index ≤ 3, the soils exhibited hydric characteristics, and the areas contained wetland hydrology indicators.

USACE wetland determination data forms that detail the existing vegetation, soil characteristics, and hydrology were prepared for each wetland and its associated upland point (Appendix A).

**Wetland A46**

Wetland A46 (W-A46) is a 2,560-square foot (SF) palustrine emergent (PEM) wetland (Figure 4-2). Indicators of wetland hydrology include surface water, drainage patterns, geomorphic position. Dominant vegetation consists of reed canary grass (*Phalaris arundinacea*) and lesser poverty rush (*Juncus tenuis*). The soil between 0 and 4 inches exhibits low-chroma matrix (10YR 4/2) with a gravelly, silty clay loam texture that contains redoximorphic features (7.5YR 4/4).

**Wetland B12**

Wetland B12 (W-B12) is a 20,830-SF PEM wetland (Figure 4-3). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), black walnut (*Juglans nigra*), and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/1) with a silty clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland B13**

Wetland B13 (W-B13) is a 1,377-SF PEM wetland (Figure 4-3). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of lamp rush (*Juncus effusus*) and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 8 inches exhibited a low-chroma matrix (10YR 4/2) with a sandy clay loam texture that contains redoximorphic features (5YR 4/4).

**Wetland B14 PFO**

Wetland B14 PFO (W-B14 PFO) is a 9,359-SF palustrine forested (PFO) wetland (Figure 4-3). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of black willow (*Salix nigra*), rambler rose (*Rosa multiflora*), reed canary grass (*Phalaris arundinacea*), and arrow-leaf tearthumb (*Persicaria sagittata*). The soil between 0 and 12 inches exhibited a low-chroma matrix (2.5Y 4/2) with a silty clay loam texture that contains redoximorphic features (5YR 4/4).

**Wetland B14 PEM**

Wetland B14 PEM (W-B14 PEM) is a PEM wetland greater than 17,248- SF (Figure 4-3). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of black willow (*Salix nigra*), rambler rose (*Rosa multiflora*), arrow-leaf tearthumb (*Persicaria sagittata*), Japanese stilt grass (*Microstegium vimineum*), and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 12 inches exhibited a low-chroma matrix (2.5Y 4/2) with a silty clay loam texture that contains redoximorphic features (5YR 4/4).

**Wetland C33**

Wetland C33 (W-C33) is a PEM wetland greater than 27,132-SF (Figure 4-4). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of reed canary grass (*Phalaris*

*arundinacea*) and arrowleaf tearthumb (*Persicaria sagittata*). The soil between 0 and 7 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 5/4). The soil between 7 and 12 inches exhibits a low-chroma matrix (10YR 5/2) with a sandy loam texture that contains redoximorphic features (7.5YR 5/4).

**Wetland C34**

Wetland C34 (W-C34) is a 2,836-SF PEM wetland (Figure 4-4). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile and geomorphic position. Dominant vegetation consists of reed canary grass (*Phalaris arundinacea*). The soil between 0 and 8 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland C35**

Wetland C35 (W-C35) is a 17,808-SF PEM wetland (Figure 4-4). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of reed canary grass (*Phalaris arundinacea*), arrowleaf tearthumb (*Persicaria sagittata*), and lamp rush (*Juncus effusus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 5/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland A47**

Wetland A47 (W-A47) is a 2,556-SF PEM wetland (Figure 4-5). Indicators of wetland hydrology include surface water, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of rough-stalk blue grass (*Poa trivialis*) and creeping buttercup (*Ranunculus repens*). The soil between 0 and 6 inches exhibited low-chroma matrix (10YR 4/2) with a silt loam texture. The soil between 6 and 12 inches exhibited low-chroma matrix (2.5Y 4/2) with a silt loam texture that contains redoximorphic features (7.5YR 4/4).

**Wetland A48**

Wetland A48 (W-A48) is a 2,530-SF PEM wetland (Figure 4-6). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, oxidized rhizospheres on living roots, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of reed canary grass (*Phalaris arundinacea*). The soil between 0 and 6 inches exhibited low-chroma matrix (2.5Y 4/2) with a silty clay loam texture that contains redoximorphic features (7.5YR 4/6). The soil between 6 and 12 inches exhibited low-chroma matrix (10YR 4/2) with a silty clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland B15**

Wetland B15 (W-B15) is a 15,756-SF PEM wetland (Figure 4-7). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, oxidized rhizospheres on living roots, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of lamp rush (*Juncus effusus*), shallow sedge (*Carex lurida*), Japanese stilt grass (*Microstegium vimineum*), an unidentified blackberry (*Rubus* sp.), arrow-leaf tearthumb (*Persicaria sagittata*), dark-green bulrush (*Scirpus atrovirens*), and flat-top goldentop (*Euthamia graminifolia*). The soil between 0 and 3 inches exhibited a low-chroma matrix (10YR 4/2) with a silty clay loam texture that contains redoximorphic features (7.5YR 4/6). The soil between 3 and 12 inches exhibited a low-chroma matrix (2.5YR 4/2) with a silty clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland C49 PEM**

Wetland C49 PEM (W-C49 PEM) is a PEM wetland greater than 65,060-SF (Figure 4-11). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile, standing dead/falling timber, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), multiflora rose (*Rosa multiflora*), dark-green bulrush (*Scirpus atrovirens*), Japanese stilt grass (*Microstegium vimineum*), and lamp sedge (*Juncus effusus*). The soil between 0 and 5 inches exhibits a low-chroma matrix (10YR 3/1) with a silt loam texture. The soil between 5 and 12 inches exhibits a low-chroma matrix (10YR 5/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland C49 PFO (1)**

Wetland C49 PFO (1) (W-C49 PFO (1)) is a PFO wetland greater than 50,252-SF (Figure 4-11). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), American sycamore (*Platanus occidentalis*), Norther spicebush (*Lindera benzoin*), Japanese stilt grass (*Microstegium vimineum*), and skunk-cabbage (*Symplocarpus foetidus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a gravelly clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland C49 PFO (2)**

Wetland C49 PFO (2) (W-C49 PFO (2)) is a PFO wetland greater than 67,265-SF (Figure 4). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile, standing dead/falling timber, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), swamp white oak (*Quercus bicolor*), pin oak (*Quercus palustris*), Norther spicebush (*Lindera benzoin*), Japanese stilt grass

(*Microstegium vimineum*), and sensitive fern (*Onoclea sensibilis*). The soil between 0 and 5 inches exhibits a low-chroma matrix (10YR 3/1) with a silt loam texture. The soil between 5 and 12 inches exhibits a low-chroma matrix (10YR 5/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland B20**

Wetland B20 (W-B20) is a 4,076-SF PEM wetland (Figure 4-12). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of American sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), white meadowsweet (*Spiraea alba*), Norther spicebush (*Lindera benzoin*), and rice cut grass (*Leersia oryzoides*). The soil betweem 0 and 12 inches exhibited a low-chroma matrix (10YR 5/1) with a silt clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland B19 PEM (1)**

Wetland B19 PEM (1) (W-B19 PEM (1)) is a 31,551-SF PEM wetland (Figure 4-12). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of shallow sedge (*Carex lurida*) and lamp rush (*Juncus effusus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (7.5YR 3/1) with a silt loam texture.

**Wetland B19 PEM (2)**

Wetland B19 PEM (2) (W-B19 PEM (2)) is a PEM wetland greater than 15,298-SF (Figure 4-12). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of shallow sedge (*Carex lurida*) and lamp rush (*Juncus effusus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (7.5YR 3/1) with a silt loam texture.

**Wetland B19 PFO (1)**

Wetland B19 PFO (1) (W-B19 PFO (1)) is a 36,663-SF PFO wetland (Figure 4-12). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of pin oak (*Quercus palustris*), red maple (*Acer rubrum*), Japanese stilt grass (*Microstegium vimineum*), and an unidentified greenbrier (*Smilax* sp.). The soil between 0 and 4 inches exhibits a low-chroma matrix (10YR 4/2) with a silt loam texture. The soil between 4 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a silt loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland B19 PFO (2)**

Wetland B19 PFO (2) (W-B19 PFO (2)) is a PFO wetland greater than 26,680-SF (Figure 4-12). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of pin oak (*Quercus palustris*), red maple (*Acer rubrum*), American hornbeam (*Carpinus caroliniana*), Norther spicebush (*Lindera benzoin*), skunk-cabbage (*Symplocarpus foetidus*), Japanese stilt grass (*Microstegium vimineum*), and sensitive fern (*Onoclea sensibilis*). The soil between 0 and 6 exhibits a low-chroma matrix (7.5YR 4/1) with a silty loam texture that contains redoximorphic features (5YR 3/4). The soil between 6 and 12 inches exhibits a low-chroma matrix (7.5YR 4/1) with a silt loam texture that contains redoximorphic features (5YR 4/6).

**Wetland H16**

Wetland H16 (W-H16) is a 1,809-SF PEM wetland (Figure 4-12). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*), chufa (*Cyperus esculentus*), and dark-green bulrush (*Scirpus atrovirens*). The soil between 0 and 10 inches exhibits a 2.5Y 7/2 matrix with a sandy texture that contains redoximoprhic features (5Y 6/1). The soil between 10 and 15 inches exhibits a low-chroma matrix (2.5Y 3/1) with a loam texture that contains redoximorphic features (7.5YR 3/4).

**Wetland JA3**

Wetland JA3 (W-JA3) is a 950-SF PEM wetland (Figure 4-12). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile and geomorphic position. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*) and skunk-cabbage (*Symplocarpus foetidus*). The soil between 0 and 2 inches exhibits a low-chroma matrix (10YR 3/2) with a sandy loam texture. The soil between 2 and 16 inches exhibits a low-chroma matrix (10YR 4/2) with a sandy loam texture that contains redoximorphic features (2.5YR 3/6).

**Wetland H15 PEM (1)**

Wetland H15 PEM (1) (W-H15 PEM (1)) is a 33,360-SF PEM wetland (Figure 4-13). Indicators of wetland hydrology include surface water, a high water table, and saturation within the upper 12 inches of the soil profile. Dominant vegetation consists of lamp rush (*Juncus effusus*) and dark-green bulrush (*Scirpus atrovirens*). The soil between 0 and 15 inches exhibits a low-chroma matrix (2.5Y 4/1) with a gravelly, silty loam texture that contains redoximorphic features (5YR 4/6).

**Wetland H15 PEM (2)**

Wetland H15 PEM (2) (W-H15 PEM (2)) is a 6,568-SF PEM wetland (Figure 4-13). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, drainage patterns, and geomorphic position. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*), dark-green bulrush (*Scirpus atrovirens*), and sensitive fern (*Onoclea sensibilis*). The soil between 0 and 8 inches exhibits a 10YR 4/3 matrix with a silt loam texture. The soil between 8 and 16 inches exhibits a low-chroma matrix 10YR 4/1 with a silt loam texture that contains redoximorphic features (10YR 5/8).

**Wetland H15 PFO (1)**

Wetland H15 PFO (1) (W-H15 PFO (1)) is a 1,649-SF PFO wetland (Figure 4-13). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of red maple (*Acer rubrum*), American hornbeam (*Carpinus caroliniana*), and nanny-berry (*Viburnum lentago*). The soil between 0 and 3 inches exhibits a chroma matrix (2.5Y 2/1) with a silt loam texture. The soil between 3 and 12 inches exhibits a low-chroma matrix (10YR 4/1) with a silt loam texture that contains redoximorphic features (7.5YR 3/3).

**Wetland H15 PFO (2)**

Wetland H15 PFO (2) (W-H15 PFO (2)) is a 1,398-SF PFO wetland (Figure 4-13). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of swamp white oak (*Quercus bicolor*), red maple (*Acer rubrum*), slippery elm (*Ulmus rubra*), nanny-berry (*Viburnum lentago*), and Allegheny blackberry (*Rubus allegheniensis*). The soil between 0 and 3 inches exhibits a chroma matrix (2.5Y 2/1) with a silt loam texture. The soil between 3 and 12 inches exhibits a low-chroma matrix (10YR 4/1) with a silt loam texture that contains redoximorphic features (7.5YR 3/3).

**Wetland Q75**

Wetland Q75 (W-Q75) is a PFO wetland greater than 25,829-SF (Figure 4-15). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, water marks, drainage patterns, stunted/stressed plants, geomorphic position, and a positive FAC-Neutral test. Dominant vegetation consists of white oak (*Quercus bicolor*), black tupelo (*Nyssa sylvatica*), slippery elm (*Ulmus rubra*), red maple (*Acer rubrum*), and skunk-cabbage (*Symplocarpus foetidus*). The soil between 0 and 10 inches exhibits a low-chroma matrix

(7.5YR 3/1) with a mucky silt loam texture. The soil between 10 and 14 inches exhibits a low-chroma matrix (7.5YR 4/1) with a silt loam texture.

**Wetland Q76**

Wetland Q76 (W-Q76) is a 4,969-SF palustrine scrub-shrub (PSS) wetland (Figure 4-15). Indicators of wetland hydrology include surface water, high water table, saturation within the upper 12 inches of the soil profile, oxidized rhizospheres on living roots, drainage patterns, geomorphic position, and a positive FAC-Neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), silky dogwood (*Cornus amomum*), Japanese stiltgrass (*Microstegium vimenium*), sensitive fern (*Onoclea sensibilis*), shallow sedge (*Carex lurida*), and arrowleaf tearthumb (*Persicaria saggitata*) The soil between 0 and 10 inches exhibits a low-chroma matrix (7.5YR 4/1) with a silty clay loam texture that contains redoximorphic features (5YR 4/6). The soil between 10 and 20 inches exhibits a low-chroma matrix (10YR 5/3) with a sandy clay loam texture that contains redoximorphic features (7.5YR 3/3).

**Wetland Q77**

Wetland Q77 (W-Q77) is a 14,256-SF PEM wetland (Figure 4-15). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, drainage patterns, geomorphic position, and a positive FAC-Neutral test. Dominant vegetation consists of black willow (*Salix nigra*), reed canary grass (*Phalaris arundinacea*), Japanese stiltgrass (*Microstegium vimineum*), broadleaf cattail (*Typha latifolia*), and woolgrass (*Scirpus cyperinus*). The soil between 0 and 16 inches exhibits a low-chroma matrix (10YR 4/2) with a mucky clay loam texture that contains redoximorphic features (10YR 5/6).

**Wetland Q78**

Wetland Q78 (W-Q78) is a PFO wetland greater than 1,050-SF (Figure 4-16). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile, a high water table, drainage patterns, and geomorphic position. Dominant vegetation consists of American sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), Canadian clearweed (*Pilea pumila*), Japanese stiltgrass (*Microstegium vimineum*), and small-spike false nettle (*Boehmeria cylindrica*). The soil between 0 and 18 inches exhibits a low-chroma matrix (10YR 3/1) with a clay loam texture. The soil between 18 and 24 inches exhibits a low-chroma matrix (10YR 4/3) with a clay loam texture that contains redoximorphic features (10YR 5/6).

**Wetland Q79 PEM**

Wetland Q79 (W-Q52 PEM) is a PEM wetland greater than 6,993-SF (Figure 4-16). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile, drainage patterns, and geomorphic position. Dominant vegetation consists of rambler rose (*Rosa multiflora*),

silky dogwood (*Cornus amomum*), and Japanese stilt grass (*Microstegium vimineum*). The soil between 0 and 4 inches exhibits a low-chroma matrix (7.5YR 3/1) with a mucky clay loam texture. The soil between 4 and 16 inches exhibits a low-chroma matrix (7.5YR 4/2) with a sandy clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland Q79 PFO**

Wetland Q79 (W-Q52 PFO) is a PFO wetland greater than 5,822-SF (Figure 4-16). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, drainage patterns, geomorphic position, shallow aquitard, and a positive FAC-Neutral test. Dominant vegetation consists of American sycamore (*Platanus occidentalis*), American beech (*Fagus grandifolia*), shagbark hickory (*Carya ovata*), red maple (*Acer rubrum*), black walnut (*Juglans nigra*), Japanese stilt grass (*Microstegium vimineum*), horsebrier (*Smilax rotundifolia*), and poison ivy (*Toxicodendron radicans*). The soil between 0 and 6 inches exhibits a low-chroma matrix (7.5YR 5/1) with a mucky clay loam texture. The soil between 6 and 10 inches exhibits a low-chroma matrix (7.5YR 4/2) with a sandy clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland C38**

Wetland C38 (W-C38) is a PEM wetland greater than 32,344-SF (Figure 4-16). Indicators of wetland hydrology include oxidized rhizospheres on living roots, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of multiflora rose (*Rosa multiflora*), red osier (*Cornus alba*), arrowleaf tearthumb (*Persicaria sagittata*), and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 10 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (5YR 4/4). The soil between 10 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a sand texture.

**Wetland H17 PEM (1)**

Wetland H17 PEM (1) (W-H17 PEM (1)) is a 7,888-SF PEM wetland (Figure 4-17). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, oxidized rhizospheres on living roots, and drainage patterns. Dominant vegetation consists of red osier dogwood (*Cornus alba*), southern arrow-wood (*Viburnum dentatum*), arrow-leaf tearthumb (*Persicaria sagittata*) and Japanese stilt grass (*Microstegium vimineum*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/1) with a silt loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland H17 PEM (2)**

Wetland H17 PEM (2) (W-H17 PEM (2)) is a 2,766-SF PEM wetland (Figure 4-17). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, oxidized rhizospheres on living roots, and drainage patterns. Dominant vegetation consists of red osier dogwood (*Cornus alba*), southern arrow-wood (*Viburnum dentatum*), arrow-leaf tearthumb (*Persicaria sagittata*) and Japanese stilt grass (*Microstegium vimineum*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/1) with a silty loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland H17 PFO (1)**

Wetland H17 PFO (1) (W-H17 PFO (1)) is a 1,885-SF PFO wetland (Figure 4-17). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and oxidized rhizospheres on living roots. Dominant vegetation consists of black willow (*Salix nigra*) and rice cut grass (*Leersia virginica*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/1) with a silt loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland H17 PFO (2)**

Wetland H17 PFO (2) (W-H17 PFO (2)) is PFO wetland a greater than 19,578-SF (Figure 4-17). Indicators of wetland hydrology include a high water table and saturation within the upper 12 inches of the soil profile. Dominant vegetation consists of silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), Norther spicebush (*Lindera benzoin*), swamp rose (*Rosa palustris*), red osier (*Cornus alba*), Southern arrow-wood (*Viburnum dentatum*), arrow-leaf tearthumb (*Persicaria sagittata*), an unidentified touch-me-not (*Impatiens* sp.), and shallow sedge (*Carex lurida*). The soil between 0 and 15 inches exhibits a low-chroma matrix (2.5Y 4/1) with a silt loam texture that contains redoximorphic features (7.5YR 3/4).

**Wetland C48 PEM**

Wetland C48 PEM (W-C48 PEM) is a 27,107-SF PEM wetland (Figure 4-18). Indicators of wetland hydrology include surface water, a high water table, and saturation within the upper 12 inches of the soil profile. Dominant vegetation consists of red maple (*Acer rubrum*), swamp rose (*Rosa palustris*), reed canary grass (*Phalaris arundinacea*), uptight sedge (*Carex stricta*), and arrowleaf tearthumb (*Persicaria sagittata*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 3/1) with a clay loam texture.

**Wetland C48 PFO**

Wetland C48 PFO (W-C48 PFO) is a PFO wetland greater than 4,241-SF (Figure 4-18). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil

profile, drainage patterns, geomorphic position, and microtopographic relief. Dominant vegetation consists of red maple (*Acer rubrum*), swamp rose (*Rosa palustris*), skunk-cabbage (*Symplocarpus foetidus*), and uptight sedge (*Carex stricta*). The soil between 0 and 8 inches exhibits a low-chroma matrix (2.5Y 2.5/1) with a muck texture.

**Wetland C47**

Wetland C47 (W-C47) is a PEM wetland greater than 124,882-SF (Figure 4-18). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, oxidized rhizospheres on living roots, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of lamp rush (*Juncus effusus*), arrowleaf tearthumb (*Persicaria sagittata*), and harvestlice (*Agrimonia parviflora*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland C44**

Wetland C44 (W-C44) is a 81,624-SF PEM wetland (Figure 4-19). Indicators of wetland hydrology include surface water, a high water table, and saturation within the upper 12 inches of the soil profile. Dominant vegetation consists of common timothy grass (*Phalaris angusta*), sensitive fern (*Onoclea sensibilis*), and lamp rush (*Juncus effusus*). The soil between 0 and 3 inches exhibits a low-chroma matrix (10YR 4/2) with a gravelly clay loam texture. The soil beyond 3 inches exhibits a low-chroma matrix (10YR 4/2) with a gravelly clay loam texture that contains redoximorphic features (2.5Y 4/6).

**Wetland C43 PEM**

Wetland C43 PEM (W-C43 PEM) is a 26,381-SF PEM wetland (Figure 4-19). Indicators of wetland hydrology include surface water, a high water table, and saturation within the upper 12 inches of the soil profile. Dominant vegetation consists of broad-leaf cattail (*Typha latifolia*) and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/4).

**Wetland C43 PFO (1)**

Wetland C43 PFO (1) (W-C43 PFO (1)) is a PFO wetland greater than 118,027-SF (Figure 4-19). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile and geomorphic position. Dominant vegetation consists of red maple (*Acer rubrum*), slippery elm (*Ulmus rubra*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), Japanese stilt grass (*Microstegium vimineum*), skunk-cabbage (*Symplocarpus foetidus*), and an unidentified blackberry (*Rubus* sp.). The soil between 0 and 6 inches exhibits a low-chroma matrix

(2.5Y 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6). The soil between 6 and 12 inches exhibits a low-chroma matrix (2.5Y 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6 and 10YR 6/1).

**Wetland C43 PFO (2)**

Wetland C43 PFO (2) (W-C43 PFO (2)) is a PFO wetland greater than 107,244-SF (Figure 4-19). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), slippery elm (*Ulmus rubra*), American hornbeam (*Carpinus caroliniana*), Norther spicebush (*Lindera benzoin*), skunk-cabbage (*Symplocarpus foetidus*). The soil between 0 and 3 inches exhibits a low-chroma matrix (2.5Y 2.5/1) with a clay loam texture. The soil between 3 and 12 inches exhibits a low-chroma matrix (2.5Y 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/2).

**Wetland C42**

Wetland C42 (W-C42) is a 14,770-SF PEM wetland (Figure 4-20). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, and drainage patterns. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*), dark-green bulrush (*Scirpus atrovirens*), and an unidentified sedge (*Carex* sp.). The soil between 0 and 12 inches exhibits a low-chroma matrix (2.5Y 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/4).

**Wetland H1 PEM**

Wetland H1 PEM (W-H1 PEM) is an 11,450-SF PEM wetland (Figure 4-21). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and drainage patterns. Dominant vegetation consists of red osier dogwood (*Cornus alba*), Japanese stilt grass (*Microstegium vimineum*), harvestlice (*Agrimonia parviflora*), spearmint (*Mentha spicata*), blunt broom sedge (*Carex tribuloides*), lamp rush (*Juncus effusus*), arrow-leaf tearthumb (*Persicaria sagittata*), purple-leaf willowherb (*Epilobium coloratum*), climbing-dogbane (*Thyrsanthella difformis*), and an unidentified blackberry (*Rubus* sp.). The soil between 0 and 16 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland H1 PFO**

Wetland H1 PFO (W-H1 PFO) is a PFO wetland greater than 44,632-SF (Figure 4-21). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, water-stained leaves, oxidized rhizospheres on living roots, drainage patterns, and a

positive FAC-neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), and nodding onion (*Allium cernuum*). The soil between 0 and 3 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture. The soil between 3 and 7 inches exhibits a low-chroma matrix (2.5Y 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6). The soil between 7 and 12 inches exhibits a low chroma matrix (2.5Y 4/2) with a clay loam texture that exhibits redoximorphic features (5YR 4/6) and a depletion (2.5Y 6/1).

**Wetland C37 PEM**

Wetland C37 PEM (W-C37 PEM) is a 12,339-SF PEM wetland (Figure 4-21). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*) and dark-green bulrush (*Scirpus atrovirens*). The soil between 0 and 5 inches exhibits a low-chroma matrix (2.5Y 3/1) with a sandy loam texture. The soil between 5 and 15 inches exhibits a low-chroma matrix (2.5Y 6/1) with a sandy clay loam texture that contains redoximorphic features (10YR 5/6).

**Wetland C37 PFO (1)**

Wetland C37 PFO (1) (W-C37 PFO (1)) is a PFO wetland greater than 33,837-SF (Figure 4-21). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of red maple (*Acer rubrum*) and skunk-cabbage (*Symplocarpus foetidus*). The soil between 0 and 5 inches exhibits a low-chroma matrix (2.5Y 3/1) with a sandy loam texture. The soil between 5 and 15 inches exhibits a low-chroma matrix (2.5Y 6/1) with a sandy clay loam texture that contains redoximorphic features (10YR 5/6).

**Wetland C37 PSS**

Wetland C37 PSS (W-C37 PSS) is a 2917-SF PSS wetland (Figure 4-21). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of Norther spicebush (*Lindera benzoin*) and skunk-cabbage (*Symplocarpus foetidus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (2.5Y 5/1) with a clay loam texture that contains redoximorphic features (2.5Y 6/6).

**Wetland C37 PFO (2)**

Wetland C37 PFO (2) (W-C37 PFO (2)) is a PFO wetland greater than 7,473-SF (Figure 4-21). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, water stained leaves, oxidized rhizospheres on living roots, drainage patterns, geomorphic position, and a positive FAC-Neutral test. Dominant vegetation consists of

red maple (*Acer rubrum*), Norther spicebush (*Lindera benzoin*), skunk-cabbage (*Symplocarpus foetidus*), and Japanese stilt grass (*Microstegium vimineum*). The soil between 0 and 6 inches exhibits a low-chroma matrix (10YR 3/2) with a sandy clay loam texture that contains redoximorphic features (7.5YR 4/6). The soil between 6 and 16 inches exhibits a low-chroma matrix (10YR 6/2) with a clay loam texture that contains redoximorphic features (10YR 6/8).

**Wetland JA2**

Wetland JA2 (W-JA2) is a 386-SF PEM wetland (Figure 4-22). Indicators of wetland hydrology include surface water, saturation within the upper 12 inches of the soil profile, algal mat or crust, and aquatic fauna. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*), arrowleaf tearthumb (*Persicaria saggitata*), and spotted touch-me-not (*Impatiens capensis*). The soil between 0 and 2 inches exhibits a low-chroma matrix (10YR 2/2) with a silt loam texture. The soil between 2 and 8 inches exhibits a low-chroma matrix (2.5Y 3/1) with a silt loam texture that contains redoximorphic features (2.5YR 3/6). The soil between 8 and 12 inches exhibits a low-chroma matrix (5Y 2.5/1) with a silt loam texture that contains redoximorphic features (2.5YR 3/6).

**Wetland H2**

Wetland H2 (W-H2) is a 1,151-SF PEM wetland (Figure 4-22). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, drainage patterns, and a positive FAC-neutral test. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*), reed canary grass (*Phalaris arundinacea*), and arrow-leaf tearthumb (*Persicaria sagittata*). The soil between 0 and 12 inches exhibits a low-chroma matrix (5YR 4/2) with a silty loam texture that contains redoximorphic features (5YR 4/6) and a depletion (2.5Y 6/1).

**Wetland BB31 PSS**

Wetland BB31 PSS (W-BB31 PSS) is a 2,186-SF PEM wetland (Figure 4-27). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, sediment deposits, and drainage patterns. Dominant vegetation consists of river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), pinkweed (*Persicaria sagittata*), and an unidentified sedge (*Carex* sp.). The soil between 0 and 14 inches exhibits a low-chroma matrix (2.5Y 3/1) with a loam texture that contains redoximorphic features (10YR 4/6).

**Wetland BB31 PEM**

Wetland BB31 PEM (W-BB31 PEM) is a 3,766-SF PEM wetland (Figure 4-27). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, sediment deposits, and drainage patterns. Dominant vegetation consists of pinkweed (*Persicaria pensylvanica*), reed canary grass (*Phalaris arundinacea*), creeping-jenny (*Lysimachia*

*nummularia*), and an unidentified sedge (*Carex* sp.). The soil between 0 and 14 inches exhibits a low-chroma matrix (2.5Y 3/1) with a loam texture that contains redoximorphic features (10YR 4/6).

**Wetland BB26**

Wetland BB26 (W-BB26) is a 577-SF PEM wetland (Figure -28). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, sediment deposits, drift deposits, and drainage patterns. Dominant vegetation consists of an unidentified sedge (*Carex* sp.) and lamp rush (*Juncus effusus*). The soil between 0 and 4 inches exhibits a chroma matrix of 10YR 4/3 with a sand texture. The soil between 4 and 10 inches exhibits a low-chroma matrix (10YR 4/2) with a sand texture that contains redoximorphic features (10YR 4/3). The soil between 10 and 16 inches exhibits a low-chroma matrix (10YR 3/1) with a silty clay loam texture.

**Wetland BB28**

Wetland BB28 (W-BB28) is a 178-SF PEM wetland (Figure 4-30). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, sediment deposits, drift deposits, and drainage patterns. Dominant vegetation consists of an unidentified sedge (*Carex* sp.) and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 4 inches exhibits a low-chroma matrix of 10YR 3/2 with a silty clay loam texture that contains redoximorphic features (10YR 5/6). The soil between 4 and 16 inches exhibits a low-chroma matrix (10YR 3/1) with a silty clay loam texture that contains redoximorphic features (7.5YR 3/4).

**Wetland BB29 PSS**

Wetland BB29 (W-BB29) is a 555-SF PSS wetland (Figure 4-30). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, drift deposits, oxidized rhizospheres on living roots, and drainage patterns. Dominant vegetation consists of black elder (*Sambucus nigra*), an unidentified alder (*Alnus* sp.), silky dogwood (*Cornus amomum*), and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 16 inches exhibits a low-chroma matrix of 10YR 3/1 with a silty clay loam texture that contains redoximorphic features (10YR 3/6).

**Wetland BB29 PEM**

Wetland BB29 (W-BB29) is a 3,152-SF PEM wetland (Figure 4-30). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, drift deposits, oxidized rhizospheres on living roots, and drainage patterns. Dominant vegetation consists of reed canary grass (*Phalaris arundinacea*), an unidentified sedge (*Carex* sp.), and spotted touch-me-not (*Impatiens capensis*). The soil between 0 and 16 inches exhibits a low-

chroma matrix of 10YR 3/1 with a silty clay loam texture that contains redoximorphic features (10YR 3/6).

**Wetland BB30 PEM**

Wetland BB30 (W-BB30) is a 1,196-SF PEM wetland (Figure 4-30). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and drainage patterns. Dominant vegetation consists of reed canary grass (*Phalaris arundinacea*). The soil between 0 and 6 inches exhibits a low-chroma matrix of 10YR 3/2 with a silt loam texture that contains redoximorphic features (7.5YR 3/4). The soil between 6 and 16 inches exhibits a low-chroma matrix of 5Y 4/1 with a silt loam texture that contains redoximorphic features (5YR 3/4).

**Wetland BB30 PSS**

Wetland BB30 (W-BB30) is a 179-SF PSS wetland (Figure 4-30). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and drainage patterns. Dominant vegetation consists of silky dogwood (*Cornus amomum*), black willow (*Salix nigra*), and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 6 inches exhibits a low-chroma matrix of 10YR 3/2 with a silt loam texture that contains redoximorphic features (7.5YR 3/4). The soil between 6 and 16 inches exhibits a low-chroma matrix of 5Y 4/1 with a silt loam texture that contains redoximorphic features (5YR 3/4).

**Wetland B71**

Wetland B71 (W-B71) is a PFO wetland greater than 71,751-SF (Figure 4-33). Indicators of wetland hydrology include drift deposits, drainage patterns, and geomorphic position. Dominant vegetation consists of silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), ash-leaf maple (*Acer negundo*), Morrow's honeysuckle (*Lonicera morrowii*), rambler rose (*Rosa multiflora*), and an unidentified touch-me-not (*Impatiens* sp.). The soil between 0 and 5 inches exhibits a 10YR 4/3 matrix with a sandy loam texture. The soil between 5 and 15 inches exhibits a low-chroma matrix (10YR 4/2) with a silty loam texture that contains redoximorphic features (7.5YR 5/6).

**Wetland B70**

Wetland B70 (W-B70) is a 4,814-SF PEM wetland (Figure 4-33). Indicators of wetland hydrology include surface water, water-stained leaves, saturation visible on aerial imagery, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of black willow (*Salix nigra*), narrow-leaf cat-tail (*Typha angustifolia*), and cottongrass bulrush (*Scirpus cyperinus*). The

soil between 0 and 12 inches exhibits a low-chroma matrix (2.5YR 4/2) and contains redoximorphic features (2.5YR 6/6).

**Wetland B69**

Wetland B69 (W-B69) is a 3,826-SF PEM wetland (Figure 4-34). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of dark-green bulrush (*Scirpus atrovirens*) and cottongrass bulrush (*Scirpus cyperinus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (2.5YR 4/6) with a gravelly, silt loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland B68**

Wetland B68 (W-B68) is a 1,243-SF PEM wetland (Figure 4-34). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of dark-green bulrush (*Scirpus atrovirens*) and cottongrass bulrush (*Scirpus cyperinus*). The soil between 0 and 12 inches exhibits a chroma matrix (2.5YR 4/6) with a gravelly, silt loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland B67**

Wetland B67 (W-B67) is a 5,971-SF PEM wetland (Figure 4-34). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, and a positive FAC-neutral test. Dominant vegetation consists of common reed (*Phragmites australis*), orchard grass (*Dactylis glomerata*), purple-leaf willowherb (*Epilobium coloratum*), and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a gravelly, silty loam texture that contains redoximorphic features (7.5YR 4/6).

**Wetland K18**

Wetland K18 (W-K18) is a 1,766-SF PEM wetland (Figure 4-35). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, aquatic fauna, and sparsely vegetated concave surface. Dominant vegetation consists of Norther spicebush (*Lindera benzoin*), tartarian honeysuckle (*Lonicera tatarica*), lamp rush (*Juncus effusus*), and Japanese stilt grass (*Microstegium vimineum*). The soil between 0 and 5 inches exhibits a low-chroma matrix (10YR 3/2) with a gravelly silt loam texture that contains redoximorphic features (7.5YR 4/4).

**Wetland K19**

Wetland K19 (W-K19) is a 1,041-SF PEM wetland (Figure 4-35). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, aquatic fauna, a sparsely vegetated concave surface, and a positive FAC-neutral test. Dominant vegetation consists of Norther spicebush (*Lindera benzoin*), tartarian honeysuckle (*Lonicera tatarica*), sensitive fern (*Onoclea sensibilis*), lamp rush (*Juncus effusus*), and Japanese stilt grass (*Microstegium vimineum*). The soil between 0 and 5 inches exhibits a low-chroma matrix (10YR 3/2) with a gravelly silt loam texture that contains redoximorphic features (7.5YR 4/4).

**Wetland K21**

Wetland K21 (W-K21) is a 476-SF PEM wetland (Figure 4-35). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, water-stained leaves, a sparsely vegetated concave surface, and a positive FAC-neutral test. Dominant vegetation consists of an unidentified blue grass (*Poa* sp.), sensitive fern (*Onoclea sensibilis*), and dark-green bulrush (*Scirpus atrovirens*). The soil between 0 and 5 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/4). The soil between 5 and 12 inches exhibits a 7.5YR 6/6 matrix with a gravely clay loam texture that contains redoximorphic features (7.5YR 4/3).

**Wetland H35**

Wetland H35 (W-H35) is a PEM wetland greater than 11,741-SF (Figure 4-37). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of dark-green bulrush (*Scirpus atrovirens*), deer-tongue rosette grass (*Dichanthelium clandestinum*), and lamp rush (*Juncus effusus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (2.5Y 4/1) with a clay texture that contains redoximorphic features (10YR 5/8).

**Wetland BB160**

Wetland BB160 (W-BB160) is a 108-SF PEM wetland (Figure 4-37). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, drift deposits, oxidized rhizospheres on living roots, and drainage patterns. Dominant vegetation consists of spotted touch-me-not (*Impatiens capensis*), lance-leaf goldenrod (*Solidago lancifolia*), and an unidentified sedge (*Carex* sp.). The soil between 0 and 16 inches exhibits a low-chroma matrix (10YR 3/2) with a silty clay loam texture that contains redoximorphic features (10YR 4/6).

**Wetland H36**

Wetland H36 (W-H36) is a 9,211-SF PEM wetland (Figure 4-37). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, true aquatic plants, and geomorphic position. Dominant vegetation consists of red maple (*Acer rubrum*), black walnut (*Juglans nigra*), green ash (*Fraxinus pennsylvanica*), black cherry (*Prunus serotina*), European privet (*Ligustrum vulgare*), swamp rose (*Rosa palustris*), sensitive fern (*Onoclea sensibilis*), and rough-stalk blue grass (Poa trivialis). The soil between 0 and 15 inches exhibits a chroma matrix (2.5Y 5/1) with a clay loam texture that contains redoximorphic features (10YR 5/6).

**Wetland H31**

Wetland H31 (W-H31) is a 3,615-SF PEM wetland (Figure 4-44). Indicators of wetland hydrology include surface water, saturation within the upper 12 inches of the soil profile, and geomorphic position. Dominant vegetation consists of black willow (*Salix nigra*) and narrow-leaf cat-tail (*Typha angustifolia*). The soil between 0 and 12 inches exhibits a low-chroma matrix (2.5Y 4/2) with a silt loam texture that contains redoximorphic features (10YR 5/8).

**Wetland H30**

Wetland H30 (W-H30) is a 3,959-SF PEM wetland (Figure 4-46). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, true aquatic plants, and geomorphic position. Dominant vegetation consists of black willow (*Salix nigra*) and narrow-leaf cat-tail (*Typha angustifolia*). The soil between 0 and 12 inches exhibits a low-chroma matrix (5Y 4/2) with a silt loam texture that contains redoximorphic features (10YR 5/8).

**Wetland B36**

Wetland B36 (W-B36) is a 9,329-SF PEM wetland (Figure 4-49). Indicators of wetland hydrology include saturation within the upper 12 inches of the soil profile, a high water table, oxidized rhizospheres on living roots, drainage patterns, and a positive FAC-neutral test. Dominant vegetation consists of small-spike false nettle (*Boehmeria cylindrica*), Japanese stilt grass (*Microstegium vimineum*), and shallow sedge (*Carex lurida*). The soil between 0 and 12 inches exhibits a low-chroma matrix (2.5YR 4/1) with a silty loam texture that contains redoximorphic features (7.5YR 4/6).

## 3.2 STREAM IDENTIFICATION AND EVALUATION

Based on field evidence and best professional judgment, it was determined that 66 streams were identified within the evaluated study area. A data sheet that details the bank and channel characteristics, substrate composition, aquatic habitat, and hydrology was prepared for each of the streams (Appendix C).

**Stream A66**

Stream A66 (S-A66) is an ephemeral tributary to South Branch French Creek (Figure 4-3). The stream bank is approximately 3 feet in width. The bank height is 1 foot. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream B14**

Stream B14 (S-B14) is South Branch French Creek, a perennial tributary to French Creek (Figure 4-3). The stream bank is approximately 11 feet in width. The bank height is 4 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 16 inches.

**Stream C56**

Stream C56 (S-C56) is a perennial tributary to South Branch French Creek (Figure 4-4). The stream bank is approximately 6 feet in width. The bank height is 18 inches. The stream bed contains a cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 4 inches.

**Stream C57**

Stream C57 (S-C57) is an ephemeral tributary to South Branch French Creek (Figure 4-4). The stream bank is approximately 3 feet in width. The bank height is 2 feet. The stream bed contains a sand and organic substrate. The stream exhibited no flow at the time of the field investigation.

**Stream C58**

Stream C58 (S-C58) is a perennial tributary to South Branch French Creek (Figure 4-4). The stream bank is approximately 4 feet in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, sand, and clay substrate. At the time of the field investigation, the stream exhibited an average water depth of 4 inches.

**Stream A68**

Stream A68 (S-A68) is an ephemeral tributary to South Branch French Creek (Figure 4-4). The stream bank is approximately 3.5 feet in width. The bank height is 6 inches. The stream bed contains a cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream A70**

Stream A70 (S-A70) is an ephemeral tributary to Marsh Creek (Figure 4-5). The stream bank is approximately 4 feet in width. The bank height is 1 foot. The stream bed contains a cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 inches.

**Stream A71**

Stream A71 (S-A71) is Marsh Creek, a perennial tributary to East Branch Brandywine Creek (Figure 4-6). The stream bank is approximately 8 feet in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 18 inches.

**Stream B15**

Stream B15 (S-B15) is a perennial tributary to Marsh Creek (Figure 4-7). The stream bank is approximately 6 feet in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, sand, silt, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 15 inches.

**Stream C100**

Stream C100 (S-C100) is an ephemeral tributary to Marsh Creek (Figure 4-11). The stream bank is approximately 2 feet in width. The bank height is 6 inches. The stream bed contains a sand, silt, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 inch.

**Stream C99**

Stream C99 (S-C99) is an intermittent tributary to Marsh Creek (Figure 4-11). The stream bank is approximately 5 feet in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, sand, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 5 inches.

**Stream B18**

Stream B18 (S-B18) is a perennial tributary to Marsh Creek (Figure 4-12). The stream bank is approximately 5 feet in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 4 inches.

**Stream B19**

Stream B19 (S-B19) is an intermittent tributary to Marsh Creek (Figure 4-12). The stream bank is approximately 2 feet in width. The bank height is 4 inches. The stream bed contains a boulder and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 inch.

**Stream H9**

Stream H9 (S-H9) is a perennial tributary to Marsh Creek (Figure 4-12). The stream bank is approximately 8 feet in in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 8 inches.

**Stream H52**

Stream H52 (S-H52) is Marsh Creek, a perennial tributary to East Branch Brandywine Creek (Figure 4-15). The stream bank is approximately 20 feet in in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 18 inches.

**Stream Q200**

Stream Q200 (S-Q200) is an intermittent tributary to Marsh Creek (Figure 4-15). The stream bank is approximately 2 feet in in width. The bank height is 1 foot. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 inches.

**Stream Q81**

Stream Q81 (S-Q81) is an intermittent tributary to Marsh Creek (Figure 4-15). The stream bank is approximately 5 feet in width. The bank height is 8 inches. The stream bed contains a boulder, cobble, gravel, sand, silt, and clay substrate. The stream exhibited no flow at the time of the field investigation.

**Stream Q82**

Stream Q82 (S-Q82) is an ephemeral tributary to Marsh Creek (Figure 4-15). The stream bank is approximately 4 feet in width. The bank height is 6 inches. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. The stream exhibited no flow at the time of the field investigation.

**Stream Q83**

Stream Q83 (S-Q83) is a perennial tributary to Marsh Creek (Figure 4-15). The stream bank is approximately 6 feet in width. The bank height is 1 foot. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation the stream exhibited an average water depth of 10 inches.

**Stream Q84**

Stream Q84 (S-Q84) is an intermittent tributary to Marsh Creek (Figure 4-15). The stream bank is approximately 2 feet in width. The bank height is 2 feet. The stream bed contains a cobble, gravel, sand, and silt substrate. At the time of the field investigation the stream exhibited an average water depth of 2 inches.

**Stream Q86**

Stream Q86 (S-Q86) is an intermittent tributary to Marsh Creek (Figure 4-15). The stream bank is approximately 7 feet in width. The bank height is 3 feet. The stream bed contains a bedrock, boulder, cobble, gravel, sand, silt, and organic substrate. The stream exhibited no flow at the time of the field investigation.

**Stream Q85**

Stream Q85 (S-Q85) is an intermittent tributary to Marsh Creek (Figure 4-15). The stream bank is approximately 5 feet in width. The bank height is 18 inches. The stream bed contains a boulder, cobble, gravel, and sand substrate. The stream exhibited no flow at the time of the field investigation.

**Stream Q87**

Stream Q87 (S-Q87) is an ephemeral tributary to Black Horse Creek (Figure 4-16). The stream bank is approximately 6 feet in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. The stream exhibited no flow at the time of the field investigation.

**Stream Q88**

Stream Q88 (S-Q88) is Black Horse Creek a perennial tributary to Marsh Creek (Figure 4-16). The stream bank is approximately 25 feet in width. The left bank height is 3 feet and the right bank height is 4 feet. The stream bed contains a bedrock, boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation the stream exhibited an average water depth of 20 inches.

**Stream C72**

Stream C72 (S-C72) is a perennial tributary to Black Horse Creek (Figure 4-16). The stream bank is approximately 4 feet in width. The bank height is 1 foot. The stream bed contains a cobble, gravel, sand, silt, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 foot.

**Stream H11**

Stream H11 (S-H11) is an intermittent tributary to Marsh Creek (Figure 4-18). The stream bank is approximately 1.5 feet in in width. The bank height is 4 inches. The stream bed contains a cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream H10**

Stream H10 (S-H10) is an intermittent tributary to Marsh Creek (Figure 4-18). The stream bank is approximately 3 feet in in width. The bank height is 4 inches. The stream bed contains a cobble, gravel, sand, silt, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream C96**

Stream C96 (S-C96) is a perennial tributary to Marsh Creek (Figure 4-18). The stream bank is approximately 6 feet in width. The bank height is 1 foot. The stream bed contains a boulder, cobble, gravel, sand, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 10 inches.

**Stream C97 (Downstream)**

Stream C97 (S-C97) is a perennial tributary to Marsh Creek (Figure 4-18). The stream bank is approximately 4 feet in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 6 inches.

**Stream C97 (Upstream)**

Stream C97 (S-C97) is a perennial tributary to Marsh Creek (Figure 4-18). The stream bank is approximately 6 feet in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 8 inches.

**Stream C98**

Stream C98 (S-C98) is an intermittent tributary to Marsh Creek (Figure 4-18). The stream bank is approximately 3 feet in width. The bank height is 18 inches. The stream bed contains a cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream C94**

Stream C94 (S-C94) is an ephemeral tributary to Marsh Creek (Figure 4-19). The stream bank is approximately 2 feet in width. The left bank height is 6 inches and the right bank height is 4 inches. The stream bed contains a cobble, gravel, sand, silt, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream C93**

Stream C93 (S-C93) is an intermittent tributary to Marsh Creek (Figure 4-19). The stream bank is approximately 2.5 feet in width. The bank height is 1 foot. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 5 inches.

**Stream C92**

Stream C92 (S-C92) is an ephemeral tributary to Marsh Creek (Figure 4-19). The stream bank is approximately 2.5 feet in width. The bank height is 1 foot. The stream bed contains a sand and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 inches.

**Stream C91**

Stream C91 (S-C91) is an intermittent tributary to Marsh Creek (Figure 4-19). The stream bank is approximately 4 feet in width. The bank height is 8 inches. The stream bed contains a boulder, cobble, gravel, sand, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 inches.

**Stream C87**

Stream C87 (S-C87) is a perennial tributary to Marsh Creek (Figure 4-19). The stream bank is approximately 10 feet in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 8 inches.

**Stream C90**

Stream C90 (S-C90) is an ephemeral tributary to Marsh Creek (Figure 4-19). The stream bank is approximately 3 feet in width. The bank height is 6 inches. The stream bed contains a sand, silt, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 1.5 inches.

**Stream C89**

Stream C89 (S-C89) is an ephemeral tributary to Marsh Creek (Figure 4-19). The stream bank is approximately 4 feet in width. The bank height is 6 inches. The stream bed contains a boulder, cobble, gravel, sand, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream H1**

Stream H1 (S-H1) is an ephemeral tributary to Shamona Creek (Figure 4-21). The stream bank is approximately 2 feet in in width. The bank height is 6 inches. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream H2**

Stream H2 (S-H2) is an ephemeral tributary to Shamona Creek (Figure 4-21). The stream bank is approximately 3 feet in in width. The bank height is 1 inch. The stream bed contains a cobble, gravel, sand, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 4 inches.

**Stream H3**

Stream H3 (S-H3) is a perennial tributary to Shamona Creek (Figure 4-21). The stream bank is approximately 13 feet in in width. The left bank height is 2 feet. The right bank height is 2.5 feet The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 6 inches.

**Stream H4**

Stream H4 (S-H4) is an ephemeral tributary to Shamona Creek (Figure 4-21). The stream bank is approximately 1 foot in width. The bank height is 6 inches. The stream bed contains a boulder, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 inch.

**Stream C67**

Stream C67 (S-C67) is an intermittent tributary to Shamona Creek (Figure 4-21) The stream bank is approximately 1.5 inches in width. The bank height is 8 inches. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 inches.

**Stream C68**

Stream C68 (S-C68) is an intermittent tributary to Shamona Creek (Figure 4-21). The stream bank is approximately 3 feet in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream C69**

Stream C69 (S-C69) is an ephemeral tributary to Shamona Creek (Figure 4-21). The stream bank is approximately 2 feet in width. The bank height is 3 inches. The stream bed contains a cobble, gravel, sand, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 0.5 inches.

**Stream H5**

Stream H5 (S-H5) is Shamona Creek, a perennial tributary to East Branch Brandywine Creek (Figure 4-22). The stream bank is approximately 12 feet in in width. The bank height is 4 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 feet.

**Stream H6**

Stream H6 (S-H6) is an ephemeral tributary to Shamona Creek (Figure 4-22). The stream bank is approximately 2 feet in in width. The bank height is 1.5 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 inch.

**Stream C64**

Stream C64 (S-C64) is a perennial tributary to Valley Creek (Figure 4-24). The stream bank is approximately 5 feet in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream C63**

Stream C63 (S-C63) is a perennial tributary to Valley Creek (Figure 4-25). The stream bank is approximately 8 feet in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 inch.

**Stream C62**

Stream C62 (S-C62) is an intermittent tributary to Valley Creek (Figure 4-27). The stream bank is approximately 6 feet in width. The left bank height is 1 foot and the right bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream C61**

Stream C61 (S-C61) is a perennial tributary to Valley Creek (Figure 4-27). The stream bank is approximately 9 feet in width. The left bank height is 1 foot and the right bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 7 inches.

**Stream C59**

Stream C59 (S-C59) is a perennial tributary to Valley Creek (Figure 4-27). The stream bank is approximately 8 feet in width. The bank height is 10 inches. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 5 inches.

**Stream C60**

Stream C60 (S-C60) is an ephemeral tributary to Valley Creek (Figure 4-27). The stream bank is approximately 3 feet in width. The bank height is 6 inches. The stream bed contains a boulder, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 0.5 inches.

**Stream C66**

Stream C66 (S-C66) is an ephemeral tributary to Valley Creek (Figure 4-27). The stream bank is approximately 4 feet in width. The bank height is 6 inches. The stream bed contains a boulder, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 0.5 inches.

**Stream BB26**

Stream BB26 (S-BB26) is an ephemeral tributary to Valley Creek (Figure 4-28). The stream bank is approximately 7 feet in width. The bank height is 4.5 feet. The stream bed contains a cobble, gravel, silt, sand, and organic substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 inches.

**Stream BB27**

Stream BB27 (S-BB27) is an intermittent tributary to Valley Creek (Figure 4-28). The stream bank is approximately 3.5 feet in width. The bank height average is 16.5 inches. The stream bed contains a cobble, gravel, silt, and clay substrate. At the time of the field investigation, the stream exhibited an average water depth of 2 inches.

**Stream BB28**

Stream BB28 (S-BB28) is a perennial tributary to Valley Creek (Figure 4-28). The stream bank is approximately 10 feet in width. The left bank height average is 9 inches. The right bank height average is 10 inches. The stream bed contains a cobble, gravel, silt, and clay substrate. At the time of the field investigation, the stream exhibited an average water depth of 7.5 inches.

**Stream BB29**

Stream BB29 (S-BB29) is an ephemeral tributary to Valley Creek (Figure 4-30). The stream bank is approximately 4 feet in width. The bank height average is 20 inches. The stream bed contains a cobble, gravel, silt, and clay substrate. At the time of the field investigation, the stream exhibited no flow.

**Stream BB30**

Stream BB30 (S-BB30) is a perennial tributary to Valley Creek (Figure 4-30). The stream bank is approximately 7 feet in width. The bank height average is 2 feet. The stream bed contains a cobble, gravel, silt, and clay substrate. At the time of the field investigation, the stream exhibited an average water depth of 9.5 inches.

**Stream B81**

Stream B81 (S-B81) is Valley Creek, a perennial tributary to East Branch Brandywine Creek (Figure 4-33). The stream bank is approximately 12 feet in in width. The bank height is 2 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 15 inches.

**Stream B80**

Stream B80 (S-B80) is an ephemeral tributary to Valley Creek (Figure 4-33). The stream bank is approximately 3 feet in in width. The bank height is 6 inches. The stream bed contains a cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 inch.

**Stream B79**

Stream B79 (S-B79) is a perennial tributary to Valley Creek (Figure 4-33). The stream bank is approximately 7 feet in in width. The bank height is 6 inches. The stream bed contains a boulder, cobble, gravel, sand, silt, and clay substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 foot.

**Stream H30**

Stream H30 (S-H30) is Chester Creek, a perennial tributary to Delaware River (Figure 4-37). The stream bank is approximately 10 feet in in width. The bank height is 3 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 4 inches.

**Stream H31**

Stream H31 (S-H31) is a perennial tributary to Chester Creek (Figure 4-37). The stream bank is approximately 3 feet in in width. The bank height is 1 foot. The stream bed contains a boulder, cobble, gravel, and sand substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream H33**

Stream H33 (S-H33) is an ephemeral tributary to Chester Creek (Figure 4-37). The stream bank is approximately 4 feet in in width. The bank height is 3 feet. The stream bed contains a cobble, gravel, and clay substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream B34**

Stream B34 (S-B34) is an intermittent tributary to Chester Creek (Figure 4-49). The stream bank is approximately 2 feet in width. The bank height is 1.5 inches. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 3 inches.

**Stream B35**

Stream B35 (S-B35) is an ephemeral tributary to Chester Creek (Figure 4-49). The stream bank is approximately 3 feet in width. The bank height is 6 inches. The stream bed contains a gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 4 inches.

# 4.0 CONCLUSIONS

During the field investigations of Chester County, located within the Southeast Region of the proposed Pennsylvania Pipeline Project, 51 areas were identified within the evaluated study area which exhibited all three criteria necessary to be classified as a jurisdictional wetland in accordance with the 1987 Manual and the Regional Supplement:

1. Predominance of hydrophytic vegetation (plants which are adapted for life in saturated soil conditions);
2. Hydric soils (soils which were formed under water, or in saturated conditions); and
3. Wetland hydrology (or the presence of inundated or saturated soils at some time during the growing season).

Additionally, 66 streams were identified within the evaluated study area.

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**TABLE**

**Table 1**
**Wetland and Stream Summary**
**Pennsylvania Pipeline Project**


| Water Resource | Dominant Plant Community/Flow Regime | Bank Full Width (ft.) | Water Depth (in.) | Channel Depth | Wetland Size (Square Feet) | Wetland Size (Acres) | Associated Water Resource |
|---|---|---|---|---|---|---|---|
| **Wetlands** | | | | | | | |
| W-A46 | PEM | - | - | - | 2560 | 0.1 | S-A66 |
| W-B12 | PEM | - | - | - | 20830 | 0.5 | S-B14 |
| W-B13 | PEM | - | - | - | 1377 | 0.0 | S-B14 |
| W-B14 | PFO | - | - | - | 9359 | 0.2 | S-B14 |
| W-B14 | PEM | - | - | - | 17248 | 0.4 | S-B14 |
| W-C33 | PEM | - | - | - | 27132 | 0.6 | S-C56, S-C57 |
| W-C34 | PEM | - | - | - | 2836 | 0.1 | S-C56 |
| W-C35 | PEM | - | - | - | 17808 | 0.4 | S-C58 |
| W-A47 | PEM | - | - | - | 2556 | 0.1 | S-A67 |
| W-A48 | PEM | - | - | - | 2530 | 0.1 | S-A71 |
| W-B15 | PEM | - | - | - | 15756 | 0.4 | S-B15 |
| W-C49 | PEM | - | - | - | 65060 | 1.5 | S-C100 |
| W-C49 | PFO (1) | - | - | - | 50252 | 1.2 | N/A |
| W-C49 | PFO (2) | - | - | - | 67265 | 1.5 | N/A |
| W-B20 | PEM | - | - | - | 4076 | 0.1 | N/A |
| W-B19 | PEM (1) | - | - | - | 31551 | 0.7 | S-B18 |
| W-B19 | PEM (2) | - | - | - | 15298 | 0.4 | S-B18, S-B19 |
| W-B19 | PFO (1) | - | - | - | 36663 | 0.8 | S-B18, S-B20 |
| W-B19 | PFO (2) | - | - | - | 26680 | 0.6 | S-B18, S-B19 |
| W-H16 | PEM | - | - | - | 1809 | 0.0 | S-H9 |
| W-JA3 | PEM | - | - | - | 950 | 0.0 | S-H9 |
| W-H15 | PEM (1) | - | - | - | 33360 | 0.8 | N/A |
| W-H15 | PEM (2) | - | - | - | 6568 | 0.2 | N/A |
| W-H15 | PFO (1) | - | - | - | 1649 | 0.0 | N/A |
| W-H15 | PFO (2) | - | - | - | 1398 | 0.0 | N/A |
| W-Q75 | PFO | - | - | - | 25829 | 0.6 | S-Q200, S-Q81 |
| W-Q76 | PSS | - | - | - | 4969 | 0.1 | S-Q83 |
| W-Q77 | PEM | - | - | - | 14256 | 0.3 | S-Q86, S-Q85 |
| W-Q78 | PFO | - | - | - | 1050 | 0.0 | N/A |

* = See Data Sheet for Channel Depth - Right and Left Bank Measurements Differ.
' = Feet
" = Inches

**Table 1**
**Wetland and Stream Summary**
**Pennsylvania Pipeline Project**


| Water Resource | Dominant Plant Community/Flow Regime | Bank Full Width (ft.) | Water Depth (in.) | Channel Depth | Wetland Size (Square Feet) | Wetland Size (Acres) | Associated Water Resource |
|---|---|---|---|---|---|---|---|
| W-Q79 | PEM | - | - | - | 6993 | 0.2 | S-Q87 |
| W-Q79 | PFO | - | - | - | 5822 | 0.1 | S-Q87, S-Q88 |
| W-C38 | PEM | - | - | - | 32344 | 0.7 | S-C72 |
| W-H17 | PEM (1) | - | - | - | 7888 | 0.2 | S-H10 |
| W-H17 | PEM (2) | - | - | - | 2766 | 0.1 | S-H10, S-H11 |
| W-H17 | PFO (1) | - | - | - | 1885 | 0.0 | S-H10, S-H11 |
| W-H17 | PFO (2) | - | - | - | 19578 | 0.4 | S-H10 |
| W-C48 | PEM | - | - | - | 27107 | 0.4 | N/A |
| W-C48 | PFO | - | - | - | 4241 | 0.1 | N/A |
| W-C47 | PEM | - | - | - | 124882 | 2.9 | S-C96, S-C97 |
| W-C44 | PEM | - | - | - | 81624 | 1.7 | S-C93, S-C94 |
| W-C43 | PEM | - | - | - | 26381 | 0.6 | S-C87, S-C91 |
| W-C43 | PFO (1) | - | - | - | 118027 | 2.7 | S-C87, S-C91 |
| W-C43 | PFO (2) | - | - | - | 107244 | 2.5 | S-C87, S-C92 |
| W-C42 | PEM | - | - | - | 14770 | 0.3 | N/A |
| W-H1 | PEM | - | - | - | 11450 | 0.3 | S-H1, S-H2 |
| W-H1 | PFO | - | - | - | 44632 | 1.0 | S-H1, S-H2 |
| W-C37 | PEM | - | - | - | 12339 | 0.3 | S-C67, S-C68 |
| W-C37 | PFO (1) | - | - | - | 33837 | 0.8 | S-C67, S-C68 |
| W-C37 | PSS | - | - | - | 2917 | 0.1 | S-C67 |
| W-C37 | PFO (2) | - | - | - | 7473 | 0.2 | S-C67, S-C68 |
| W-JA2 | PEM | - | - | - | 386 | 0.0 | S-H5 |
| W-H2 | PEM | - | - | - | 1151 | 0.0 | S-H5, S-H6 |
| W-BB31 | PSS | - | - | - | 2186 | 0.1 | S-C61 |
| W-BB31 | PEM | - | - | - | 3766 | 0.1 | S-C61 |
| W-BB26 | PEM | - | - | - | 577 | 0.0 | S-BB28 |
| W-BB28 | PEM | - | - | - | 178 | 0.0 | S-BB29 |
| W-BB29 | PSS | - | - | - | 555 | 0.0 | S-BB30 |
| W-BB29 | PEM | - | - | - | 3152 | 0.1 | S-BB30 |
| W-BB30 | PEM | - | - | - | 1196 | 0.0 | |

* = See Data Sheet for Channel Depth - Right and Left Bank Measurements Differ.
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" = Inches

**Table 1**
**Wetland and Stream Summary**
**Pennsylvania Pipeline Project**


| Water Resource | Dominant Plant Community/Flow Regime | Bank Full Width (ft.) | Water Depth (in.) | Channel Depth | Wetland Size (Square Feet) | Wetland Size (Acres) | Associated Water Resource |
|---|---|---|---|---|---|---|---|
| W-BB30 | PSS | - | - | - | 179 | 0.0 | |
| W-B71 | PFO | - | - | - | 71751 | 1.6 | S-B78, S-B81 |
| W-B70 | PEM | - | - | - | 4814 | 0.1 | N/A |
| W-B69 | PEM | - | - | - | 3826 | 0.1 | N/A |
| W-B68 | PEM | - | - | - | 1243 | 0.0 | N/A |
| W-B67 | PEM | - | - | - | 5971 | 0.1 | N/A |
| W-K18 | PEM | - | - | - | 1766 | 0.0 | N/A |
| W-K19 | PEM | - | - | - | 1041 | 0.0 | N/A |
| W-K21 | PEM | - | - | - | 476 | 0.0 | N/A |
| W-H35 | PEM | - | - | - | 11741 | 0.3 | S-H30 |
| W-BB160 | PEM | - | - | - | 108 | 0.0 | S-H30 |
| W-H36 | PEM | - | - | - | 9211 | 0.2 | S-H30, S-H31 |
| W-H31 | PEM | - | - | - | 3615 | 0.1 | N/A |
| W-H30 | PEM | - | - | - | 3959 | 0.1 | N/A |
| W-B36 | PEM | - | - | - | 9329 | 0.2 | S-B34 |
| **Streams** | | | | | | | |
| S-A66 | Ephemeral | 3' | 3" | 1' | - | - | - |
| S-B14 | Perennial | 11' | 16" | 4' | - | - | - |
| S-C56 | Perennial | 6' | 4" | 18" | - | - | - |
| S-C57 | Ephemeral | 3' | No Flow | 2' | - | - | - |
| S-C58 | Perennial | 4' | 4" | 3' | - | - | - |
| S-A68 | Ephemeral | 3.5' | 3" | 6" | - | - | - |
| S-A70 | Ephemeral | 4' | 2" | 1' | - | - | - |
| S-A71 | Perennial | 8' | 18" | 2' | - | - | - |
| S-B15 | Perennial | 6' | 15" | 3' | - | - | - |
| S-C100 | Ephemeral | 2' | 1" | 6" | - | - | - |
| S-C99 | Intermittent | 5' | 5" | 3' | - | - | - |
| S-B18 | Perennial | 5' | 4" | 2' | - | - | - |
| S-B19 | Intermittent | 2' | 1" | 4" | - | - | - |
| S-H9 | Perennial | 8' | 8" | 3' | - | - | - |

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' = Feet
" = Inches

**Table 1**
**Wetland and Stream Summary**
**Pennsylvania Pipeline Project**


| Water Resource | Dominant Plant Community/Flow Regime | Bank Full Width (ft.) | Water Depth (in.) | Channel Depth | Wetland Size (Square Feet) | Wetland Size (Acres) | Associated Water Resource |
|---|---|---|---|---|---|---|---|
| S-H52 | Perennial | 20' | 18" | 3' | - | - | - |
| S-Q200 | Intermittent | 2' | 2" | 1' | - | - | - |
| S-Q81 | Intermittent | 5' | No Flow | 8" | - | - | - |
| S-Q82 | Ephemeral | 4' | No Flow | 6" | - | - | - |
| S-Q83 | Perennial | 6' | 10" | 1' | - | - | - |
| S-Q84 | Intermittent | 2' | 2" | 2' | - | - | - |
| S-Q86 | Intermittent | 7' | No Flow | 3' | - | - | - |
| S-Q85 | Intermittent | 5' | No Flow | 18" | - | - | - |
| S-Q87 | Ephemeral | 6' | No Flow | 3' | - | - | - |
| S-Q88 | Perennial | 25' | 20" | * | - | - | - |
| S-C72 | Perennial | 4' | 12" | 1' | - | - | - |
| S-H11 | Intermittent | 1.5' | 3" | 4" | - | - | - |
| S-H10 | Intermittent | 3' | 3" | 4" | - | - | - |
| S-C96 | Perennial | 6' | 10" | 1' | - | - | - |
| S-C97 Downstream | Perennial | 4' | 6" | 2' | - | - | - |
| S-C97 Upstream | Perennial | 6' | 8" | 2' | - | - | - |
| S-C98 | Intermittent | 3' | 3" | 18" | - | - | - |
| S-C94 | Ephemeral | 2' | 3" | * | - | - | - |
| S-C93 | Intermittent | 2.5' | 5" | 1' | - | - | - |
| S-C92 | Ephemeral | 2.5' | 2" | 1' | - | - | - |
| S-C91 | Intermittent | 4' | 2" | 8" | - | - | - |
| S-C87 | Perennial | 10' | 8" | 2' | - | - | - |
| S-C90 | Ephemeral | 3' | 1.5" | 6" | - | - | - |
| S-C89 | Ephemeral | 4' | 3" | 6" | - | - | - |
| S-H1 | Ephemeral | 2' | 3" | 6" | - | - | - |
| S-H2 | Ephemeral | 3' | 4" | 1" | - | - | - |
| S-H3 | Perennial | 13' | 6" | * | - | - | - |
| S-H4 | Ephemeral | 1' | 1" | 6" | - | - | - |
| S-C67 | Intermittent | 1.5' | 2" | 8" | - | - | - |
| S-C68 | Intermittent | 3' | 3" | 2' | - | - | - |

* = See Data Sheet for Channel Depth - Right and Left Bank Measurements Differ.
' = Feet
" = Inches

**Table 1**
**Wetland and Stream Summary**
**Pennsylvania Pipeline Project**


| Water Resource | Dominant Plant Community/Flow Regime | Bank Full Width (ft.) | Water Depth (in.) | Channel Depth | Wetland Size (Square Feet) | Wetland Size (Acres) | Associated Water Resource |
|---|---|---|---|---|---|---|---|
| S-C69 | Ephemeral | 2' | 0.5" | 3" | - | - | - |
| S-H5 | Perennial | 12' | 2' | 4' | - | - | - |
| S-H6 | Ephemeral | 2' | 1" | 18" | - | - | - |
| S-C64 | Perennial | 5' | 3" | 2' | - | - | - |
| S-C63 | Perennial | 8' | 1" | 3' | - | - | - |
| S-C62 | Intermittent | 6' | 3" | * | - | - | - |
| S-C61 | Perennial | 9' | 7" | * | - | - | - |
| S-C59 | Perennial | 8' | 5" | 10" | - | - | - |
| S-C60 | Ephemeral | 3' | 0.5" | 6" | - | - | - |
| S-C66 | Ephemeral | 4' | 0.5" | 6" | - | - | - |
| S-BB26 | Ephemeral | 7' | 2" | 4.5' | - | - | - |
| S-BB27 | Intermittent | 3.5' | 2" | 10" | - | - | - |
| S-BB28 | Perennial | 10' | 7.5" | * | - | - | - |
| S-BB29 | Ephemeral | 4' | no flow | 16.5" | - | - | - |
| S-BB30 | Perennial | 7' | 9.5" | 2' | - | - | - |
| S-B81 | Perennial | 12' | 15" | 2' | - | - | - |
| S-B80 | Ephemeral | 3' | 1" | 6" | - | - | - |
| S-B79 | Perennial | 7' | 12" | 6" | - | - | - |
| S-H30 | Perennial | 10' | 4" | 3' | - | - | - |
| S-H31 | Perennial | 3' | 3" | 1' | - | - | - |
| S-H33 | Ephemeral | 4' | 3" | 3' | - | - | - |
| S-B34 | Intermittent | 2' | 3" | 18" | - | - | - |
| S-B35 | Ephemeral | 3' | 4" | 6" | - | - | - |

* = See Data Sheet for Channel Depth - Right and Left Bank Measurements Differ.
' = Feet
" = Inches

**Table 2**
**Mapped Hydric Soils in Study Area**
**Pennsylvania Pipeline Project, Chester County**

| Map Unit Symbol | Map Unit Name | Component Name and Phase | Component Percent | Landforms |
|---|---|---|---|---|
| Ba | Baile silt loam | Baile | 85 | Depressions |
| CaA | Califon loam, 0 to 3 percent slopes | Holly | 4 | Flood plains |
| CaA | Califon loam, 0 to 3 percent slopes | Baile | 3 | Depressions |
| CaA | Califon loam, 0 to 3 percent slopes | Fluvaquents | 3 | Flood plains |
| CaB | Califon loam, 3 to 8 percent slopes | Baile | 4 | Depressions |
| CaB | Califon loam, 3 to 8 percent slopes | Hatboro | 4 | Flood plains |
| Co | Codorus silt loam | Hatboro | 8 | Flood plains |
| Co | Codorus silt loam | Baile | 3 | Depressions |
| CpA | Cokesbury silt loam, 0 to 3 percent slopes | Cokesbury | 85 | Depressions |
| CpA | Cokesbury silt loam, 0 to 3 percent slopes | Holly | 3 | Valley floors |
| CpB | Cokesbury silt loam, 3 to 8 percent slopes | Cokesbury | 90 | Depressions |
| CpB | Cokesbury silt loam, 3 to 8 percent slopes | Holly | 3 | Valley floors |
| Cs | Comus silt loam | Holly | 8 | Flood plains |
| EdB | Edgemont channery loam, 3 to 8 percent slopes | Andover | 3 | Drainageways |

**Table 2**
**Mapped Hydric Soils in Study Area**
**Pennsylvania Pipeline Project, Chester County**

| | | | | |
|---|---|---|---|---|
| EdC | Edgemont channery loam, 8 to 15 percent slopes | Andover | 3 | Drainageways |
| EdD | Edgemont channery loam, 15 to 25 percent slopes | Andover | 3 | Drainageways |
| GdA | Gladstone gravelly loam, 0 to 3 percent slopes | Cokesbury | 1 | Depressions |
| GdB | Gladstone gravelly loam, 3 to 8 percent slopes | Cokesbury | 3 | Depressions |
| GdC | Gladstone gravelly loam, 8 to 15 percent slopes | Cokesbury | 5 | Depressions |
| GdD | Gladstone gravelly loam, 15 to 25 percent slopes | Cokesbury | 5 | Depressions |
| GdE | Gladstone gravelly loam, 25 to 35 percent slopes | Cokesbury | 3 | Depressions |
| GfB | Gladstone gravelly loam, 0 to 8 percent slopes, very bouldery | Cokesbury | 5 | Depressions |
| GfD | Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery | Cokesbury | 5 | Depressions |
| GfF | Gladstone gravelly loam, 25 to 50 percent slopes, very bouldery | Cokesbury | 5 | Depressions |
| GlB | Glenville silt loam, 3 to 8 percent slopes | Baile | 5 | Depressions |
| Ha | Hatboro silt loam | Hatboro | 95 | Flood plains |
| MaB | Manor loam, 3 to 8 percent slopes | Hatboro | 2 | Flood plains |
| MaC | Manor loam, 8 to 15 percent slopes | Hatboro | 2 | Flood plains |
| UrlB | Urban land-Gladstone complex, 0 to 8 percent slopes | Cokesbury | 5 | Depressions |

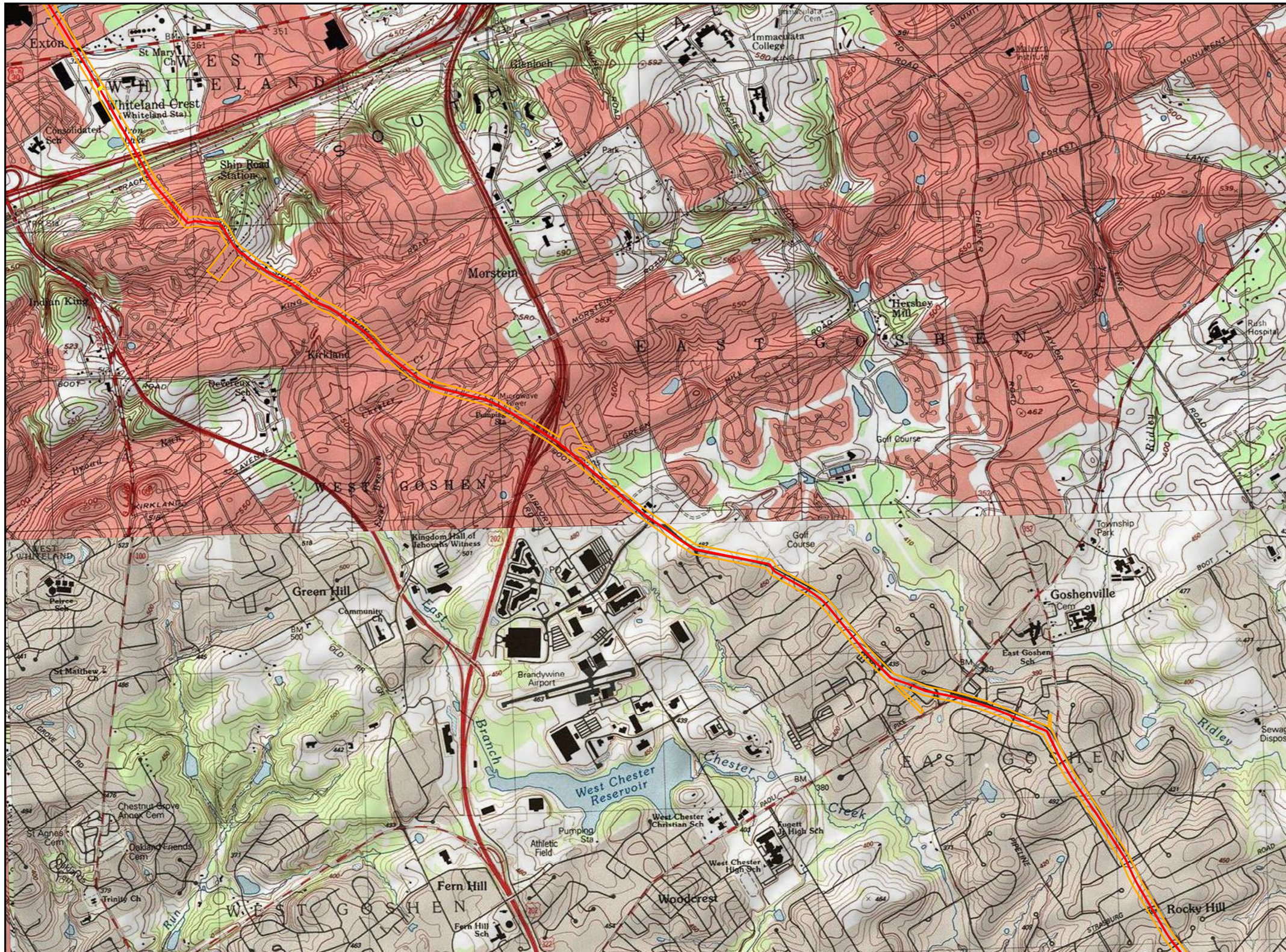
**Table 2**
**Mapped Hydric Soils in Study Area**
**Pennsylvania Pipeline Project, Chester County**

| | | | | |
|---|---|---|---|---|
| UrlD | Urban land-Gladstone complex, 8 to 25 percent slopes | Cokesbury | 5 | Depressions |
| UugB | Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes | Baile | 1 | Depressions |
| UugD | Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes | Baile | 1 | Depressions |
| Modified from Hydric Soils of the United States (NRCS 2014) | | | | |

**Table 3.**
**Mapped NWI and Corresponding Delineated Wetlands**
**Pennsylvania Pipeline Project**

| Figure Number | NWI code | NWI Latitude | NWI Longitude | Corresponding Wetland ID |
|---|---|---|---|---|
| 4-4 | PUBHh | 40.137290° | -75.810096° | Pond-A4 |
| 4-18 | PUBHh | 40.079744° | -75.710548° | Pond-H2 |
| 4-18 | PEM5C | 40.077555° | -75.706955° | Wetland C47 |
| 4-21 | PFO1A | 40.063340° | -75.681030° | Wetland C37 |
| 4-33 | PFO1A | 40.030691° | -75.619721° | Wetland B71 |
| 4-34 | PUBHh | 40.023994° | -75.614746° | Pond-B10 |

# FIGURES




**USGS PROJECT LOCATION MAP**
**FIGURE 1-5**
**PENNSYLVANIA PIPELINE PROJECT**
**AUGUST 19, ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY, PA**

TETRA TECH

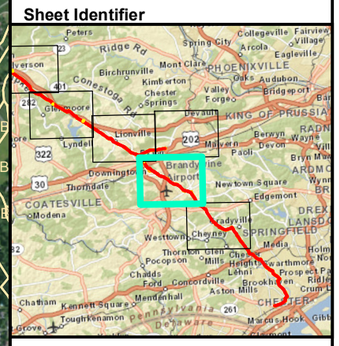
Notes:
1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
2) Quadrangles being displayed are Malvern, West Chester

FIGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PFP WETLANDS SE\PENNPIPELINE_SOUTHEAST_USGS_CHESTERCO.MXD 08/20/15 JN

**Legend**

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NRCS Soils and Codes

**Sheet Identifier**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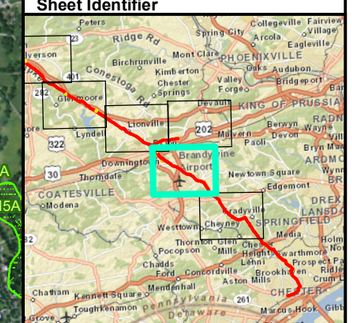
Concordville
Mendenhall
Kennett Square
Toughkenamon
Chatham
Marcus Hook
Pennsylvania
Delaware
Chester
Lionville
Exton
Malvern
Paoli
Devon
Berwyn
Wayne
Brandywine Airport
Birchrunville
Pocopson
Lenni
Brookhaven
Aston Mills
Glenmoore
Lyndell
Collegeville
Fairview Village
Eagleville
Arcola
Mont Clare
Audubon
Bridgeport
Valley Forge
Devault
Ridge Rd
Conestoga Rd
Peters
Iverson
KING OF PRUSSIA
RADNOR
ARDMORE
DREXEL HILL
SPRINGFIELD
Brynn Mawr
Wynnewood
Haverford
Bryn Mawr
Holmes
Norwood
Swarthmore
Prospect Park
Ridley Park
Crum Lynne
Glenolden
Folcroft
Sharon Hill
Darby
Upper Darrby
Lansdowne
Yeadon
Colwyn
Aldan
Ridley Park
Marcus Hook
Gibbsboro
Grove
Tower Hill
Ashland
Pocopson
Chadds Ford
Kennett Square
Toughkenamon
Chatham
Mendenhall
Concordville
Thornton
Glen Mills
Cheyney
Lenni
Brookhaven
Aston Mills
Westtown
Edgemont
Newtown Square
Thorndale
Downingtown
Malvern
Paoli
Devon
Berwyn
Wayne
Lionville
Exton
Glenmoore
Lyndell
Birchrunville
Kimberton
Chester Springs
Valley Forge
Devault
Collegeville
Fairview Village
Eagleville
Arcola
Mont Clare
Audubon
Bridgeport
Spring City
Ridge Rd
Conestoga Rd
Peters
Iverson
Brandywine Airport
Coatesville
Modena
Phoenixville
Chester
Media
Springfield
Pennsylvania
Delaware
Marcus Hook
Gibbsboro
Grove
Tower Hill
Ashland
Darby
Upper Darrby
Lansdowne
Yeadon
Colwyn
Aldan
Ridley Park
Glenolden
Folcroft
Sharon Hill
Haverford
Bryn Mawr
Wynnewood
Swarthmore
Prospect Park
Ridley Park
Crum Lynne
Drexel Hill
Ardmore
Radnor
Haverford
Bryn Mawr
Wynnew

**Legend**

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NWI Wetlands and Codes

**Sheet Identifier**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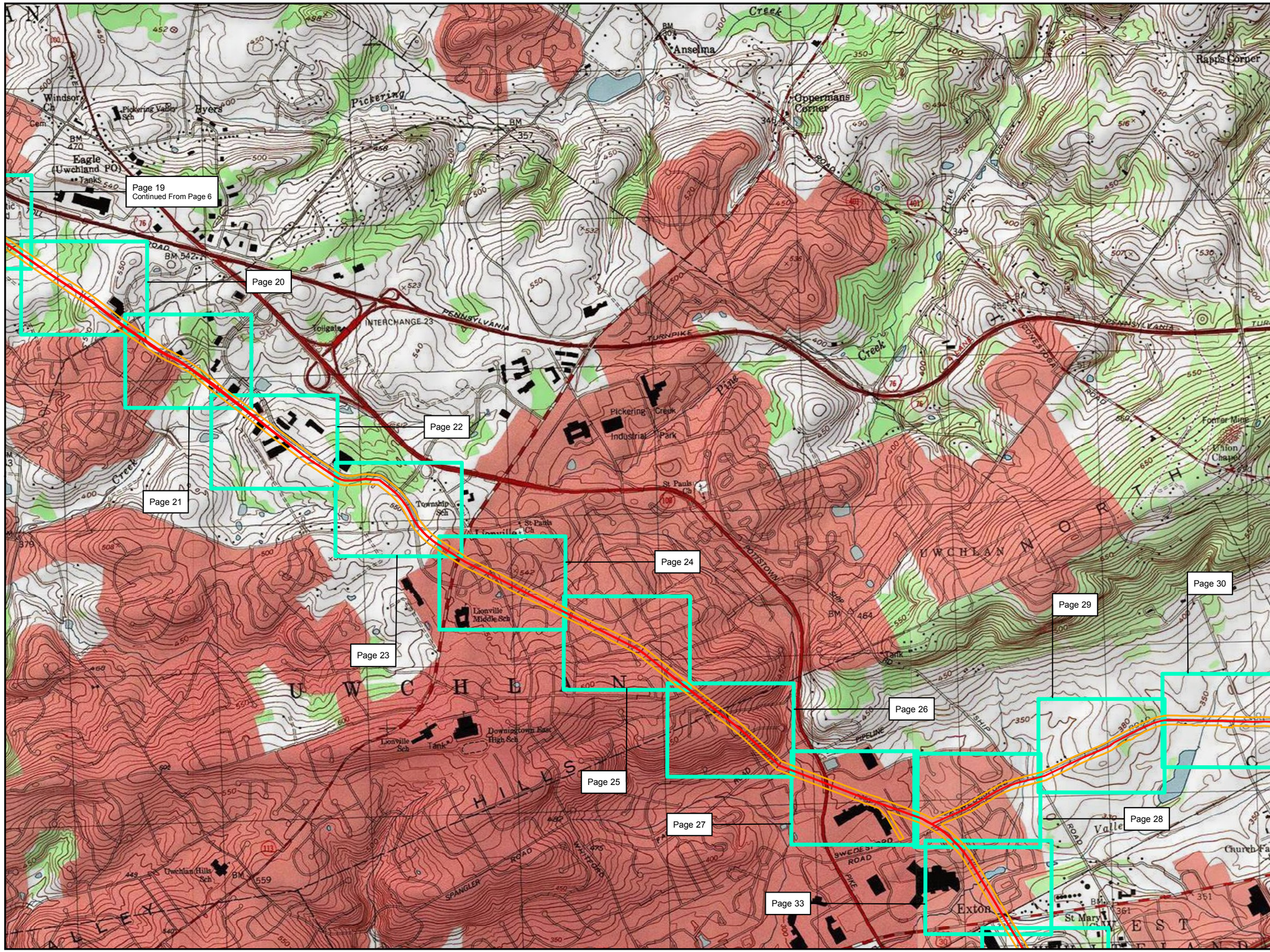
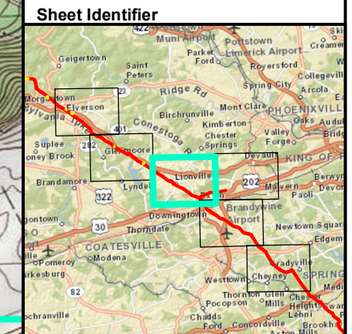
Collegeville
Spring City
Arcola
Eagleville
Birchrunville
Kimberton
Chester Springs
Valley Forge
Bridgeport
King of Prussia
Lionville
Lyndell
Downington
Thorndale
Brandywine Airport
Newtown Square
Edgemont
Coatesville
Modena
Westtown
Cheyney
Media
Springfield
Pocopson
Chadds Ford
Concordville
Brookhaven
Aston Mills
Mendenhall
Chatham
Kennett Square
Toughkenamon
Marcus Hook
Pennsylvania
Delaware
Ridge Rd
Conestoga Rd
Peters
Iverson
Berwyn
Wayne
Devon
Paoli
Malvern
Devault
Glenmoore
Birdsboro
Ardmore
Drexel Hill
Lansdowne
Brynmawr
Wynnewood
Bryn Mawr
Haverford
Prospect Park
Ridley Park
Crum Lynne
Holmesburg
Norwood
Glen Mills
Thornton
Lenni
Heights
Cheyney
Mill
Glen
Mont Clare
Oaks
Audubon
Valley Forge
Devault
Pacoli
Malvern
Devon
Berwyn
Wayne
Brynmawr
Ardmore




## Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- Index

**Sheet Identifier**




Feet: 0 1,000 2,000

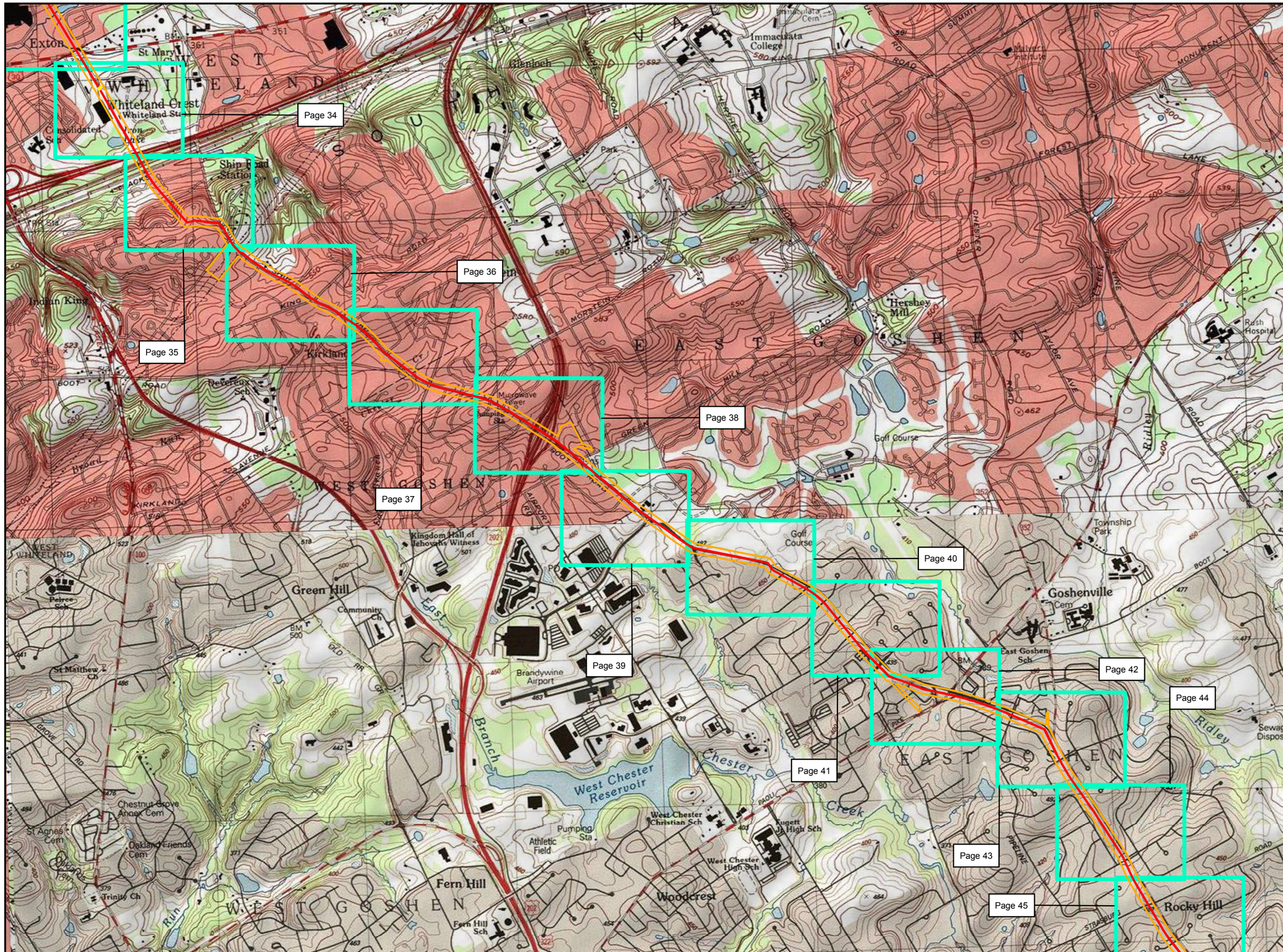
Meters: 0 300 600

**USGS PROJECT LOCATION MAP**
**FIGURE 4-INDEX-3**
**PENNSYLVANIA PIPELINE PROJECT**
**AUGUST 19, ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY, PA**

TETRA TECH

Notes:
1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
2) Quadrangles being displayed are Downingtown, Malvern

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SE\PENNPIPELINE_SOUTHEAST_INDEX_CHESTERCO.MXD 08/2015 JN




**USGS PROJECT LOCATION MAP**
**FIGURE 4-INDEX-5**
**PENNSYLVANIA PIPELINE PROJECT**
**AUGUST 19, ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY, PA**

TETRA TECH

Notes:
1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
2) Quadrangles being displayed are Malvern, West Chester

FIGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SE\PENNPIPELINE_SOUTHEAST_INDEX_CHESTERCO.MXD 08/20/15 JN

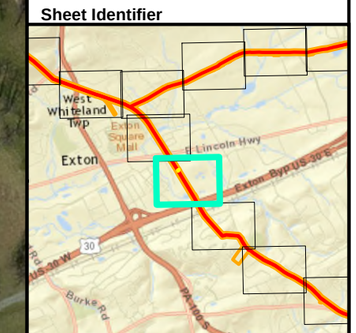
**Legend**

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

**Wetland**

- PEM
- PFO
- PSS
- PuB
- Stormwater Impoundment

**Sheet Identifier**




N

0 100 200 Feet

0 30.45 60.9 Meters

**NRCS SOILS MAP**
**FIGURE 4-34**
**PENNSYLVANIA PIPELINE PROJECT**
**AUGUST 19, 2015 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY, PA**

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SE\PEN\PIPELINE_CHESTERCO_DETAIL_COPY.MXD 08/21/15 JN

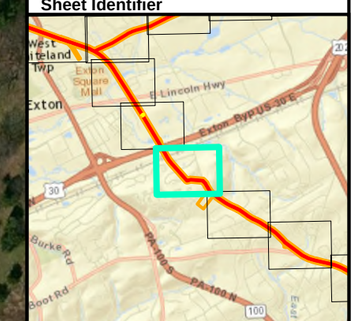
**Legend**

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

**Wetland**

- PEM
- PFO
- PSS
- PuB
- Stormwater Impoundment

**Sheet Identifier**




N

Feet: 0 100 200

Meters: 0 30.45 60.9

**NRCS SOILS MAP**
**FIGURE 4-35**
**PENNSYLVANIA PIPELINE PROJECT**
**AUGUST 19, 2015 ALIGNMENT**
**SUNOCO LOGISTICS, L.P.**
**CHESTER COUNTY, PA**

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEIPEN\PIPELINE_CHESTERCO_DETAIL_COPY.MXD 08/21/15 JN

# APPENDIX A

# USACE DATA SHEETS

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 03/10/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-B69

Investigator(s): A. Grech, A. Stott, Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): foot-slope Local relief (concave, convex, none): Concave Slope (%): 0-3%

Subregion (LRR or MLRA): LRRS Lat: 40.027777 Long: -75.617376 Datum: NAD 83

Soil Map Unit Name: Urban land-Udorthents, limestone complex, 0 to 8 percent slopes NWI classification: None

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:
Cowardin: PEM
HGM: Depressional
WT: Isolate

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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): 4" |
| 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:

Remarks:

## VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-B69

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Scirpus atrovirens | 30 | ✔ | OBL |
| 2. Scirpus cyperinus | 30 | ✔ | FACW |
| 3. Dactylis glomerata | 15 | | FACU |
| 4. Epilobium coloratum | 10 | | FACW |
| 5. Typha angustifolia | 10 | | OBL |
| 6. Rumex crispus | 5 | | FAC |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100 = Total Cover | | |
| 50% of total cover: 50 | 20% of total cover: 20 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**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% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ✔ No ___

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

**SOIL** Sampling Point: W-B69

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 2.5YR 4/6 | 85 | 7.5YR 4/6 | 15 | C | M | GRSIL | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: PPP City/County: Chester Sampling Date: 03/10/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-B69 UPL

Investigator(s): A. Grech, A. Stott, Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): foot-slope Local relief (concave, convex, none): Concave Slope (%): 0-3%

Subregion (LRR or MLRA): LRRS Lat: 40.027699 Long: -75.617183 Datum: NAD 83

Soil Map Unit Name: Urban land-Udorthents, limestone complex, 0 to 8 percent slopes NWI classification: None

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:
Upland

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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 (Four Strata) – Use scientific names of plants.** Sampling Point: W-B69 UPL

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. Elaeagnus umbellata | 15 | ✔ | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 15 = Total Cover | | |
| 50% of total cover: 7.5 | 20% of total cover: 3 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Poa sp. | 20 | ✔ | ND |
| 2. Dactylis glomerata | 20 | ✔ | FACU |
| 3. Solidago sp. | 20 | ✔ | ND |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 60 = Total Cover | | |
| 50% of total cover: 30 | 20% of total cover: 12 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**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% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | | x 1 = |
| FACW species | | x 2 = |
| FAC species | | x 3 = |
| FACU species | | x 4 = |
| UPL species | | x 5 = |
| Column Totals: | (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ___ No ✔

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

ND - Not determined

*Vegetation not ID'd to species level not included in dominance test.

## SOIL

Sampling Point: W-B69 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 |
|---|---|---|---|---|---|---|---|---|
| 0-5" | 10YR 4/3 | 100% | | | | | GRSIL | |
| 5-12" | 10YR 5/3 | 90 | 7.5YR 4/6 | 10 | C | M | GRSIL | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: PPP City/County: Chester Sampling Date: 03/10/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-B68

Investigator(s): A. Grech, A. Stott, Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): foot-slope Local relief (concave, convex, none): Concave Slope (%): 0-3%

Subregion (LRR or MLRA): LRRS Lat: 40.027576 Long: -75.617076 Datum: NAD 83

Soil Map Unit Name: Urban land-Udorthents, limestone complex, 0 to 8 percent slopes NWI classification: None

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:
Cowardin: PEM
HGM: Depressional
WT: Isolate

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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): 4" |
| 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:

Remarks:

## VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-B68

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Scirpus atrovirens | 30 | ✔ | OBL |
| 2. Scirpus cyperinus | 30 | ✔ | FACW |
| 3. Dactylis glomerata | 15 | | FACU |
| 4. Epilobium coloratum | 10 | | FACW |
| 5. Typha angustifolia | 10 | | OBL |
| 6. Rumex crispus | 5 | | FAC |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100 = Total Cover | | |
| 50% of total cover: 50 | 20% of total cover: 20 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**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% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | | x 1 = |
| FACW species | | x 2 = |
| FAC species | | x 3 = |
| FACU species | | x 4 = |
| UPL species | | x 5 = |
| Column Totals: | (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ✔ No ___

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

**SOIL** Sampling Point: W-B68

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 2.5YR 4/6 | 85 | 7.5YR 4/6 | 15 | C | M | GRSIL | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: PPP City/County: Chester Sampling Date: 03/10/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-B68 UPL

Investigator(s): A. Grech, A. Stott, Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): foot-slope Local relief (concave, convex, none): Concave Slope (%): 0-3%

Subregion (LRR or MLRA): LRRS Lat: 40.027699 Long: -75.617183 Datum: NAD 83

Soil Map Unit Name: Urban land-Udorthents, limestone complex, 0 to 8 percent slopes NWI classification: None

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:
Upland

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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 (Four Strata) – Use scientific names of plants.** Sampling Point: W-B68 UPL

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. Elaeagnus umbellata | 15 | ✔ | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 15 = Total Cover | | |
| 50% of total cover: 7.5 | 20% of total cover: 3 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Poa sp. | 20 | ✔ | ND |
| 2. Dactylis glomerata | 20 | ✔ | FACU |
| 3. Solidago sp. | 20 | ✔ | ND |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 60 = Total Cover | | |
| 50% of total cover: 30 | 20% of total cover: 12 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**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% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | | x 1 = |
| FACW species | | x 2 = |
| FAC species | | x 3 = |
| FACU species | | x 4 = |
| UPL species | | x 5 = |
| Column Totals: | (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ___ No ✔

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

ND - Not determined

*Vegetation not ID'd to species level not included in dominance test.

**SOIL** Sampling Point: W-B68 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 |
|---|---|---|---|---|---|---|---|---|
| 0-5" | 10YR 4/3 | 100% | | | | | GRSIL | |
| 5-12" | 10YR 5/3 | 90 | 7.5YR 4/6 | 10 | C | M | GRSIL | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: PPP City/County: Chester Sampling Date: 03/10/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-B67

Investigator(s): A. Grech, A. Stott, Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): foot-slope Local relief (concave, convex, none): Concave Slope (%): 0-3%

Subregion (LRR or MLRA): LRRS Lat: 40.027288 Long: -75.616975 Datum: NAD 83

Soil Map Unit Name: Urban land-Udorthents, limestone complex, 0 to 8 percent slopes NWI classification: None

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:
Cowardin: PEM
HGM: Depressional
WT: Isolate

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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): 4" |
| 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:

Remarks:

## VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-B67

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. Salix nigra | 10 | ✔ | OBL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 10 = Total Cover | | |
| 50% of total cover: 5 | 20% of total cover: 2 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Phragmites australis | 25 | ✔ | FACW |
| 2. Dactylis glomerata | 20 | ✔ | FACU |
| 3. Epilobium coloratum | 15 | ✔ | FACW |
| 4. Phalaris arundinacea | 15 | ✔ | FACW |
| 5. Juncus effusus | 10 | | FACW |
| 6. Poa sp. | 10 | | ND |
| 7. Scirpus cyperinus | 5 | | FACW |
| 8. Typha angustifolia | 5 | | OBL |
| 9. Rumex crispus | 2 | | FAC |
| 10. | | | |
| 11. | | | |
| | 107 = Total Cover | | |
| 50% of total cover: 53.5 | 20% of total cover: 21.4 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ✔ No ___

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

ND - Not determined

**SOIL** Sampling Point: W-B67

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10YR 4/2 | 85 | 7.5YR 4/6 | 15 | C | M | GRSIL | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: PPP City/County: Chester Sampling Date: 03/10/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-B67 UPL

Investigator(s): A. Grech, A. Stott, Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): foot-slope Local relief (concave, convex, none): Concave Slope (%): 0-3%

Subregion (LRR or MLRA): LRRS Lat: 40.027699 Long: -75.617183 Datum: NAD 83

Soil Map Unit Name: Urban land-Udorthents, limestone complex, 0 to 8 percent slopes NWI classification: None

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:
Upland

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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 (Four Strata) – Use scientific names of plants.** Sampling Point: W-B67 UPL

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. Elaeagnus umbellata | 15 | ✔ | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 15 = Total Cover | | |
| 50% of total cover: 7.5 | 20% of total cover: 3 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Poa sp. | 20 | ✔ | ND |
| 2. Dactylis glomerata | 20 | ✔ | FACU |
| 3. Solidago sp. | 20 | ✔ | ND |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 60 = Total Cover | | |
| 50% of total cover: 30 | 20% of total cover: 12 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**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% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | | x 1 = |
| FACW species | | x 2 = |
| FAC species | | x 3 = |
| FACU species | | x 4 = |
| UPL species | | x 5 = |
| Column Totals: | (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ___ No ✔

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

ND - Not determined

*Vegetation not ID'd to species level not included in dominance test.

**SOIL** Sampling Point: W-B67 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 |
|---|---|---|---|---|---|---|---|---|
| 0-5" | 10YR 4/3 | 100% | | | | | GRSIL | |
| 5-12" | 10YR 5/3 | 90 | 7.5YR 4/6 | 10 | C | M | GRSIL | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: PPP City/County: Chester Sampling Date: 04/21/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-K18

Investigator(s): J. McGuirk, D. Quinn Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): Valley Bottom Local relief (concave, convex, none): Concave Slope (%): 0-3

Subregion (LRR or MLRA): LRRS Lat: 40.022631 Long: -75.613212 Datum: NAD 83

Soil Map Unit Name: Glenelg silt loam, 3 to 8 percent slopes NWI classification: None

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:

Cowardin Code: PEM
HGM: Depressional
WT: Isolate

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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): 3" |
| 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:

Remarks:

## VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-K18

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. Lindera benzoin | 15 | ✔ | FAC |
| 2. Lonicera tatarica | 10 | ✔ | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 25 = Total Cover | | |
| 50% of total cover: 12.5 | 20% of total cover: 5 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Juncus effusus | 10 | ✔ | FACW |
| 2. Microstegium vimineum | 10 | ✔ | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 20 = Total Cover | | |
| 50% of total cover: 10 | 20% of total cover: 4 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | | x 1 = |
| FACW species | | x 2 = |
| FAC species | | x 3 = |
| FACU species | | x 4 = |
| UPL species | | x 5 = |
| Column Totals: | (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ✔ No ___

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

**SOIL** Sampling Point: W-K18

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-5" | 10YR 3/2 | 95 | 7.5YR 4/4 | 5 | C | M | GRSiL | |
| 5"+ | | | | | | | | Refusal - Coarse Fragments |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: Coarse Fragments

Depth (inches): 5"+

**Hydric Soil Present?** **Yes** ✔ **No** ___

Remarks:

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 04/21/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-K19

Investigator(s): J. McGuirk, D. Quinn Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): Valley Bottom Local relief (concave, convex, none): Concave Slope (%): 0-3

Subregion (LRR or MLRA): LRRS Lat: 40.022496 Long: -75.613695 Datum: NAD 83

Soil Map Unit Name: Glenelg silt loam, 3 to 8 percent slopes NWI classification: None

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:

Cowardin Code: PEM
HGM: Depressional
WT: Isolate

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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): 3" |
| 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:

Remarks:

## VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-K19

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. Lindera benzoin | 15 | ✔ | FAC |
| 2. Lonicera tatarica | 10 | ✔ | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 25 = Total Cover | | |
| 50% of total cover: 12.5 | 20% of total cover: 5 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Onoclea sensibilis | 20 | ✔ | FACW |
| 2. Juncus effusus | 10 | ✔ | FACW |
| 3. Microstegium vimineum | 10 | ✔ | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 40 = Total Cover | | |
| 50% of total cover: 20 | 20% of total cover: 8 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ✔ No ___

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

**SOIL** Sampling Point: W-K19

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-5" | 10YR 3/2 | 95 | 7.5YR 4/4 | 5 | C | M | GRSiL | |
| 5"+ | | | | | | | | Refusal - Coarse Fragments |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: Coarse Fragments

Depth (inches): 5"+

**Hydric Soil Present?** **Yes** ✔ **No** ___

Remarks:

## WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 04/21/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-K21

Investigator(s): J. McGuirk, D. Quinn Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): Toe-of-Slope Local relief (concave, convex, none): Concave Slope (%): 0-1

Subregion (LRR or MLRA): LRRS Lat: 40.022246 Long: -75.613179 Datum: NAD 83

Soil Map Unit Name: Glenelg silt loam, 3 to 8 percent slopes NWI classification: None

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 ____ |
| Wetland Hydrology Present? | Yes ✔ | No ____ |

**Is the Sampled Area within a Wetland?** **Yes** ✔ **No** ____

Remarks:

Cowardin Code: PEM
HGM: Depressional
WT: Isolate

### HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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:

Remarks:

**VEGETATION (Four Strata) – Use scientific names of plants.** Sampling Point: W-K21

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Poa sp. | 25 | ✔ | ND |
| 2. Onoclea sensibilis | 15 | ✔ | FACW |
| 3. Scirpus atrovirens | 15 | ✔ | OBL |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 55 = Total Cover | | |
| 50% of total cover: 27.5 | 20% of total cover: 11 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**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% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | | x 2 = | |
| FAC species | | x 3 = | |
| FACU species | | x 4 = | |
| UPL species | | x 5 = | |
| Column Totals: | (A) | | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ✔ No ___

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

ND- Not determined

*Vegetation not ID'd down to the species level not included in dominance test.

**SOIL** Sampling Point: W-K21

**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 |
|---|---|---|---|---|---|---|---|---|
| 0-5" | 10YR 4/2 | 93 | 7.5YR 4/4 | 7 | C | M | CL | |
| 5-12" | 7.5YR 6/6 | 70 | 7.5YR 4/3 | 30 | C | M | GRCL | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: PPP City/County: Chester Sampling Date: 04/21/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-K18,K19,K20, K21 UPL

Investigator(s): J. McGuirk, D. Quinn Section, Township, Range: West Whiteland

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope (%): 0-3

Subregion (LRR or MLRA): LRRS Lat: 40.022602 Long: -75.614013 Datum: NAD 83

Soil Map Unit Name: Glenelg silt loam, 3 to 8 percent slopes NWI classification: None

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:

Upland

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is 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 on 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 (Four Strata) – Use scientific names of plants.

Sampling Point: W-K18,K19,K20, K21 UPL

| Tree Stratum (Plot size: 30') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Tilia americana | 10 | ✔ | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 10 = Total Cover | | |
| 50% of total cover: 5 | 20% of total cover: 2 | | |

| Sapling/Shrub Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. Lonicera tatarica | 15 | ✔ | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 15 = Total Cover | | |
| 50% of total cover: 7.5 | 20% of total cover: 3 | | |

| Herb Stratum (Plot size: 5') | | | |
|---|---|---|---|
| 1. Poa sp. | 25 | ✔ | ND |
| 2. Dactylis glomerata | 20 | ✔ | FACU |
| 3. Solidago sp. | 15 | | ND |
| 4. Trifolium pratense | 15 | | FACU |
| 5. Securigera varia | 10 | | UPL |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 85 = Total Cover | | |
| 50% of total cover: 42.5 | 20% of total cover: 17 | | |

| Woody Vine Stratum (Plot size: 15') | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| 50% of total cover: 0 | 20% of total cover: 0 | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3* (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species | | x 1 = |
| FACW species | | x 2 = |
| FAC species | | x 3 = |
| FACU species | | x 4 = |
| UPL species | | x 5 = |
| Column Totals: | (A) | (B) |

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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.

**Definitions of Four Vegetation Strata:**

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

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** Yes ___ No ✔

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

ND- Not determined

**SOIL** Sampling Point: W-K18,K19,K20, K21 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 4/4 | 33 | 10YR 4/6 | 33 | C | M | GRSiL | |
| | | | 7.5YR 4/6 | 33 | C | M | GRSiL | |
| 8"+ | | | | | | | | Refusal - Coarse Fragments |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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: Coarse Fragments

Depth (inches): 8"+

**Hydric Soil Present?** Yes _____ No ✔

Remarks:

Fill disturbance on location.

# APPENDIX B

# WETLAND PHOTOGRAPHS

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 61 | **Feature Name:** | W-B71 | **Date:** | 03/10/2014 |
| **Direction:** | N | **Plant Community:** | PFO | **Remarks:** | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 62 | **Feature Name:** | W-B70 | **Date:** | 03/10/2014 |
| **Direction:** | E | **Plant Community:** | PEM | **Remarks:** | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 63 | **Feature Name:** | W-B69 | **Date:** | 03/10/2014 |
| **Direction:** | N | **Plant Community:** | PEM | **Remarks:** | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 64 | **Feature Name:** | W-B68 | **Date:** | 03/10/2014 |
| **Direction:** | S | **Plant Community:** | PEM | **Remarks:** | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 65 | **Feature Name:** | W-B67 | **Date:** | 03/10/2014 |
| **Direction:** | S | **Plant Community:** | PEM | **Remarks:** | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 66 | **Feature Name:** | W-K18 | **Date:** | 04/21/2014 |
| **Direction:** | S | **Plant Community:** | PEM | **Remarks:** | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 67 | **Feature Name:** | W-K19 | **Date:** | 04/21/2014 |
| **Direction:** | W | **Plant Community:** | PEM | **Remarks:** | N/A |

| | | | | | |
|---|---|---|---|---|---|
| **Photograph Number:** | 68 | **Feature Name:** | W-K21 | **Date:** | 04/21/2014 |
| **Direction:** | S | **Plant Community:** | PEM | **Remarks:** | N/A |

# APPENDIX C

# STREAM DATA SHEETS

**No Streams are within the Lisa Drive Major Modification LOD**

# APPENDIX D

# STREAM PHOTOGRAPHS

**No Streams are within the Lisa Drive Major Modification LOD**

# APPENDIX E

# HYDRIC SOILS LIST

# Hydric Soils List
# Chester County, Pennsylvania

| Map Unit Symbol | Map Unit Name | Component Name and Phase | Component Percent | Landforms |
|---|---|---|---|---|
| Ba | Baile silt loam | Baile | 85 | Depressions |
| BaB | Baile silt loam, 3 to 8 percent slopes | Baile | 85 | Depressions |
| BbB | Baile silt loam, 0 to 8 percent slopes, very stony | Baile, very stony | 100 | Depressions |
| Bo | Bowmansville-Knauers silt loams | Knauers | 40 | Flood plains |
| CaA | Califon loam, 0 to 3 percent slopes | Holly | 4 | Flood plains |
| CaA | Califon loam, 0 to 3 percent slopes | Baile | 3 | Depressions |
| CaA | Califon loam, 0 to 3 percent slopes | Fluvaquents | 3 | Flood plains |
| CaB | Califon loam, 3 to 8 percent slopes | Baile | 4 | Depressions |
| CaB | Califon loam, 3 to 8 percent slopes | Hatboro | 4 | Flood plains |
| CaC | Califon loam, 8 to 15 percent slopes | Holly | 3 | Valley floors |
| CaC | Califon loam, 8 to 15 percent slopes | Fluvaquents | 1 | Flood plains |
| CbB | Califon loam, 0 to 8 percent slopes, extremely stony | Holly | 3 | Flood plains |

| | | | | |
|---|---|---|---|---|
| CbB | Califon loam, 0 to 8 percent slopes, extremely stony | Fluvaquents | 1 | Flood plains |
| ClA | Clarksburg silt loam, 0 to 3 percent slopes | Thorndale | 5 | Depressions |
| ClB | Clarksburg silt loam, 3 to 8 percent slopes | Thorndale | 5 | Depressions |
| Co | Codorus silt loam | Hatboro | 8 | Flood plains |
| Co | Codorus silt loam | Baile | 3 | Depressions |
| CpA | Cokesbury silt loam, 0 to 3 percent slopes | Cokesbury | 85 | Depressions |
| CpA | Cokesbury silt loam, 0 to 3 percent slopes | Holly | 3 | Valley floors |
| CpB | Cokesbury silt loam, 3 to 8 percent slopes | Cokesbury | 90 | Depressions |
| CpB | Cokesbury silt loam, 3 to 8 percent slopes | Holly | 3 | Valley floors |
| CqB | Cokesbury silt loam, 0 to 8 percent slopes, very stony | Cokesbury, very stony | 90 | Depressions |
| CqB | Cokesbury silt loam, 0 to 8 percent slopes, very stony | Holly | 3 | Valley floors |
| Cs | Comus silt loam | Holly | 8 | Flood plains |
| CyA | Croton silt loam, 0 to 3 percent slopes | Croton | 90 | Depressions |
| CyB | Croton silt loam, 3 to 8 percent slopes | Croton | 90 | Depressions |
| DfA | Duffield silt loam, 0 to 3 percent slopes | Thorndale | 2 | Depressions |
| DfB | Duffield silt loam, 3 to 8 percent slopes | Thorndale | 2 | Depressions |
| EdB | Edgemont channery loam, 3 to 8 percent slopes | Andover | 3 | Drainageways |

| | | | | |
|---|---|---|---|---|
| EdC | Edgemont channery loam, 8 to 15 percent slopes | Andover | 3 | Drainageways |
| EdD | Edgemont channery loam, 15 to 25 percent slopes | Andover | 3 | Drainageways |
| ExB | Edgemont channery sandy loam, 0 to 8 percent slopes, extremely stony | Andover, extremely stony | 2 | Drainageways |
| ExD | Edgemont channery sandy loam, 8 to 25 percent slopes, extremely stony | Andover, extremely stony | 3 | Drainageways |
| ExF | Edgemont channery sandy loam, 25 to 60 percent slopes, extremely stony | Andover, extremely stony | 3 | Drainageways |
| Gb | Gibraltar silt loam | Holly | 5 | Flood plains |
| GdA | Gladstone gravelly loam, 0 to 3 percent slopes | Cokesbury | 1 | Depressions |
| GdB | Gladstone gravelly loam, 3 to 8 percent slopes | Cokesbury | 3 | Depressions |
| GdC | Gladstone gravelly loam, 8 to 15 percent slopes | Cokesbury | 5 | Depressions |
| GdD | Gladstone gravelly loam, 15 to 25 percent slopes | Cokesbury | 5 | Depressions |
| GdE | Gladstone gravelly loam, 25 to 35 percent slopes | Cokesbury | 3 | Depressions |
| GfB | Gladstone gravelly loam, 0 to 8 percent slopes, very bouldery | Cokesbury | 5 | Depressions |
| GfD | Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery | Cokesbury | 5 | Depressions |
| GfF | Gladstone gravelly loam, 25 to 50 percent slopes, very bouldery | Cokesbury | 5 | Depressions |
| GlA | Glenville silt loam, 0 to 3 percent slopes | Baile | 5 | Depressions |
| GlB | Glenville silt loam, 3 to 8 percent slopes | Baile | 5 | Depressions |
| Ha | Hatboro silt loam | Hatboro | 95 | Flood plains |

| | | | | |
|---|---|---|---|---|
| Ho | Holly silt loam | Holly | 94 | Flood plains |
| Ho | Holly silt loam | Brinkerton | 2 | Depressions |
| JoB | Joanna loam, 3 to 8 percent slopes | Croton | 5 | Depressions |
| JoC | Joanna loam, 8 to 15 percent slopes | Croton | 5 | Depressions |
| JoD | Joanna loam, 15 to 25 percent slopes | Croton | 5 | Depressions |
| JpB | Joanna loam, 0 to 8 percent slopes, extremely stony | Croton | 4 | Depressions |
| JpD | Joanna loam, 8 to 25 percent slopes, extremely stony | Croton | 2 | Depressions |
| JpF | Joanna loam, 25 to 50 percent slopes, extremely stony | Croton | 2 | Depressions |
| LbA | Lamington silt loam, 0 to 3 percent slopes | Lamington | 85 | Terraces |
| LcB | Lawrenceville silt loam, 3 to 8 percent slopes | Doylestown | 3 | Drainageways |
| LhB | Lehigh channery silt loam, 3 to 8 percent slopes | Croton | 3 | Depressions |
| LhB | Lehigh channery silt loam, 3 to 8 percent slopes | Doylestown, extremely stony | 1 | Drainageways |
| LhC | Lehigh channery silt loam, 8 to 15 percent slopes | Croton | 2 | Depressions |
| LhC | Lehigh channery silt loam, 8 to 15 percent slopes | Doylestown | 1 | Drainageways |
| LkB | Lehigh channery silt loam, 0 to 8 percent slopes, extremely stony | Croton, extremely stony | 1 | Depressions |
| Ln | Lindside silt loam | Holly | 12 | Flood plains |
| MaB | Manor loam, 3 to 8 percent slopes | Hatboro | 2 | Flood plains |

| | | | | |
|---|---|---|---|---|
| MaC | Manor loam, 8 to 15 percent slopes | Hatboro | 2 | Flood plains |
| McA | Mattapex silt loam, 0 to 3 percent slopes | Othello | 1 | Terraces |
| McA | Mattapex silt loam, 0 to 3 percent slopes | Hatboro | 1 | Flood plains |
| MlA | Mount Lucas silt loam, 0 to 3 percent slopes | Towhee | 7 | Depressions |
| MlB | Mount Lucas silt loam, 3 to 8 percent slopes | Towhee | 6 | Depressions |
| MlC | Mount Lucas silt loam, 8 to 15 percent slopes | Towhee | 5 | Depressions |
| MnB | Mount Lucas silt loam, 0 to 8 percent slopes, extremely stony | Towhee, extremely stony | 9 | Depressions |
| MuB | Murrill gravelly loam, 3 to 8 percent slopes | Thorndale | 2 | Depressions |
| NeB | Neshaminy silt loam, 3 to 8 percent slopes | Towhee | 3 | Depressions |
| NeC | Neshaminy silt loam, 8 to 15 percent slopes | Towhee | 5 | Depressions |
| NeD | Neshaminy silt loam, 15 to 25 percent slopes | Towhee | 5 | Depressions |
| NfB | Neshaminy gravelly silt loam, 0 to 8 percent slopes, extremely bouldery | Towhee, extremely stony | 5 | Depressions |
| NfD | Neshaminy gravelly silt loam, 8 to 25 percent slopes, extremely bouldery | Towhee, extremely stony | 3 | Depressions |
| NfF | Neshaminy gravelly silt loam, 25 to 60 percent slopes, extremely bouldery | Towhee, extremely stony | 3 | Depressions |
| PfC | Penn channery silt loam, 8 to 15 percent slopes | Croton | 3 | Depressions |
| RaB | Raritan silt loam, 3 to 8 percent slopes | Knauers | 2 | Flood plains |
| ReA | Readington silt loam, 0 to 3 percent slopes | Croton | 3 | Depressions |

| | | | | |
|---|---|---|---|---|
| ReB | Readington silt loam, 3 to 8 percent slopes | Croton | 6 | Depressions |
| Ro | Rowland silt loam | Knauers | 8 | Flood plains |
| Th | Thorndale silt loam | Thorndale | 100 | Depressions |
| ToA | Towhee silt loam, 0 to 3 percent slopes | Towhee | 96 | Depressions |
| ToB | Towhee silt loam, 3 to 8 percent slopes | Towhee | 88 | Depressions |
| ToB | Towhee silt loam, 3 to 8 percent slopes | Watchung, silt loam | 2 | Depressions |
| TxB | Towhee silt loam, 0 to 8 percent slopes, very stony | Towhee, very stony | 90 | Depressions |
| Udp | Udorthents, sanitary landfill | Croton | 2 | Depressions |
| UdsB | Udorthents, schist and gneiss, 0 to 8 percent slopes | Hatboro | 1 | Flood plains |
| UdsD | Udorthents, schist and gneiss, 8 to 25 percent slopes | Hatboro | 1 | Flood plains |
| UdtB | Udorthents, shale and sandstone, 0 to 8 percent slopes | Croton | 1 | Depressions |
| UrbB | Urban land-Baile complex, 0 to 8 percent slopes | Baile | 30 | Depressions |
| UrfB | Urban land-Cokesbury complex, 0 to 8 percent slopes | Cokesbury | 30 | Depressions |
| UrfD | Urban land-Cokesbury complex, 8 to 25 percent slopes | Cokesbury | 30 | Depressions |
| UrhB | Urban land-Duffield complex, 0 to 8 percent slopes | Thorndale | 2 | Depressions |
| UrkB | Urban land-Edgemont complex, 0 to 8 percent slopes | Andover | 2 | Drainageways |
| UrkD | Urban land-Edgemont complex, 8 to 25 percent slopes | Andover | 2 | Drainageways |

| | | | | |
|---|---|---|---|---|
| UrlB | Urban land-Gladstone complex, 0 to 8 percent slopes | Cokesbury | 5 | Depressions |
| UrlD | Urban land-Gladstone complex, 8 to 25 percent slopes | Cokesbury | 5 | Depressions |
| Uro | Urban land-Hatboro complex | Hatboro | 30 | Flood plains |
| Urp | Urban land-Holly complex | Holly | 30 | Flood plains |
| UruB | Urban land-Neshaminy complex, 0 to 8 percent slopes | Towhee | 5 | Depressions |
| UrxB | Urban land-Penn complex, 0 to 8 percent slopes | Croton | 4 | Depressions |
| UrxD | Urban land-Penn complex, 8 to 25 percent slopes | Croton | 4 | Depressions |
| UryB | Urban land-Towhee complex, 0 to 8 percent slopes | Towhee | 30 | Depressions |
| UugB | Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes | Baile | 1 | Depressions |
| UugD | Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes | Baile | 1 | Depressions |
| WaA | Watchung silt loam, 0 to 3 percent slopes | Watchung, silt loam | 86 | Depressions |
| WaA | Watchung silt loam, 0 to 3 percent slopes | Towhee | 9 | Depressions |
| WaB | Watchung silt loam, 3 to 8 percent slopes | Watchung, silt loam | 80 | Depressions |
| WaB | Watchung silt loam, 3 to 8 percent slopes | Towhee | 7 | Depressions |
| WaB | Watchung silt loam, 3 to 8 percent slopes | Croton | 3 | Depressions |
| Modified from Hydric Soils of the United States (NRCS 2014) | | | | |

# APPENDIX F

# RESUMES

# Preston R Smith

**DEPARTMENT MANAGER/BIOLOGIST/ECOLOGIST**

**PITTSBURGH, PA**

**EDUCATION:** B.S. Biology (Environmental Science); University of Pittsburgh; Dec. 2000
M.S. Biological Sciences; Wright State University; March 2010

**EXPERIENCE SUMMARY:**

Mr. Preston Smith is a Biologist with 13+ total years of professional experience. Mr. Smith currently manages the Wetlands and Ecological Services Department for the Appalachian Basin Oil and Gas Services Group. His current responsibilities include project management, staff management, workload delegation including scheduling personnel for field work and report writing, QA/QC of work products and deliverables, and proposal/budget preparation. Mr. Smith has been involved in wetland delineations, habitat studies, plant surveys, permitting, and related report generation for commercial Oil and Gas clients in Pennsylvania, Ohio, and West Virginia for natural gas pipelines, water lines, well pads, impoundments, and water withdrawal locations. Since starting at Tetra Tech, Mr. Smith has also been involved in NEPA Categorical Exclusion, Environmental Assessment, and Environmental Impact Statement projects in several capacities serving as Project Manager, Deputy Project Manager, Water Resources Specialist, and Ecologist for various clients including the US Coast Guard, Department of Energy, Federal Energy Regulatory Commission, Nuclear Regulatory Commission, and Tennessee Department of Transportation.

**TRAINING:** OSHA 1910.120 40-Hour HAZWOPER Training; June 22, 2007
OSHA 1910.120(e)(4) 8-Hour HAZWOPER Supervisory; October 17, 2008
OSHA 1910.120 8-Hour HAZWOPER Refresher; November 1, 2013
ACOE-based 40-hour Wetland Delineation Certification; June 26, 2009

**RELEVANT PROJECT EXPERIENCE:**

**Manager, Wetlands and Ecological Services Department; Various Midstream and Exploration and Production Oil and Gas Clients, Ohio, Pennsylvania, and West Virginia, 2011-present.** As the Wetlands and Ecological Services Department Manager, Mr. Smith has managed Wetland Delineation and Stream Identification field activities and report generation for 250+ miles of pipeline, 40+ well pads, 20+ water withdrawal locations**;**

**Natural Resources Lead; Confidential Client; Ohio, West Virginia, and Pennsylvania, 2013-present.** As the Natural Resources Lead, Mr. Smith is responsible for scheduling and managing Wetland and Stream surveys and Rare, Threatened, and Endangered Species Surveys for an approximately 350-mile Non-FERC, Natural Gas Liquid Pipeline. He is also responsible for Agency coordination.

**Task Manager/Biologist; Confidential Client, Washington, Allegheny, and Westmoreland County, PA, 2013.** As a Task Manager/Biologist, Mr. Smith scheduled field crews and participated in Rare, Threatened and Endangered Plant surveys for large natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

**Task Manager/Biologist; Confidential Client, Beaver and Butler County, PA, 2013-present.** As a Task Manager/Biologist, Mr. Smith scheduled field crews and participated in Rare, Threatened and Endangered Plant surveys for a large natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

**Natural Resource Permit Manager; Confidential Client; West Virginia; 2013-present.** As the Natural Resource Permitting Manager, Mr. Smith prepared Preconstruction Notifications for U.S. Army Corps of Engineers Nationwide Permit 12 for several natural gas and water pipeline projects. He also prepared a Stream Activity Application Reports for submittal to the WV Department of Natural Resources (WV DNR) Office of Lands and Streams as part of these projects. Mr. Smith coordinated with US Fish and Wildlife Service and WV DNR Natural Heritage Program to evaluate the potential for threatened and endangered species within the project areas.

**Natural Resource Permit Manager; Multiple Clients; Ohio; 2012-present.** As the Natural Resource Permitting Manager, Mr. Smith prepared Preconstruction Notifications for U.S. Army Corps of Engineers Nationwide Permit 12 for several natural gas pipeline projects. Mr. Smith coordinated with US Fish and Wildlife Service and the Ohio Department of Natural Resources Division of Wildlife to evaluate the potential for threatened and endangered species within the project areas.

**Project Manager; Stream Restoration Plan; Confidential Client; Eastern Ohio; 2013.** As a Project Manager, Mr. Smith managed and contributed to Stream Restoration and Mitigation Plan for an Ohio EPA Director's Authorization to open cut a Class III Cold-water habitat stream. The Stream Restoration and Mitigation Plan was approved by Ohio EPA and led to the successful approval of the Director's Authorization.

**Task Manager; Confidential Client; Fayette County, PA, September 2012.** As a Task Manager/Biologist, Mr. Smith scheduled field crews for a Rare, Threatened and Endangered Plant survey for a natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

**Task Manager; Confidential Client; Armstrong County, PA, July 2012.** As a Task Manager/Biologist, Mr. Smith scheduled field crews for a Rare, Threatened and Endangered Plant survey for a natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

**Project Biologist; Confidential Client; Fayette County, PA; 2010.** As a Project Biologist, Mr. Smith completed a field survey for presence/absence and potential habitat survey for the Allegheny woodrat, *Neotoma magister*, and submitted the report to the PA Game Commission for expedited review for Marcellus Shale-related activities. The survey was approved by the PA Game Commission.

**Biologist/Wetland Delineator/; Confidential Clients; Western PA/Northern West Virginia/Eastern Ohio; 2009-present.** As a Biologist/Wetland Delineator, Mr. Smith has conducted and assisted with wetland investigations based on the 1987 US Army Corps of Engineers Wetland Delineation Manual and Regional Supplements. The investigations involved

identifying wetland vegetation, soils, and hydrology along linear pipelines, water withdrawal sites, and well pad sites and preparing Wetland Reports for Marcellus/Utica Shale-related activities.

**Biologist; Confidential Client; Eastern OH; 2012.** As a Biologist, Mr. Smith assisted with a habitat survey for Indiana Bat roost tree suitability. The investigations involved identifying suitable habitat for the Indiana bat (*Myotis sodalis*) and preparing a report for submittal with a Nationwide Permit 12 to the Army Corps of Engineers.

**Natural Resource Permit Manager; Confidential Client; West Virginia; 2011.** As the Project Permitting Manager, Mr. Smith coordinated with USFWS and WV Department of Natural Resources (WV DNR) to secure the permitting for Nationwide Permit 12 for a natural gas pipeline project. Mr. Smith also prepared a Stream Activity Application Report for submittal to the WV DNR as part of this project.

**Project Manager; Environmental Assessment for the New Station Lake Charles; U.S. Coast Guard; Lake Charles, LA. 2010-2011.** As a project manager, Mr. Smith managed all aspects of the EA and Finding of No Significant Impact for construction and operation of a new USCG facility in Lake Charles, LA from kickoff to completion. His duties included client management, budget monitoring, workload delegation, agency coordination, contributing to various sections of the document, site visit to characterize habitat, and publishing and submittal of all documents.

**Deputy Project Manager; Environmental Impact Statement for a Coal Gasification Plant; U.S. Department of Energy; Beaumont, TX. 2009-2010.** As a Deputy Project Manager, Mr. Smith assisted the Project Manager with client relations, attended the Public Scoping Meeting, coordinated and attended meetings with federal and local agencies, drafted and attended project meetings, and authored several ecological sections of a pre-Draft Environmental Impact Statement for the DoE for the TX Energy Industrial Gasification Plant. Mr. Smith also coordinated and participated in Biological surveys including fish and benthic sampling on the Neches River and a site habitat characterization in for the project, which is currently on hold.

**NEPA Project Manager; Categorical Exclusion for the Memphis Medical Center Streetscape; City of Memphis; Memphis, TN. 2011-present.** As a NEPA project manager, Mr. Smith is managing all aspects of the CE for street improvements along a 2.81-mile segment of Elvis Presley Boulevard. His duties include client management, budget monitoring, workload delegation, agency coordination, contributing to the document, and publishing and submittal of all documents.

**NEPA Analyst/Environmental Scientist; FERC-regulated Environmental Assessment for an Interstate Natural Gas Pipeline; West Virginia and Pennsylvania; 2010-present.** As a NEPA analyst, Mr. Smith drafted the Aquatic Resource section of a FERC-regulated EA for a commercial Oil and Gas client for Marcellus Shale-related activities.

**NEPA Analyst/Ecologist; NEPA Environmental Report in support of a DOE Federal Loan Guarantee Program for Clean Coal Technology for a Coal Gasification Plant; Beaumont, TX; Eastman Chemical; 2008-2009.** As a NEPA Specialist, Mr. Smith authored several ecological sections of an Environmental Report in support of an Environmental Impact Statement for the DoE for the TX Energy Industrial Gasification Plant.

**Biologist/Field Operations Leader; TX Energy Environmental Report; Eastman Chemical; Beaumont, TX; 2008.** As the Field Operations Leader, Mr. Smith coordinated and participated in Biological surveys including fish and benthic sampling on the Neches River and a site habitat characterization in Beaumont, TX.

**Deputy Project Manager/NEPA Analyst/Ecologist; Environmental Assessment for a Dredge Boat Basin at the U.S. Coast Guard Station, Marblehead, OH; 2007.** As a Deputy Project Manager/NEPA Analyst/Ecologist, Mr. Smith contributed to the planning and development of an environmental assessment and Finding of No Significant Impact/Record of Decision for a proposed blasting/dredging operation for the U.S. Coast Guard. He authored the geology, topography, soils, seismic zone considerations and coastal zone considerations; water resources and drainage; hazardous materials and hazardous waste; aquatic environment; threatened and endangered species; and the wild and scenic rivers sections of the environmental assessment in addition to assisting with overall document research and development.

**Aquatic Ecologist; South Texas Project Combined Construction and Operating License Application Environmental Report; Bechtel; Texas; 2007.** As an Aquatic Ecologist, Mr. Smith prepared the aquatic ecology sections for site alternatives to building and operating two Advanced Boiling Water Reactors (ABWR) units on the South Texas Project (STP) site. He evaluated the aquatic environmental impacts associated with developing new nuclear capacity at each of three alternative sites. Part of the evaluation included the impacts of water usage and disposal for electricity generation. Additionally, the impacts to threatened and endangered species were considered.

**Aquatic Ecologist; Beaver Valley Nuclear Power Station License Renewal Environmental Review Program; FirstEnergy Nuclear Operating Company; Pennsylvania; 2007.** As an Aquatic Ecologist, Mr. Smith prepared part of the aquatic impacts section of an environmental report for the Davis-Besse Nuclear Power Station license renewal. The focus of the section was assessing the impacts of impingement/entrainment on fish species and comparing the data to permissible rates.

**Benthic Ecologist; U.S. Navy, NSF Dahlgren, VA; 2008-present.** As a benthic ecologist, Mr. Smith prepared response to comments, attended meetings, and prepared a work plan for field studies, and a benthic report in support of benthic monitoring program at NSF Dahlgren.

**Ecologist; Endangered Species Review; Munitions Response Program; MCB Quantico; 2007-2008.** As an Ecologist, Mr. Smith prepared the endangered species section of the Munitions Response Program at the Marine Corps Base Quantico. He gathered information on species occurring at the base and determined the Federal and State status of those species and identified locations where those species are likely to occur.

**Project Manager; Wetland Delineation for the New Station Lake Charles; U.S. Coast Guard; Lake Charles, LA. 2011-2012.** As a project manager, Mr. Smith is currently managing all aspects of the Wetland Delineation for a proposed site of a new USCG facility in Lake Charles, LA. His duties

included client management, budget monitoring, workload delegation, and review of the jurisdictional determination.

**CHRONOLOGICAL WORK HISTORY:**

**Wetlands and Ecological Services Department Manager, Tetra Tech NUS, Inc.; Pittsburgh, PA; November 2011-present.**

**Biologist/Ecological Risk Assessor; Tetra Tech NUS, Inc.; Pittsburgh, PA; January 2007-November 2011.**

**Research Assistant/Lab Manager; Wright State University; Dayton, OH; September 2003-December 2006.**
Managed an aquatic toxicology laboratory. Responsibilities included maintaining laboratory cultures and supplies, managing grant related research projects (see descriptions above), supervising undergraduate students, writing technical reports, conducting literature reviews, and maintaining laboratory and field equipment.

**Research Assistant; Indiana University of Pennsylvania; Indiana, PA; September 2002-August 2003.**
Provided support in maintaining laboratory insect cultures and supplies. Conducted small mammal surveys; endangered reptile surveys (Eastern Massasauga Rattlesnake); collected and identified amphibians and reptiles in Western Pennsylvania for the Pennsylvania Herpetological Atlas; identified benthic macroinvertebrates for Abandoned Mine Drainage projects.

TETRA TECH

# Jason McGuirk
## Wetland/Environmental Scientist IV

## EXPERIENCE SUMMARY

Mr. Jason McGuirk has six years of professional experience in wetland delineation, permitting, fisheries and wildlife, and stream assessments and classification in Pennsylvania, New York, Ohio, and Alaska. Mr. McGuirk has conducted hundreds of wetland delineations, stream evaluations as well as conducted and produced habitat assessments, and post monitoring impact statements and assessments on over 800 miles of proposed natural gas pipeline, and fifty plus proposed well pad sites. He has extensive knowledge in watercourse classification and assessment including the Rosgen method. In particular attention of his has been focused on fisheries habitat and macro-invertebrate work, with over fifty miles of stream classifications in Alaska. Mr. McGuirk's educational background is in Fisheries and Aquaculture with a minor focus in Marine Biology and Wildlife management.

## RELEVANT EXPERIENCE

**Environmental Scientist III; Sunoco Logistics; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects, Engendered Species Surveys; Reptilia (*Glyptemys muhlenbergii*), Plantae (*Ellisia nyctelea*);** Pennsylvania. Segments 1, 2, and 3 wetlands field lead, and crew leader. Responsibilities include organizing and conducting all field work operations for multiple wetlands crews, wetland delineations and stream assessments for the proposed 450 mile Pennsylvania Pipeline Project. Additional work included proposing potential re-route on an environmental basis.

**Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

**Environmental Scientist III; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

### EDUCATION

B.T. Fisheries and Aquaculture, SUNY Cobleskill, 2011T

### REGISTRATIONS

Wild Plant Management Permit, PA, 2014, Permit # 14-651

### AREA OF EXPERTISE

Wetland Delineation and Stream Identification, Fisheries, and Botanical Surveys

### TRAINING/CERTIFICATIONS

Winter Vegetation ID, Rutgers University, 2012

Amtrak Contractor Certification, 2014

Certified Wetland Assessment Delineator, NY, 2009

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

6+

### YEARS WITH TETRA TECH

2+

**Environmental Scientist III; Gulfport Energy Corporation; Wetland Delineations for Miscellaneous Natural Gas Well Pad Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural well pads southeastern Ohio. Specific tasks included field survey, report preparation, PCN preparation, and completion of Ohio EPA specific wetland and stream assessments.

**Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineation and Engendered Species Survey (*Ranunculus flabellaris and Alopecurus aequalis*) for Vanport to Butler Gas Pipeline; Butler County, Pennsylvania.** Responsible for performing and assisting with wetland delineation and endangered species survey along pipeline right-of-way. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Antero Resources Appalachian Corp.; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ritchie and Doddridge Counties, West Virginia.** Responsible for performing and assisting with wetland delineations for various proposed natural gas well pads and access roads in northern West Virginia. Specific tasks included field survey and report preparation.

**Wetland & Watercourse Biologist; Chesapeake Energy; Schoharie County, PA; November 2011 to October 2012.** Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 30 miles of pipeline in Northeastern Pennsylvania.

**Wetland & Watercourse Biologist; Southwest Energy L.P; Schoharie County, PA; November 2011 to October 2012.** Responsible for conducting wetland delineations on proposed Well pad and compressor sites. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 15 proposed well pad locations in Northeastern Pennsylvania.

**Wetland & Watercourse Biologist; Southwest Energy L.P; Susquehanna County, PA; November 2011 to October 2012.** Responsible for conducting wetland delineations on proposed Well pad and compressor sites. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 20 proposed well pad locations in Northeastern Pennsylvania.

**Wetland & Watercourse Biologist; Chesapeake Energy; Carroll, Jefferson County, OH; November 2011 to October 2012.** Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed ORAM and QHEI Assessments, and preparation of wetland report for 30 miles of pipeline in Eastern Ohio.

**Wetland & Watercourse Biologist; Shell Oil; Butler County, PA; November 2011 to October 2012.** Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 40 miles of pipeline in Western Pennsylvania.

**Wetland & Watercourse Biologist; Chesapeake Energy; Schoharie County, PA; November 2011 to October 2012.** Responsible for conducting Indiana Bat habitat surveys on multiple proposed natural gas pipelines in Northeastern Pennsylvania.

**Wetland & Watercourse Biologist; Chesapeake Energy; Schoharie County, PA; November 2011 to October 2012.** Responsible for conducting post construction habitat monitoring and assessment of constructed natural gas pipelines in Northeastern Pennsylvania.

## CHRONOLOGICAL HISTORY

Wetland Environmental Scientist IV; Tetra Tech, Inc.; Pittsburgh, PA, June 2014 - Present

Wetland Environmental Scientist III; Tetra Tech, Inc.; Pittsburgh, PA, February 2013 - June 2014

Wetland & Watercourse Biologist; Hanover Engineering & Associates; Towanda, PA, November 2011 - October 2012

Assistant Hatchery Manager; SUNY Cobleskill; Cobleskill, NY, September – May of 2009- 2011

Biological Fisheries Technician, US Forest Service; Thorne Bay, AK, May 2010 - August 2010

Fisheries Technician, Cook Inlet Aquaculture Association, Kenai, AK, May 2009 – August 2009

## SCIENTIFIC/TECHNICAL PUBLICATIONS

- McGuirk, J, M, "Walleye (*Sander vitreus)* spawning movements and habitat utilization in Otsego Lake, NY, 2011

## MEMBERSHIPS

- N/A

## AWARDS

- David E. Moorehouse Award for Outstanding Junior in Fisheries and Aquaculture B.T.

**ANDREW J. GRECH**
**WETLAND ENVIRONMENTAL SCIENTIST III**
**PITTSBURGH, PA**

**EDUCATION:** **B.T. Wildlife Management, SUNY Cobleskill, 2011**

**CERTIFICATIONS/ REGISTRATIONS:** **Certified Wetland Assessment Delineator, NY, 2009**

**TRAINING:** **Sedges, Grasses, and Rushes ID, Rutgers University, 2012**
**Wetland Hydrology, Rutgers University, 2012**

**EXPERIENCE SUMMARY:**

Mr. Andrew Grech has five years of professional experience in wetland delineation, permitting, fisheries and wildlife, and stream assessments and classification in Pennsylvania, New York, and Ohio. Mr. Grech has conducted hundreds of wetland delineations, stream evaluations as well as conducted and produced habitat assessments, and post monitoring impact statements and assessments on over one hundred and fifty miles of proposed natural gas pipeline, and twenty proposed well pad sites. He has extensive knowledge in watercourse classification and assessment including the Rosgen method. Mr. Grech's educational background is in Wildlife Management with a minor focus in Fisheries & Aquaculture.

**PROJECT EXPERIENCE:**

**Wetland & Watercourse Biologist; Chesapeake Energy; Bradford, Wyoming, & Susquehanna Counties, PA; March 2012 to March 2013.** Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 40 miles of pipeline in Northeastern Pennsylvania.

**Wetland & Watercourse Biologist; Chesapeake Energy; Carroll, Jefferson County, OH; June-November 2012.** Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed ORAM and QHEI Assessments, and preparation of wetland report for 50 miles of pipeline in Eastern Ohio.

**Wetland & Watercourse Biologist; Shell Oil; Mckean & Bradford Counties, PA; March 2012 to March 2013.** Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 40 miles of pipeline in Northeast/central Pennsylvania.

**Wetland & Watercourse Biologist; Chesapeake Energy; Bradford, Wyoming, & Susquehanna Counties, PA; November 2012 to March 2013.** Responsible for conducting post construction habitat monitoring and assessment of constructed natural gas pipelines in Northeastern Pennsylvania.

**Wetland & Watercourse Biologist; Southwest Energy; Wayne, Monroe, & Pike Counties, PA; November 2012 to March 2013.** Responsible for conducting wetland delineations for proposed well pads. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 15 proposed well pads in Northeastern Pennsylvania.

**Wetland & Watercourse Biologist; Markwest Energy; Allegheny, Butler, & Washington Counties, PA; August 2013 to October 2013.** Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 20 miles of pipeline in Southwest Pennsylvania.

**Wetland & Watercourse Biologist; REX Energy; Butler County, PA; September 2013.** Responsible for conducting wetland delineations for proposed water withdrawal sites along Connoquenessing Creek and Glade Run. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland reports for 2 water withdrawal sites in Southwest Pennsylvania.

**Environmental Mgmt. Systems:**

- Angler Surveys and Census for the Ice Fishery of Otsego Lake, NYDEC September - December 2007
- Pond surveys (water quality, fish identification, mapping) for Schoharie County residents January – May 2008
- Sonic and radio tracking, research crew member on 24 hour tracking samples. Otsego Lake N.Y. Through SUNY Cobleskill from September – December 2008
- Reptile and Amphibian trapping survey. SUNY Cobleskill from March – May 2009
- Wetland delineation, Field work in various wetlands thoughout the Cobleskill N.Y. area from September- December 2009
- Electrofishing Survey, Member of boat electro fishing crew; scapper, fish ID, Gill net retrieval, and fish measuring for night as well as day sampling of Otsego Lake N.Y. Through Biological Field Station from January – May 2010
- Waterfowl habitat survey, Activity budget survey, Nest Predation survey, various research projects around Cobleskill N.Y. September - December 2010.

**Sampling:**

**Fisheries Technician; SUNY Cobleskill; Cobleskill, NY; September 2008**. Responsible for preforming a fisheries survey and rescue for the N.Y. State power authority, on Gilboa reservoir. Sampled and collected fishes to be transported to mitigation location.

**Fisheries Technician; SUNY Cobleskill; Cobleskill, NY; on and off from September 2007-December 2010.** Responsible for collecting state fisheries data on several N.Y. state watersheds. Field sampling including haul seines, electro-shocking, gill nets, fyke nets, Responsible for the use of MS-222 for anesthetizing fishes during the study.

**Wildlife Technician; SUNY Cobleskill; Cobleskill, NY; June 2010.** Conducted local herpetology surveys on both salamander and frog habitats locally in and around Cobleskill area. Used amphibian traps to capture live specimens and recorded population densities and species diversity indexes for each location. Specifically focusing on human impacts, and habitat alterations and the population and diversity impacts associated with the disturbance.

**Other:**

**New York State DEC;** Trap-netted birds of prey, Richmondville, NY
**SUNY Cobleskill;** Electro-fishing/sonic tagging Walleye, Otsego Lake, NY
**Otsego Lake Biological Field Station;** Trap-netting/hydro-acoustic survey of Alewife, Otsego Lake, NY
**SUNY Cobleskill;** Electro-fished lake at night for a "mark and re-capture study," Otsego Lake, NY
**New York State DEC;** Bat count surveys, Howe Caverns, Cobleskill, NY
**Peabody Wildlife Management Area;** Trapping/radio-telemetry of Bob-white Quail, Drakesboro, KY
**Colorado Parks and Wildlife Commission;** Trapped and collared Columbian Sharp-tailed Grouse, W. CO
**Colorado Parks and Wildlife Commission;** Performed radio-telemetry and observation counts of Bighorn Sheep, W. CO

**CHRONOLOGICAL WORK HISTORY:**

Wetland Environmental Scientist III; Tetra Tech, Inc.; Pittsburgh, PA, August 2013- Present

Environmental technician/Range Manager, XH Angus Ranch; Saratoga, WY March 2013- August 2013

Wetland & Watercourse Biologist; Hanover Engineering & Associates; Towanda, PA, March 2012 - March 2013

Environmental Technician, Mount Agamenticus, York, ME, May 2011-March 2012

Seasonal Park Ranger, US Army Corps of Engineers, Thomaston, CT, May- September 2009 & 2010

**PROFESSIONAL AFFILIATIONS:**

American Wildlife Society

TETRA TECH

# Korey M. McCluskey
## Environmental Scientist IV – Technical Lead

## EXPERIENCE SUMMARY

Mr. Korey McCluskey a wetland/environmental scientist - technical lead with 8+ years of experience in wetland delineation, stream evaluation, rare, threatened & endangered (SOSC) botanical surveying and assessment, and construction monitoring throughout Pennsylvania, Ohio, West Virginia, New Jersey and New York. Korey has performed hundreds of wetland delineations and stream evaluations as well as conducted numerous botanical surveys, habitat assessments, and related report generation. Korey is on the USFWS short list of qualified surveyors for the federally listed Running Buffalo Clover. He has provided environmental consultation to clients in the commercial Oil and Gas, residential development, and public utility sectors to ensure compliance with local, state, and federal environmental regulations and ordinances through the environmental permitting process, including minimization of impacts to aquatic and terrestrial resources. This permitting, documentation, and guidance includes the preparation of wetland delineation and stream evaluation reports, botanical reports, wetland creation, wetland monitoring, 404 and related state and local permits, assisting with environmental assessments, and preparation of other environmental reports. He also has experience performing bat hibernaculum and summer roost tree habitat surveys in Western Pennsylvania.

## RELEVANT EXPERIENCE

### FIELD (OIL/GAS)

**Wetland/Environmental Scientist IV - Department Technical Lead; Sunoco Logistics; OPP and PPP Natural Gas Pipeline Projects, Multiple Counties across Ohio, West Virginia, and Pennsylvania; October 2013 to present.** Responsibilities included aiding in wetland delineations and stream assessments for the proposed 450 miles of the Ohio Pipeline (OPP) and Pennsylvania Pipeline Projects (PPP).

**Wetland/Environmental Scientist IV - Department Technical Lead; Sunoco Logistics; OPP and PPP Natural Gas Pipeline Projects, Rare, Threatened, and Engendered Species Surveys; 43 listed Species of Special Concern (SOSC); March 2014 to present.** Pennsylvania. Segments 1, 2, and 3 Botanical Survey Lead, and crew leader. Responsibilities included organizing and conducting all field work operations for multiple botanical crews, conducted botanical surveys for the 350 miles of proposed pipeline installation for the Ohio Pipeline (OPP) and Pennsylvania Pipeline Projects (PPP). Additional work included proposing potential re-routes and avoidance recommendations on a potential environmental impact basis.

### EDUCATION

B.A., Environmental Sciences, University of Pittsburgh, April. 2006

Geographical Information Systems (GIS) Certificate, University of Pittsburgh, April. 2006

### REGISTRATIONS

Wild Plant Management Permit, PA, 2014, Permit # 15-624

USFWS Certified Qualified Surveyor for the Federally Listed Running Buffalo Clover

### AREA OF EXPERTISE

Wetland Delineation and Stream Identification & RTE Botanical Surveys

### TRAINING/CERTIFICATIONS

USFWS and WV DNR Sponsored Training for the Identification of the Federally Listed Running Buffalo Clover, Virginia Spirea, and Small Whorled Pogonia, May 2015.

2015 PA Plant Forum and Winter Woody ID workshop. Sponsored by the PA DCNR and Western Pennsylvania Conservancy, April 2015.

Creation and Restoration of Wetlands - The Olentangy River Wetland Research Park, The Ohio State University, July 2011.

Identification of Freshwater Wetland Sedges, Grasses, and Rushes - Pennsylvania Institute for Conservation Education, August 2010.

Ohio Rapid Assessment Method (ORAM) for Wetlands v. 5.0- Ohio Environmental Protection Agency, March. 2009.

ACOE-based 40-hour Wetland Delineation Certification - Richard Chinn Environmental Training, Inc., March. 2007.

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

8+

### YEARS WITHIN FIRM

2+

### CONTACT

Korey.McCluskey@TetraTech.com

**Wetland/Environmental Scientist IV - Department Technical Lead; Dominion Transmission, Inc.; Lebanon West II - TL-400 FERC Pipeline Project; Tuscarawas, Licking, Muskingum, Harrison, Coshocton, Columbiana, and Carroll Counties, Ohio (OH) and in Beaver County, Pennsylvania (PA); June 2014 to present**. Responsible for conducting wetland delineations and stream evaluations for the natural gas pipeline replacement segments of the TL-400 FERC Pipeline Project. Specific tasks included field surveys, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

**Wetland/Environmental Scientist IV - Department Technical Lead; Noble Energy, Inc.; Various Water Withdrawal Projects; Greene, Fayette, Washington Counties (PA), and Marshall County (WV); March 2014 to present**. Responsible for conducting numerous wetland delineations and stream evaluations for proposed water withdrawal projects located in southwestern Pennsylvania and the panhandle of West Virginia. Also prepared wetland delineation and stream assessment reports for each project in support of permit submissions.

**Wetland/Environmental Scientist IV - Department Technical Lead; Noble Energy, Inc.; Dunkard Fork Water Withdrawal Project; Greene County, PA; June 2014 to September 2014**. Responsible for conducting botanical surveys and habitat assessments for 5 listed SOSC. Responsible for preparing a botanical survey and habitat assessment report in support of permit submissions.

**Wetland/Environmental Scientist IV - Department Technical Lead; Noble Energy, Inc.; Wolfe Run Resevoir Water Withdrawal, Water Pipeline, and Access Road Project; Marshall County, WV; May 2014 to September 2014**. Responsible for conducting a wetland delineation and stream evaluation for a proposed water withdrawal, water pipeline, and its associated access road. Also prepared a wetland delineation and stream assessment report in support of permit submissions.

**Wetland/Environmental Scientist IV - Department Technical Lead; Rice Drilling D, LLC; Various Water Withdrawal Projects; Harrison and Belmont Counties (OH); March 2014 to present**. Responsible for conducting numerous wetland delineations and stream evaluations for proposed water withdrawal projects located in eastern Ohio. Also prepared wetland delineation and stream assessment reports for each project in support of permit submissions.

**Wetland/Environmental Scientist IV - Department Technical Lead; Rice Poseidon Midstream, LLC; North Fork Dunkard Fork Water Withdrawal Project; Greene County, PA; December 2014 to January 2015**. Responsible for conducting a botanical habitat assessment for 2 listed SOSC. Responsible for preparing a botanical habitat assessment report in support of permit submissions.

**Wetland/Environmental Scientist IV - Department Technical Lead; Rice Drilling B, LLC; Fink Pond Impoundment Project; Greene County, PA; October 2014**. Responsible for conducting a wetland delineation and stream investigation, as well as a botanical survey for 2 listed SOSC. Responsible for preparing a wetland delineation and stream identification report and a botanical survey report in support of permit submissions.

**Wetland/Environmental Scientist IV - Department Technical Lead; Rice Poseidon Midstream, LLC; Waterboy to Pollock Natural Gas Pipeline Project; Washington County, PA; July 2014 to January 2015**. Responsible for conducting a wetland delineation and stream identification survey. Responsible for preparing a wetland delineation and stream identification report in support of permit submissions.

**Wetland/Environmental Scientist IV; MarkWest Liberty Midstream and Resources, LLC; Boyscout Camp Wetland Restoration Project & Post-Restoration Monitoring; Harrison County, PA; November 2012 to present.** Responsible for evaluating post-impact conditions at a recently disturbed wetland, assist in designing a

USACE approved wetland restoration plan. Plans included survey of current and proposed wetland habitats, elevations, and hydrologic inputs; planting/seeding plan and implementation instructions; and construction/earthwork calculations and implementation instructions. Also responsible for wetland restoration monitoring for the past two years.

**Wetland/Environmental Scientist III; Sunoco Logistics; Mariner East [ME1] Pipeline Project Natural Gas Pipeline Projects, Rare, Threatened, and Engendered Species Surveys; 8 listed Species of Special Concern (SOSC); April 2013 to August 2013.** Botanical Survey Lead, and crew leader. Responsibilities included organizing and conducting all field work operations for multiple botanical crews, conducted botanical surveys for the 20 miles of the 40 mile proposed pipeline installation Mariner East [ME1] Pipeline Project. Additional work included proposing potential avoidance recommendations based on a potential environmental impact basis.

**Wetland/Environmental Scientist III; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

**Wetland/Environmental Scientist III; Gulfport Energy Corporation; Wetland Delineations for Miscellaneous Natural Gas Well Pad Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural well pads southeastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

**Wetland/Environmental Scientist III; Williams/Laurel Mountain Midstream Operations, LLC; Brown to Davis Natural Gas Pipeline Project; Fayette County, PA; January 2013 to present.** Conducted a wetland delineation and stream evaluation for the Brown to Davis natural gas pipeline project. Also prepared a wetland delineation and stream evaluation report in support of permit submissions.

**Wetland Scientist; Joseph and Lori Baker; Baker Property Wetland Restoration Project; Derry Township, Westmoreland County, PA; March 2010 to June 2010.** As onsite environmental consultant to Joseph and Lori Baker, responsible for wetland and stream encroachment survey and assessment and assisted with a wetland restoration design and planting/seeding design.

**Wetland Scientist/Project Manager; Range Resources; Multiple Temporary and Permanent Water Pipelines; Washington County, Pennsylvania. 2010 to 2011.** Mr. McCluskey was responsible for wetland delineations and stream evaluations on dozens of temporary and permanent water pipelines linking frac water impoundments in the Washington County area.

## FIELD (ENERGY TRANSMISSION)

**Wetland Scientist; Orange & Rockland Utilities, Inc., Counties of Bergen (NJ) and Rockland (NY); Transmission Line 702 – Proposed Shield Wire Replacement Project; November 2008 to February 2009.** Responsible for wetland delineation and stream evaluation of a 500 foot wide, 10 mile long transmission line corridor.

## FIELD (MINING)

**Wetland Scientist; Rosebud Mining Company; Kiski Junction Railroad Allegheny River Spur Re-activation Project; Bethel and Gilpin Townships, Armstrong County, PA; 2007 to 2008.** As onsite environmental consultant to Rosebud Mining Company, responsible for wetland delineation and assisted with the preparation of a

Joint Permit Application for USACE Individual Permit, as well as assisting with wetland mitigation site search and wetland mitigation design for railroad re-activation project.

**Wetland Scientist; MEPCO, LLC.; Coresco Overland Coal Conveyor Project; Greene (PA) and Monogalia (WV) Counties.** Responsible for wetland delineation and review and stream evaluation of a 10 mile overland coal conveyor. Rare, threatened, and endangered species (SOSC) survey and permitting services were provided.

## CHRONOLOGICAL HISTORY

Wetland/Environmental Scientist IV - Department Technical Lead; Tetra Tech, Inc.; Pittsburgh, PA, June 2014 – Present.

Wetland/Environmental Scientist III; Tetra Tech, Inc.; Pittsburgh, PA, October 2012 – June 2014.

Wetland Specialist/Project Manager; Pennsylvania Soil & Rock, Inc.; Monroeville, PA, May 2010 – October 2012.

Wetland/Environmental Specialist; Pennsylvania Soil & Rock, Inc.; Monroeville, PA, March 2008 – May 2010.

Wetlands Technician/Field Technician; Pennsylvania Soil & Rock, Inc.; Monroeville, PA, November 2006 – March 2008.

Park Naturalist; Frick Environmental Center – City of Pittsburgh; Pittsburgh, PA, April 2006 – November 2006.

## SCIENTIFIC/TECHNICAL PUBLICATIONS

- N/A

## MEMBERSHIPS

- Society of Wetland Scientists (SWS)

## AWARDS

- N/A

TETRA TECH

# Codie Vileno
## Environmental Scientist IV

## EXPERIENCE SUMMARY

Mr. Vileno has worked in the environmental field for over seven years. His experience includes conducting wetland delineations, habitat assessments, and endangered species surveys. He has additional experience performing and supervising Phase 1 archaeological surveys. Mr. Vileno's educational background includes graduate level studies in wetland ecology, stream ecology, hydrology, wetland/stream restoration methods, geology, and environmental impact assessments.

## RELEVANT EXPERIENCE

**Environmental Scientist III; Environmental and Restoration Services Contract for Site 73, Site 178, and Site 20. Army Corps of Engineers Louisville District. Savanna, Illinois; November 2014.** Conducted wetland delineation and threatened and endangered species review in support of remedial activities. Responsible for field effort and report deliverables.

**Environmental Scientist III; Sunoco Logistics; Wetland Delineation and Engendered Species Survey for Pennsylvania Pipeline Project; Pennsylvania, January 2014 to December 2014.** Conducted wetland delineations and endangered species survey along pipeline right-of-way. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Sunoco Logistics; Wetland Delineation and Engendered Species Survey for Ohio Pipeline Project; Ohio, West Virginia, Pennsylvania, January 2014 to December 2014.** Conducted wetland delineations and endangered species survey along pipeline right-of-way. Specific tasks included field survey, report preparation, and permitting activities.

**Environmental Scientist III; Rice Energy; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania and Ohio.** Conducts wetland delineations and permitting activities for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks include field survey, report preparation, completion of Ohio EPA specific wetland/stream assessments, agency consultation, and compiling of PCN.

**Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania.** Conducts wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

**Environmental Scientist III; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio.** Conducts wetland delineations for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

**Environmental Scientist III; Gulfport Energy Corporation; Wetland Delineations for Miscellaneous Natural Gas Well Pad Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural well pads southeastern Ohio. Specific tasks included field survey, report preparation, PCN preparation, and completion of Ohio EPA specific wetland and stream assessments.

### EDUCATION

B.A., Anthropology, 2007, State University College at Buffalo

### AREA OF EXPERTISE

Wetland Science

### TRAINING/CERTIFICATIONS

38 Hour ACOE Wetland Delineation Training Program, November 2009

Ohio Rapid Assessment Method for Wetlands Training Course, May 2013

Identifying Grasses, Sedges, and Rushes, June 2014

Winter Woody Plant Identification, April 2015

Running Buffalo Clover, Virginia Spirea, and Small Whorled Pogonia Federal RTE Identification Workshop, May 2015

Engineering for Ecosystem Restoration Workshop, June 2010

American Red Cross Adult First Aid/CPR/AED, March 2015

16 Hour Wilderness First Aid, November 2012

40 hours EPA 165.5 HAZWOPER Health and Safety Worker 2012

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

7+

### YEARS WITHIN FIRM

7+

### CONTACT

Codie.Vileno@TetraTech.com

**Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineation and Engendered Species Survey (Ranunculus flabellaris and Alopecurus aequalis) for Vanport to Butler Gas Pipeline; Butler County, Pennsylvania.** Responsible for performing and assisting with wetland delineation and endangered species survey along pipeline right-of-way. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Antero Resources Appalachian Corp.; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ritchie and Doddridge Counties, West Virginia.** Responsible for performing and assisting with wetland delineations for various proposed natural gas well pads and access roads in northern West Virginia. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Stone Energy; Wetland Delineation for Mercer 1 Well Pad; Sisterville, Tyler County, West Virginia; September 2012.** Performed wetland delineation for proposed natural gas well pad and associated access road. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Laurel Mountain Midstream Operating, LLC; Endangered Species Survey (Yellow Passionflower) for Miller to Headlee Pipeline Project; Greene and Cumberland Townships, Greene County, Pennsylvania; September 2012.** Assisted with botanical survey for yellow passionflower along the proposed Miller to Headlee natural gas pipeline right-of-way and access roads. Tasks included pre-survey research, field survey, and report preparation.

**Environmental Scientist III; Laurel Mountain Midstream Operating, LLC; Endangered Species Survey (Drooping Bluegrass) for Nickelville Pipeline Project; Nickelville, Venango County, Pennsylvania; July 2012.** Assisted with botanical survey for drooping bluegrass along the proposed Nickelville natural gas pipeline right-of-way. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Laurel Mountain Midstream Operating, LLC; Endangered Species Survey (Tall Larkspur) for Dunlap Creek Pipeline Project; Luzerne and Redstone Townships, Fayette County, Pennsylvania; June 2012.** Assisted with botanical survey for tall larkspur along the proposed Dunlap Creek natural gas pipeline right-of-way and access roads. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Laurel Mountain Midstream Operating, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey and report preparation.

**Environmental Scientist III; Enervest Operating, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southeastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

**Environmental Scientist III; NAVFAC Washington; Marine Corps Base Quantico Wetland Functional Analysis; Quantico, Virginia; April 2012.** Assisted with wetland functional assessments in support of remedial activities.

**Environmental Scientist III; NASA; Wallops Flight Facility Remedial Action Contract; Wallops Island, Virginia; March 2012.** Assisted with wetland delineation and wetland functional assessments in support of remedial activities.

**Environmental Scientist III; Burnett Oil Company, Inc.; New Salem, Pennsylvania; December 2011 to February 2012.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey and report preparation.

**Scientist I; Army Corps of Engineers; South Park Lake Dredge Project; Buffalo, New York; October 2011.** Supervised Phase 1 archaeological survey in preparation of dredging activities.

**Scientist I; Dominion East Ohio; Monroe County Gas Pipeline Project; Indiana Bat Habitat Assessment and Wetland Delineation; Woodsfield, Ohio; July 2011 to September 2011.** Assisted with Indiana Bat habitat assessment and wetland delineation along a proposed natural gas pipeline right-of-way. Specific tasks included field survey and completion of Ohio EPA specific wetland and stream assessments. Other responsibilities included Phase 1A archaeological assessment

**Archaeological Technician; National Grid; Lockport to Mortimer; Rochester, New York; May 2011 to October 2011.** Performed Phase 1 archaeological survey in support of transmission line replacement. Assisted with report preparation.

**Scientist I; National Fuel Gas Company; Tioga Pipeline Expansion; Tioga County, Pennsylvania; June 2011 to September 2011.** Assisted with wetland delineation along proposed natural gas pipeline right-of-way. Other responsibilities included performing a Phase 1A archaeological assessment and supervising a Phase 1 archaeological survey.

**Archaeological Technician; National Fuel Gas Company; Allegheny National Forest Pipeline Project; Warren, Pennsylvania; September 2009 to October 2009.** Performed Phase 1 archaeological survey along proposed natural gas pipeline right-of-way.

**Archaeological Technician; Dominion East Ohio; Pipeline Replacement; Wooster, Ohio; June 2008 to July 2009.** Performed Phase 1 archaeological survey along proposed natural gas pipeline right-of-way.

**Archaeological Technician; Haley & Aldrich, Inc.; AES Sparrows Point LNG; Cecil County, Maryland; June 2008 to July 2008.** Performed Phase 1 archaeological survey along proposed natural gas pipeline right-of-way.

**Archaeological Technician; Horizon Wind Energy, LLC; Arkwright Wind Farm; Arkwright, New York; September 2008 to March 2009.** Performed Phase 1 archaeological survey on proposed turbine pads and transmission lines.

**Archaeological Technician; National Fuel Gas Supply Company.; Galbraith Storage Field Expansion Project; Allegheny National Forest, Marienville, Pennsylvania; August 2008 to October 2008.** Performed Phase 1 archaeological survey along proposed natural gas pipeline right-of-way.

## CHRONOLOGICAL HISTORY

Environmental Scientist IV; Tetra Tech, Inc.; Pittsburgh, Pennsylvania; 2011 – Present

Scientist I; Tetra Tech, Inc.; Buffalo, New York; June 2008 – November 2011

Research Assistant; State University of New York Research Foundation; Buffalo, New York; October 2009 – January 2010

On-Call Research Assistant; State University of New York Research Foundation; Buffalo, New York; May 2009 – August 2009

Report Writer; Test America Laboratories; Amherst, New York; November 2007 – June 2008

## SCIENTIFIC/TECHNICAL PUBLICATIONS

N/A

## MEMBERSHIPS

- Society of Wetland Scientists

TETRA TECH

# Deanna N.Quinn
## Wetland/Environmental Scientist II

### EXPERIENCE SUMMARY

Ms. Quinn has two years' experience as an environmental scientist/ wildlife biologist with a background in wildlife and fisheries resource management. Her education background includes studies in chemistry, biology, statistics, botany, terrestrial ecology, natural resource management, conservation ecology, environmental policy and regulatory compliance, wetland ecosystems, wetland assessment and delineation, geographic information systems and other environmental related fields. Deanna has performed numerous wildlife and vegetation surveys, stream assessments habitat assessments and related report generation. As an Environmental Scientist, Deanna has had the opportunity of working fulltime on wetland delineations under Environmental Wetland Specialists, primarily for Marcellus shale projects. She also has experience performing bat hibernaculum habitat surveys in Western Pennsylvania as well as Phase 1 Bog Turtle surveys in Pennsylvania.

### RELEVANT EXPERIENCE

**Environmental Scientist II, Sunoco Logistics, Ohio-Pennsylvania Pipeline Project, Spanning from Delaware County, PA through Harrison County, Ohio, November 2013 to present.** Ms. Quinn conducted site investigations, wetland delineations, stream assessments, performed Ohio Rapid Assessment Method, PHWH HHEI & QHEI, Phase 1 Bog Turtle surveys, macroinvertebrate surveys, and wetland report preparation for proposed 300 mile natural gas pipeline reaching from the Delaware River in PA to Scio, OH.

**Environmental Scientist I; Gulfport Energy; Various Natural Gas Well Pad Sites; Belmont County, Ohio; August 2013 to present.** Ms. Quinn conducted site investigations, wetland delineations, stream assessments, performed Ohio Rapid Assessment Method, PHWH HHEI & QHEI, and wetland report preparation for proposed well pad locations in Belmont County, Ohio.

### EDUCATION

BT Wildlife Management, 2011, SUNY Cobleskill

AAS Animal Sciences & Ecology, 2009, SUNY Delhi

### REGISTRATIONS

NA

### TRAINING/CERTIFICATIONS

Certified Wetland Assessment Delineator, 2010, NY

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

3

### YEARS WITH TETRA TECH

1 year 10months

**Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania; May 2013 to present.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

## CHRONOLOGICAL HISTORY

Environmental Analysis/Management: Environmental Scientist I-II, 2013-present, Pittsburgh, PA
Research: Husbandry Services Technician I, 2013, Pittsburgh, PA
Research Wildlife Biologist, 2010-2012, Cobleskill, NY
Research Avian Research Technician, 2011, Abaco, Bahamas
Research Predator Research Technician, 2010, Batavia, NY

## SCIENTIFIC/TECHNICAL PUBLICATIONS

- N/A

## MEMBERSHIPS

- The Wildlife Society, N/A

## AWARDS

- N/A

# GREGORY P. STEVENS

## Environmental Scientist III – Technology Lead

## EXPERIENCE SUMMARY

Mr. Stevens has over five years' experience as an environmental scientist with a background in resource management through remote sensing techniques and insitu. His experience includes conducting wetland delineations, waterway quality assessments, habitat assessments, and endangered species surveys. He has conducted wetland determinations for federal and private clients. He is an Environmental Systems Research Institute geomentor, as such he has traveled to various school districts and instructed staff and students about geospatial technologies and implemented curriculum.

## RELEVANT EXPERIENCE

**Wetland/Environmental Scientist III - Sunoco Logistics; OPP and PPP Natural Gas Pipeline Projects, Multiple Counties across Ohio, West Virginia, and Pennsylvania; April 2014 to present.** Responsibilities included aiding in wetland delineations and stream assessments for the proposed 450 miles of the Ohio Pipeline (OPP) and Pennsylvania Pipeline Projects (PPP).

**Wetland/Environmental Scientist II; Dominion Transmission, Inc.; Lebanon West II - TL-400 FERC Pipeline Project; Tuscarawas, Licking, Muskingum, Harrison, Coshocton, Columbiana, and Carroll Counties, Ohio (OH) and in Beaver County, Pennsylvania (PA); June 2014 to present**. Responsible for conducting wetland delineations and stream evaluations for the natural gas pipeline replacement segments of the TL-400 FERC Pipeline Project. Specific tasks included field surveys, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

**Wetland/Environmental Scientist II; Noble Energy, Inc.; Various Water Withdrawal Projects; Greene, Fayette, Washington Counties (PA), and Marshall County (WV); April 2014 to present**. Responsible for conducting numerous wetland delineations and stream evaluations for proposed water withdrawal projects located in southwestern Pennsylvania and the panhandle of West Virginia. Also prepared wetland delineation and stream assessment reports for each project in support of permit submissions.

**Wetland/Environmental Scientist II; Rice Drilling D, LLC; Various Water Withdrawal Projects; Harrison and Belmont Counties (OH); April 2014 to present**. Responsible for conducting numerous wetland delineations and stream evaluations for proposed water withdrawal projects located in eastern Ohio. Also prepared wetland delineation and stream assessment reports for each project in support of permit submissions.

**Environmental Scientist II: Advanced Environmental Management Group: Plymouth, Michigan: July 2013 to April 2014.** Conducted wetland redeterminations as a team leader for property owners under the direction of two federal agencies in Michigan. Utilized the Midwest, NENC regional supplements and the 1987 USACOE manual. Trained four field technicians in wetland science and wetland determination procedures.

### EDUCATION

B.S. Environmental Studies, Richard Stockton College of New Jersey, 1995

B.S.Certificate Energy Management, Richard Stockton College of New Jersey, 1995

M.S. Geographic Information Systems, Eastern Michigan University, 2012

M.S.Certificate in Hydrogeology Eastern Michigan University, 2012

### AREA OF EXPERTISE

Wetland Delineation and Stream Identification & Remote Sensing

### TRAINING/CERTIFICATIONS

OSHA 1910.120 40-Hour HAZWOPER Training, Nov 2013
ACOE-based 40-hour Wetland Delineation Certification July 2013
American Red Cross CPR responder

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

5+

### YEARS WITHIN FIRM

1

### CONTACT

Greg.P.Stevens@tetratech.com

**Environmental Scientist II: Advanced Environmental Management Group: Plymouth, Michigan: July 2013 to April 2014.** Plotted soil sampling points for the Detroit District ACOE for the continued maintenance of dredging activities. Prepared field reports through the use of Bentley Microstation

**Remote Sensing Technician: Photo Science: Ann Arbor, Michigan: September 2012 to June 2013.** Mapped through satellite image interpretation land cover change using Landsat image pairs. Produced submission data for NOAA Coastal Change Analysis Program (CCAP). Required exchanges between Erdas for pixel adjustments then editing in ArcMap.

**Geospatial Consultant: United States Fish and Wildlife Service Region 3: May 2009 to August 2012.** Created a decision support database and produced maps that are implemented daily for the United States Fish and Wildlife region 3 office. Provided GIS tracking for species community assessments and invasive monitoring. Verified ecological communities and spread of invasive plants through field studies. Designed study transects along the Detroit coast and delineated the surrounding ecological communities, Department of Commerce grant #NA090AR4170172. Collected spectral signatures to develop a library that will aid in vegetation determination through hyperspectral analysis.

## CHRONOLOGICAL HISTORY

Environmental Scientist II; Tetra Tech NUS, Inc.; Pittsburgh, Pennsylvania; April 2014 to Present.

Environmental Scientist II: Advanced Environmental Management Group: Plymouth, Michigan: July 2013 to April 2014.

Remote Sensing Technician: Photo Science: Ann Arbor, Michigan: September 2012 to June 2013.

Geospatial Consultant: United States Fish and Wildlife Service Region 3: May 2009 to August 2012

GIS Laboratory Supervisor; Eastern Michigan University; September 2006 to May 2012

## SCIENTIFIC/TECHNICAL PUBLICATIONS

“Use of LiDAR in determining ecological community distribution” 2011

“Potential of Phragmites australis as a biofuel feed crop, determinations of yield and access through remote sensing” 2012

## MEMBERSHIPS

Society of Wetland Scientists (SWS)

American Association of Photogrammetry and Remote Sensing (ASPRS)

Society of Ecological Restoration (SER)

**AMANDA M. STOTT**
**WILDLIFE AND WETLAND SCIENTIST/ENVIRONMENTAL SCIENTIST I**
**PITTSBURGH, PA**

**EDUCATION:** B.T. Wildlife Management, SUNY Cobleskill, 2011
A.A.S General Studies, Liberal Arts and Sciences Herkimer C.C.C., 2009

**CERTIFICATIONS/ REGISTRATIONS:** Certified Wetland Assessment Delineator, NY, 2010

**EXPERIENCE SUMMARY:**

Ms. Amanda Stott has two years' experience as an environmental scientist/ wildlife biologist with a background in wildlife and fisheries resource management. Her education background includes studies in chemistry, biology, statistics, botany, terrestrial ecology, natural resource management, conservation ecology, environmental policy and regulatory compliance, wetland ecosystems, wetland assessment and delineation, geographic information systems and other environmental related fields. Amanda has performed numerous wildlife and vegetation surveys, stream assessments habitat assessments and related report generation. As an Environmental Scientist, Amanda has had the opportunity of working fulltime on wetland delineations under Environmental Wetland Specialists, primarily for Marcellus shale projects.

**RELEVANT PROJECT EXPERIENCE:**

**Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania; May 2013 to present.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

**Sampling:**

**Wildlife Technician; SUNY Cobleskill; Cobleskill, NY; June 2010.** Conducted local herpetology surveys on both salamander and frog habitats locally in and around Cobleskill area. Used amphibian traps to capture live specimens and recorded population densities and species diversity indexes for each location. Specifically focusing on human impacts, and habitat alterations and the population and diversity impacts associated with the disturbance.

**Wildlife Research Technician, University of Tennessee; Drakesboro, KY; August 2012.** Conducted vegetation surveys to identify nesting habits of Northern Bob-White Quail. Using a plot-less sampling method and random point generations near known nesting sites. Focusing on generating suitable habit for nesting on reclaimed coal-mine area.

**Wildlife Research Technician, Colorado Parks and Wildlife; Hayden, CO; August 2013.**
Aid in annual report of flora growth by conducting vegetation surveys on private and public lands to regenerate sage-brush nesting areas for Sage Grouse populations. Use of line-point method and random point generations.

**Environmental Mgmt. Systems:**

- Pond surveys (water quality, fish identification, mapping) for Schoharie County residents January – May 2009
- Angler Surveys and Census for the Ice Fishery of Otsego Lake, NYDEC December-February 2010
- Wetland delineation, Field work in various wetlands throughout the Cobleskill N.Y. area from September- December 2010
- Waterfowl habitat survey, Activity budget survey, Nest Predation survey, various research projects around Cobleskill N.Y. September - December 2010.
- Population surveys of ruffed grouse, NYDEC, trapping and banding, various study areas around Cobleskill N.Y. December 2009-January 2010.

**CHRONOLOGICAL WORK HISTORY:**

Wetland/Environmental Scientist I; Tetra Tech, Inc.; Pittsburgh, PA, May 2013 – Present.

Wildlife Research Technician; Colorado Parks and Wildlife; Steamboat Springs, CO April-August 2013

Wildlife Survey Technician; Western Ecosystems Inc.; Lowville, NY; July 2012-January 2013

Wildlife Research Technician; University of Tennessee; Drakesboro, KY; July-October 2011

Animal Husbandry Technician; Stonewall Boarding and Game Preserve; Esperence, NY; June 2009-April 2011

**PUBLICATIONS/ARTICLES:**

Morin. M.M, Stott, A.M.; "Wildlife Management Report for: Native Meadows Preserve"; New Milford, Connecticut; October 2012

# Adam Mengel

**Environmental Scientist/Wildlife Biologist I**

## EXPERIENCE SUMMARY

Mr. Mengel has two years of experience as an environmental scientist/ wildlife biologist with a background in ecology and conservation. His education background includes studies in chemistry, biology, mathematics, statistics, botany, terrestrial ecology, population ecology, herpetology, evolutionary biology, wetland ecosystems, wetland assessment and delineation, geographic information systems and other environmental related fields. Adam has performed numerous wildlife and vegetation surveys, stream assessments, and habitat assessments. As an Environmental Scientist, Adam has had the opportunity of working fulltime on wetland delineations under Environmental Wetland Specialists, primarily for Marcellus shale projects. He also has experience in performing both acoustic and mist net surveys for the Northern long-eared bat species in Pennsylvania and the Midwest. Additionally, he has experience in performing radio telemetry and summer roost counts.

## RELEVANT EXPERIENCE

**Crew Lead; Line 66 and Sandpiper Pipeline Project; Enbridge; WI, MN, ND; May – August 2014.** Mr. Mengel led acoustic and radio telemetry surveys for the Northern long-eared bat in the Midwest. He also performed roost counts and mist net surveys. Daily interaction with land agents and data submissions.

**Research Technician; Goleden-winged Warbler Habitat Conservation Plan; Delaware State Forest; May – July 2013.** Mr. Mengel monitored Golden-winged Warbler nesting success and assisted in locating a state record of 51 nests for the threatened species.

## EDUCATION

B.S. Biology: Environmental Science, 2012, Saint Francis University

## TRAINING/CERTIFICATIONS

First aid, CPR, AED

## OFFICE

Pittsburgh, PA

## YEARS OF EXPERIENCE

2

## YEARS WITH TETRA TECH

1

## CHRONOLOGICAL HISTORY

Environmental Scientist/Wildlife Biologist I, Tetra Tech, Inc., December, 2014 – Present, Pittsburgh, PA

Research Technician, WEST, Inc., May – August, 2014, Bloomington, IN

Research Technician, Indiana University of Pennsylvania, May – July, 2014, Indiana, PA

## SCIENTIFIC/TECHNICAL PUBLICATIONS

Loya, L.J., C. Clair, P.H. Harchack, and A.J. Mengel. 2014. "Odonate Diversity at an Acid Mine Drainage Remediation Site in Cambria, County, Pennsylvania." Argia. 26(3):14-17

## MEMBERSHIPS

- The Wildlife Society

TETRA TECH

# Jennifer Bittner
## Environmental Scientist I

## EXPERIENCE SUMMARY

Jennifer Bittner has three years of experience in the environmental field. Her experience includes stream and wetland mitigation monitoring, rare plant species surveys, and report writing. She also has experience in the oil and gas industry inspecting and recommending corrective actions for post-construction pipeline right-of-ways and facilities for erosion and sedimentation issues.

## RELEVANT EXPERIENCE

### ENERGY

- **Wetland/Environmental Scientist I; Sunoco; Pennsylvania Pipeline Project; December 2014 – Present.** Assisted with report writing for wetland and stream delineations. Tasks included stream and wetland data entry and write-ups.
- **Wetland/Environmental Scientist I; Sunoco; Ohio Pipeline Project; December 2014 – Present.** Assisted with report writing for wetland and stream delineations. Tasks included stream and wetland data entry and write-ups.
- **Wetland/Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; January 2014.** Assisted with report writing for wetland and stream delineations. Tasks included stream and wetland data entry.
- **Wetland/Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; December 2014.** Assisted in wetland and stream delineations for proposed pipeline routes and reroutes. Tasks included mapping wetlands and streams.
- **Wetland/Environmental Scientist I; Rice Energy Inc.; December 2014.** Assisted with stream field survey. Tasks included mapping the stream high water table.
- **Compliance Monitor; Hunt, Gulliot & Associates, April 2014 - November 2014.** Inspected post-construction pipeline and facility right-of-ways for erosion and sedimentation issues for Williams Companies, Inc. Tasks included documenting issues and recommending corrective actions, coordinated with other compliance monitors on how to effectively inspect all assigned pipeline and facilities each week, and complete weekly E&S Inspection reports.
- **Staff Scientist; CONSOL Energy, Inc. May 2013 - December 2013.** Assisted with wetland and stream mitigation monitoring for longwall mining restoration projects. Tasks included conducting vegetation surveys, water sampling, soil surveys, and report writing.
- **Staff Scientist; CONSOL Energy, Inc. May 2013.** Assisted with rare plant surveys for power line project. Tasks included making plots and documenting the rare plant observed.
- **Staff Scientist CONSOL Energy, Inc. October 2012 – December 2012.** Assisted with stream mitigation surveys for longwall mining projects**.** Tasks included conducting vegetation surveys, water sampling, and report writing.

### EDUCATION

M.S. Environmental Science and Management, Duquesne University

B.S. Marine Biology, Waynesburg University

### AREA OF EXPERTISE

Environmental Science

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

3

### YEARS WITHIN FIRM

1

### CONTACT

Direct : 412.921.4010

Email :Jen.Bittner@tetraatech.com

## SAMPLING

- **Water Quality Intern; Clearwater Marine Aquarium, May 2010 – August 2010.** Maintained water quality and appearance for all exhibits. Tasks included daily water testing, recordkeeping, backwashing pumps, and feeding fish, sharks, and stingrays

## CHRONOLOGICAL HISTORY

- Wetland/Environmental Scientist I; Tetra Tech, Pittsburgh, PA; December 2014 – Present
- Compliance Monitor; Hunt, Guillot & Associates, LLC; Pittsburgh, PA; April 2014 – November 2014
- Staff Scientist; Civil & Environmental Consultants, Inc.; Pittsburgh, PA; October 2012 – April 2014
- Teaching Assistant; Duquesne University; Pittsburgh, PA; January 2012 – April 2012

TETRA TECH

# Cody R. Stoliker

## ENVIRONMENTAL SCIENTIST I

## EXPERIENCE SUMMARY

Cody R. Stoliker has approximately 1 year of professional experience in wetland delineation, permitting, and stream assessments and classification in Pennsylvania, New York, Ohio, and West Virginia. With 4 years of fisheries and wildlife management experience, specializing in large game conservation, Mr. Stoliker has technician experience working with bear, elk, moose, deer, and wolves in Wyoming, as well as biologist work with whitetail deer, red stag, feral hogs, and the endangered American Burying Beetle in Oklahoma along pipeline routes where he produced habitat assessments, post monitoring impact statements and performed population control. Mr. Stoliker is assisting Tetra Tech field leads and other environmental scientists to assess and delineate streams and wetlands along natural gas pipeline routes, access roads, right-of-ways, and well pad sites. Cody R. Stoliker's educational background is in Wildlife Management with a minor focus in wetland assessment/delineation and fisheries.

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## RELEVANT EXPERIENCE

**Environmental Scientist I; Sunoco Logistics; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects Pennsylvania.** Responsible for performing and assisting with wetland delineations and stream assessments for the proposed Pennsylvania Pipeline Project. Other responsibilities included report preparation and wetland functional assessments.

**Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

**Environmental Scientist I; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

## EDUCATION

Bachelor of Technology, Wildlife Management, 2013, State University of New York at Cobleskill

## AREA OF EXPERTISE

Large Game Wildlife Management & Conservation, Wetland Assessment

## REGISTRATIONS/ AFFILIATIONS

Ducks Unlimited 2012- Present

Rocky Mountain Elk Foundation 2013 – Present

National Wild Turkey Federation 2013 - Present

## TRAINING/CERTIFICATIONS

Certified Wetland Assessment Delineator, NY, 2010

NYS Certified Class A Interior Firefighter

## OFFICE

Tetra Tech OGA
Pittsburgh, PA

## YEARS OF EXPERIENCE

1

## YEARS WITH TETRA TECH

1

## SCIENTIFIC/TECHNICAL PUBLICATIONS

N/A

## CHRONOLOGICAL HISTORY

Environmental Scientist I, Tetra Tech, 2014-2015, Pittsburgh, PA

Wildlife Biologist/Ranch Manager, Oklahoma Trophy Ranch, 2013-2014, Allen, OK

Wildlife Management Technician, Rolling Thunder & Rim Ranches, Spring-Fall 2013, Bondurant, WY

Assistant Herdsman, Bison Island, 2012-2013, Sharon Springs, NY

Avian Survey Technician, NYS Dept. of Environmental Conservation, Winter 2011, Albany NY

TETRA TECH

# Kevin Pulver
## Wetland/Environmental Scientist I

### EXPERIENCE SUMMARY

Mr. Kevin Pulver has a background in mapping, watershed management and environmental consulting. His education background includes studies in chemistry, ecology, wildlife and fisheries, biology, geography, hydrology, limnology, statistics, wetland assessment and delineation, geographic information systems, permitting, etc. As a Wetland Environmental Scientist I, Kevin had the opportunity to perform numerous wetland delineations under the supervision of seasoned professionals within the wetland department of Tetra Tech. These delineations were primarily performed for Marcellus shale projects. Kevin also has experience in watershed management/stream restoration techniques as well as GIS and AutoCAD software application.

### RELEVANT EXPERIENCE

**Environmental Scientist I; Sunoco Logistics; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects Pennsylvania.** Responsible for performing and assisting with wetland delineations and stream assessments for the proposed Pennsylvania Pipeline Project. Other responsibilities included report preparation and wetland functional assessments.

**Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

**Environmental Scientist I; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio.** Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

### EDUCATION

B.A. Environmental Studies, 2011, Penn State University - Altoona

B.S. Geography: Watershed Management; Environmental Science, 2013, Mansfield University of Pennsylvania

### TRAINING/CERTIFICATIONS

Certificate in Wetland Delineation from Wetland Training Institute

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

1

### YEARS WITH TETRA TECH

1

## CHRONOLOGICAL HISTORY

Wetland/Environmental Scientist I, Tetra Tech, Inc., November, 2014 – Present, Pittsburgh, PA

AutoCAD Drafter, Land Services Group, November 2013-July 2014, Wellsboro, PA

Cartographer, Intelligent Direct, Inc., May 2013 – November 2013, Wellsboro, PA

Biological Scientist Intern, United States Geologic Survey - Northern Appalachian Research Laboratory, Summer 2012, Wellsboro, PA

## SCIENTIFIC/TECHNICAL PUBLICATIONS

- N/A

## MEMBERSHIPS

- N/A

## AWARDS

- N/A

# DAVID J. BONOMO
## Senior Environmental Scientist

**Profile**

- Environmental scientist with over ten years experience in environmental consulting and conducting ecological field studies in Northeastern US.
- Professional experience in environmental consulting managing projects and performing wetland delineation and stream assessments; preparing permit applications; performing biological site assessments including existing vegetation evaluations, habitat and species evaluations and searches for federal and state endangered, threatened, and rare plant and animal species; conducting wetland and stream mitigation design and monitoring; and designing and conducting research studies on wildlife in the Northeastern US.
- Provides technical support for the planning, permitting and construction of wind and solar energy facilities, transmission line corridors, as well as large commercial and residential projects.
- Advanced technical skills and training for water of the US evaluations in multiple regions, including *Northcentral and Northeast, Eastern Mountains and Piedmont, and Atlantic and Gulf Coastal Plain*.

**PROFESSIONAL EXPERIENCE**

**Environmental Consultation Services, Inc.** Pen Argyl, PA
*Senior Environmental Scientist* 2014 - Present

- Provide ecological services for large-scale gas pipeline and electrical transmission utility projects, residential and industrial construction projects, and private residential owners and small business.
  - Conduct site reconnaissance, wetland and stream delineations; habitat assessments; threatened and endangered plant and animal surveys.
  - Conduct habitat evaluations, ecological assessments, and threatened and endangered wildlife and plant species and rare community surveys. Perform habitat assessments and searches for PA Special Concern species, including the bog turtle (*Glyptemys muhlenbergii*).
  - Provide site environmental surveys utilizing Trimble GPS. Prepare site mapping using Geographic Information Systems (GIS) and AutoCAD software.

**Shoener Environmental, Inc.** Dickson City, PA
*Senior Environmental Scientist* 2004 - 2014

- Provide direct project management of ecological services for high value and/or complex large-scale wind farm projects, linear state and local utility projects, Marcellus shale projects, residential and industrial construction projects, and private residential owners and small business.
  - Prepare federal, state, and local permit applications, wetland mitigation designs, and erosion and sediment control plans to meet regulatory requirements for site development.
- Prepare and review ecological project plans and budgets.
  - Conduct site reconnaissance, wetland and stream delineations; habitat assessments; threatened and endangered plant and animal surveys.
  - Inspect wetland mitigation and construction sites for regulatory compliance of erosion and stormwater controls.
  - Conduct habitat evaluation and technical services for the Ecological Services Division, including habitat evaluations, ecological assessments, and threatened and endangered wildlife and plant species and rare community surveys. Perform habitat assessments and searches for PA Special Concern species, including the small-footed bat (*Myotis leibii*), timber rattlesnake (*Crotalus horridus*), wood rat (*Neotoma magister*), and the Indiana Bat (*Myotis sodalis*).
  - Provide field mapping of environmental survey data utilizing survey quality Trimble Global Positioning System (GPS). Prepare site mapping using Geographic Information Systems (GIS) and AutoCAD software.
  - Manage field personnel for post-construction bat/bird mortality monitoring studies on wind energy facilities in Pennsylvania.

**Ecoscientific Solutions, Inc** Scranton, PA
*Environmental Scientist* 2004

- Lake and Pond Management and Water Quality technician.
- Conducted aquatic plant surveys; water quality analysis; and benthic surveys
- Certified pesticide applicator for the control of invasive aquatic vegetation.

## COMPUTER SKILLS

AutoCAD (2010-2014), ARCView (10.1), Microsoft Office (Word, Excel, PowerPoint),

## EDUCATION

**Wilkes University** Wilkes-Barre, PA
Bachelor of Science, Environmental Science 2004

- Lake and Stream Ecology, Field Botany, Water Quality Analysis, and Environmental Engineering
- Research assistant and water quality specialist for the study of freshwater bivalve populations in natural lakes of northeastern Pennsylvania.

**Continuing Education**

- A Consulting Botanist Workshop, Morris Arboretum, Philadelphia, PA, April 18, 2014
- Acoustical Bat Monitoring Workshop, Albany, New York, January 2013.
- Outdoor Emergency Care, National Ski Patrol, Poconos, Pa. Fall 2012.
- Acoustical Bat Monitoring Workshop. Bat Conservation and Management, Gettysburg, PA. Instructed by Joe Szewczak (Developer of SonoBat software), October, 2011.
- Advanced Bat Capture Techniques Workshop, Bat Conservation International and Bat Conservation Management, Patuxent Research Refuge, Laurel, MD. September 2010.
- Final Chapter 102 Training Session. Changes to the PA Chapter 102 Regulations (Erosion and Sediment Control and Stormwater Management) (effective November 19, 2010). PA DEP. Wilkes-Barre, PA. November 3, 2010.
- Annual Industry Training Workshop. PA DEP, Bureau of Oil & Gas Management. Williamsport, PA. May 11, 2010.
- Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual Northcentral and Northeast Region. PAPSS Training Conference. Laporte, Sullivan County, PA. April 27, 2010.
- Bat Capture Techniques Workshop, Bat Conservation and Management Workshop, Bat Conservation Management and Pennsylvania Game Commission (PGC), August 2007.
- Soil Science, Soil Morphology, and Field Applications, Wilkes University, June 2007.
- Hydric Soils, Rutgers University, June 2006.

## PROFESSIONAL MEMBERSHIPS

- Society of Wetland Scientist (SWS)
- Pennsylvania Lake Management Society (PALMS)
- North American Society for Bat Research (NASBR)
- National Ski Patrol (NSP)

## PROJECT PORTFOLIO

- Allegheny Ridge Wind Farm, Cambria and Blair Counties, PA (2007) - 132 MW/66 Turbines
- Highland Wind Farm, Cambria County, PA (2008) - 50MW/25 Turbines
- North Allegheny Wind, Blair County, PA (2008) – 20 MW/10 Turbines
- Sandy Ridge Wind Farm, Centre and Blair Counties, PA (2009)- 62.5 MW/25 Turbines
- Twin Ridges Wind Farm, Somerset County, PA (2011) – 136 MW/68 Turbines
- Mehoopany Wind Farm, Wyoming County, PA (2012)–180 MW/90 Turbines
- Penelec HTC Power Line – Cambria County, PA (2008), 17 lineal miles
- Valley View Business Park Phase 2, Lackawanna County, PA (2007), 810 Acres
- Harrisburg – Allentown Communication Line, Dauphin, Lebanon, Berks, and Lehigh Counties, PA (2012) – 90 lineal miles
- PA Pipeline - Natural Gas Pipeline, Western Pennsylvania to Marcus Hook Industrial Complex, Philadelphia

**KEVIN S. KEAT, *PWS, Sr. Biologist***
***Environmental Consultation Services, Inc.***
*1095 Mill Road, Pen Argyl, PA 18072*
*Phone: (484) 515-6806 Email: kevinkeat@ptd.net*

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**YEARS OF EXPERIENCE: 23**

**EDUCATION:** B.S. Earth and Environmental Science, Wilkes University, Wilkes-Barre, PA;1992

**PROFESSIONAL REGISTRATIONS AND TRAINING**

- Professional Wetland Scientist Certification – Society of Wetland Scientists Since 2013
- PA Fish & Boat Commission – Recognized Qualified Biologist, March 2006
- US Fish & Wildlife Service-Recognized Qualified Biologist, March 2006
- US Army Corps of Engineers – Recognized Qualified Wetlands Delineator, May 1998
- NY DEC - Recognized Qualified Biologist, May 2009
- NJ Fish & Wildlife Service – Recognized Qualified Biologist, March 2006
- MD Department of Natural Resources – Recognized Qualified Biologist, March 2006
- Rutgers University Certificate of Completion for Endangered and Threatened Species of Northern NJ, Survey Techniques and Habitat Assessment Regulatory Implications, 2005
- Rutgers University Certificate of Completion for Environmental and Ecological Risk Assessment; 2000
- Ohio State University, Certificate of Completion for Creation and Restoration of Wetlands for Mitigation of Wetland Loss; 1999
- Pennsylvania Department of Environmental Protection Certificate of Achievement in the Application of Pennsylvania Department of Environmental Protection Act 2 Regulations and Procedures in the Act 2 Technical Manual; 1999
- Plant Identification: Wetlands and Their Borders; 1999
- U.S. Army Corps of Engineers Wetlands Delineator Training; 1998
- USEPA Certification for Hazardous Materials Incident Response Operations (29 CFR1910.120); 1992

**PROFESSIONAL AFFILIATIONS**

**Society of Wetlands Scientists**

**PA Fish & Boat Commission Timber Rattlesnake Site Assessment and Inventory Project, 2006-Present** *Field Specialist for the Northeast Region of Pennsylvania*

**KEY QUALIFICATIONS**
Mr. Keat has worked continuously in Environmental Consulting from December 1992 to the present. He conducted environmental studies and obtained local, state and federal environmental approvals for multiple project sites throughout Pennsylvania, New Jersey and New York. Mr. Keat has performed studies for public and private projects including power transmission lines, gas pipelines, commercial and residential development, telecommunications facilities, transportation and port facilities. He has also conducted surveys for state resource protection agencies. Mr. Keat is proficient in construction monitoring, wetland delineation, biological

cause and effect stream surveys, wildlife habitat surveys and environmental impact assessments. He is experienced in surveys for endangered and threatened plant and animal species including bog turtles. He has performed phase 1, 2 and 3 surveys for bog turtles and conducted trapping surveys for the pine and corn snakes in southern New Jersey. He has conducted benthic macroinvertebrate surveys to assess stream quality. He has prepared baseline ecological evaluations to assess the effects of contamination on environmentally sensitive areas. He has prepared environmental screening and environmental assessment reports in accordance with state and federal requirements. He has performed Phase I environmental site assessments to screen for hazardous waste contamination and has performed soil and groundwater site characterizations and prepared and implemented site remediation plans.

Mr. Keat has 23 continuous years of environmental consulting experience which is extensive in conducting Wetlands Delineation, Flora/Fauna Threatened and Endangered Species Surveys, PA Chapter 105 Environmental Assessments, Ecological Assessments, Freshwater Macroinvertebrate Stream Surveys, Groundwater Monitoring, and Wetlands Mitigation/Restoration for the following:

**Project Types:**

***Several Hundred Miles of Linear Projects****:*
Electric Power Transmission Lines, Oil and Gas Pipelines, State Highway and Railway Corridors - Wetlands Delineation, T&E Species Habitat Surveys, Construction Monitoring, Wetlands Mitigation

***Oil and Gas Well Development Pads and Pump Stations:***
Wetlands delineation, T&E Botanical Species Surveys

***Large Land Tract Subdivisions****:* Residential, Commercial and Industrial Development – Wetlands Delineation, Mitigation/Restoration, T&E Species Surveys, PA Chapter 105 Environmental Assessments, Construction Monitoring

***Soil and Groundwater Remediation Projects****:* Soil Excavation and Disposal, Groundwater Pump and Treat Technologies including Petroleum-Related Volatile Organic Compounds, Heavy Metals from Industrial Contaminants – Wetlands Delineation, Wetlands Hydrological Monitoring and Mitigation, T&E Species Surveys, Ecological Risk Assessment

***Bridge Repair/Reconstruction Projects****:* Including Wetlands Delineation, T&E Species Surveys and Environmental Assessments as Per PA Chapter 105

***Government Funded Local, County, State and Federal Agency Research Projects:*** For flora/fauna species presence/absence determinations, diversity assessments, population size and distribution in PA, NJ, MD and NY.

***Permitted Municipal Waste Landfill Disposal Facilities:*** Groundwater and Surface Water Monitoring, Methane Gas Monitoring, Wetlands Mitigation/Restoration, Quantitative Macroinvertebrate Stream Surveys

**State and / or Federally Listed Threatened, Endangered or Concern Species Surveyed w/Random Visual Search Methods and / or Trapping:**

Reptiles: Bog Turtle, Wood Turtle, Spotted Turtle, Timber Rattlesnake, Copperhead, Diamond Back Rattlesnake, Eastern Coral Snake, Pine Snake, Corn Snake

Amphibians: Mole Salamanders, Pine Barrens Treefrog

PA and NJ Botanical Surveys: Wild pea (*Lathyrus ochroleucus*) Eared-false foxglove (*Agalinis auriculata*), Northeastern bulrush (*Scirpus ancistrochaetus*), Swamp dog hobble bush (*Leucothoe racemosa*), Swamp pink (*Helonias bullata*), Knieskern's beaked rush (*Rhynchospora knieskernii)*, Twin flower *(Linnaea borealis)*, Spreading globeflower (*Trollius laxus*), Carex fava, Carex shortiana, Sand cherry (*Prunus pumila*), Prickly pear cactus (*Opuntia humifusa*), Racemed milkwort (*Polygala polygama*), Small whorled pogonia (*Isotria medeoloides*), Nuttall's ticktrefoil (*Desmodium nuttallii*), Quill fameflower (*Phemeranthus teretifolius*), Mountain bugbane (*Actaea podocarpa*), Wild gooseberry (*Ribes missouriense*), Shale barren Evening primrose (*Oenothera argillicola*), Serpentine aster (*Symphyotrichum depauperatum)*, Small's ragwort (*Packera anonyma*), Torrey's rush (*Juncus torreyi*), Netted chain fern (*Woodwardia areolata*)

**Potential Hazardous Waste Site Assessments and Remediation:**

ASTM E1527-1528 Phase 1 Environmental Site Assessments for Due Diligence

PA ACT 2 Site Characterization and Remediation for Soil and Groundwater including NPL/Superfund Sites

Underground Storage Tank Indemnification Fund (USTIF) Projects

NJ ISRA Site Characterization and Remediation Projects

# ANDREW P. NEVIN, Aquatic Biologist

**EDUCATION:**
B.S., Biology, 2004, York College of Pennsylvania

**PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS:**
PA Department of Environmental Protection Freestone Macroinvertebrate Collection Certification

MD Department of Natural Resources, Maryland Biological Stream Survey Certification

MD State Highway Administration Erosion and Sediment Control Certification: Green Card/Yellow Card/Design

MD Department of Environment Drinking Water Collection Certification

Intro to Arc GIS Certification

Society for Freshwater Science (2008-present)

Mid-Atlantic Aquatic Biologists (2007-present)

The Nature Conservancy (2003-present)

**YEARS OF EXPERIENCE:**
8 Years

Mr. Nevin has accrued extensive field/laboratory experience within several diverse fields of environmental science. Over the past eight years, he has been involved with projects ranging from benthic macroinvertebrate sampling/identification, water quality monitoring, wetland delineation/functional assessment, freshwater mussel surveys, and endangered species field efforts. He has assisted in both private and state projects with MDSHA, PennDOT, and WVDOH in Pennsylvania, Maryland, New York, Missouri, Tennessee, Virginia, and West Virginia.

Mr. Nevin is involved in the study of aquatic biology, specifically benthic macroinvertebrate assemblages within freshwater lotic ecosystems. Additionally, he has been involved with physiochemical evaluations and fluvial geomorphologic characterizations of both free-stone and limestone influenced streams. Mr. Nevin is familiar with several current methodologies used to measure biotic integrity including U.S. EPA's *Rapid Bioassessment Protocol for Use in Wadeable Streams and Rivers for Benthic Macroinvertebrates and Fish* (1999), *An Index of Biotic Integrity for Wadeable Freestone Riffle-Run Streams in Pennsylvania (*PA DEP, 2013*),* VA DEQ'S *Biological Monitoring Program Quality Assurance Project Plan for Wadeable Streams and Rivers (*2008*),* and WV DEP'S *Watershed Assessment Branch Standard Operating Procedures* (2013). He is also well-versed in current wetland delineation protocols broadly outlined in the 1987 U.S Army Corps of Engineers' (USACE) Wetland Delineation Methodology as well as the more recent Regional Supplements. Mr. Nevin has also been involved with field surveys for freshwater mussels of the Atlantic Slope in Maryland and Pennsylvania and endangered species including Northeastern bulrush, Indiana bat, and the Bog turtle in Pennsylvania, Missouri, New York, and West Virginia.

## PROFESSIONAL EXPERIENCE

**Aquatic Biological Assessments** - Mr. Nevin has extensive experience in utilizing biological indicators, specifically benthic macroinvertebrate assemblages, to assess the relative health of freshwater ecosystems. He is well-versed in various collection methods and processing procedures which vary from state to state. He is also proficient with family and genus level identification of macroinvertebrate taxa of the Middle Atlantic region. Mr. Nevin has conducted biological assessments for numerous public and private sector projects within Pennsylvania, Maryland, Tennessee, Virginia, and West Virginia.

**Wetland Identification/Delineation/Functional Assessment** - Functioning as a field crew leader for numerous public and private sector projects throughout the Middle Atlantic region. He is familiar with current wetland delineation protocols broadly outlined in the 1987 USACE's Wetland Delineation Methodology as well as the more recent Regional Supplements. He is also experienced in functional analysis using several different methods including Wetland Evaluation Technique II (WET 2.0) and the New England USACE Descriptive Method.

**Freshwater Mussel Surveying** - Mr. Nevin has assisted in the collection and identification of freshwater mussels of the Atlantic Slope. He assisted the Maryland Department of Natural Resources (MD DNR) on surveys for the Dwarf Wedgemussel (*Alasmidonta heteredon*) on Nangemoy Creek and for the Green Floater (*Lasmigona subviridis*) on Licking Creek and the Potomac River utilizing timed tactile search methodologies for population density estimates. He also assisted The Nature Conservancy with mussel surveys on Conoduguinet Creek and has most recently conducted relative abundance surveys with the Pennsylvania Department of Environmental Protection (PA DEP) and the Pennsylvania Fish and Boat Commission (PFBC) on the Juniata River.

**Threatened and Endangered Species** - Mr. Nevin has extensive experience conducting habitat assessments, presence/absence surveys, and agency consultation for federally and state listed species including Northeastern bulrush (USFWS Qualified Surveyor in Pennsylvania and Virginia), the Indiana bat (USFWS and PGC Qualified Bat Identifier), small-footed bat, Northern long-eared bat, gray bat, bog turtle, and various freshwater mussel species.

## PROJECT EXPERIENCE

**Virginia NPDES Permit Applications Biological Assessments, Buchanan, Tazewell, and Wise Counties, VA (2010-present)** - Mr. Nevin was the Task Manager for field collection, processing, identification, metric calculation, and reporting of benthic macroinvertebrate kick samples for several proposed coal mining projects throughout southwestern Virginia. The purpose of these assessments was to document and assess reference baseline physiochemical, biological, and physical habitat conditions for the purpose of documenting potential impacts from the proposed projects. Benthic macroinvertebrate surveys were conducted in accordance with the protocols outlined in VA DEQ's *Biological Monitoring Program Quality Assurance Project Plan for Wadeable Streams and Rivers* (August 2008) and VA DMLR's *Permitting Guidance for Surface Coal Mining Operations to Protect Virginia's Narrative Water Quality Standards*. In addition, *A Stream Condition Index for Virginia Non-Coastal Streams* (September 2003) was referenced for all metric scores and all VASCI score calculations.

**PennDOT Route 70 Widening Project Benthic Survey and Baseline Aquatic Characterization, Washington County, PA (2013) -** Mr. Nevin was responsible for the field collection, processing, identification, and reporting of macroinvertebrate kick samples collected to describe baseline conditions of existing natural resources. *An Index of Biotic Integrity for Wadeable Freestone Riffle-Run Streams in Pennsylvania* (PA DEP, 2009) was utilized for field collection and laboratory processing protocols. Field chemistry and physical habitat parameters were also assessed during field investigations.

**PennDOT S.R. 6219, Section 20 Benthic Survey and Baseline Aquatic Characterization, Somerset County, PA (2012)** - Mr. Nevin was responsible for the field collection of macroinvertebrate samples, water chemistry data, and RBP physical habitat assessments for an extensive highway improvement project in Somerset County, Pennsylvania. Mr. Nevin also assisted with a thermal impact analysis associated with the project.

**West Virginia Department of Highways (WV DOH) Melissa-Huntington Road Project Aquatic Assessment, Cabell County, WV (2011)** - Mr. Nevin was responsible for the field collection, processing, identification, and reporting of numerous macroinvertebrate kick samples throughout the Grapevine Branch watershed in order to assess and document baseline conditions within the project area. West Virginia Stream Condition Index (WVSCI) scores were calculated using *A Stream Condition Index for West Virginia Wadeable Streams* developed by Tetra Tech Inc. (July 2000). Macroinvertebrate field sampling and laboratory processing procedures were conducted in accordance with WVDEP's *Watershed Assessment Branch Standard Operating Procedures* (2011).

**WV DOH Route 2 Widening Project Benthic Macroinvertebrate Survey/Functional Assessment, Marshall County, WV (2011)** - Mr. Nevin was responsible for the field collection, processing, identification, and reporting of numerous macroinvertebrate kick samples throughout the Ohio River watershed in order to assess and document baseline conditions within the project area. Additionally, he carried out a series of functional assessments for several tributaries to the Ohio River utilizing the U.S. EPA's *Operational Draft Regional Guidebook for the Functional Assessment of High Gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky* (July 2010).

**Dual Valley Recreational Association Aquatic Assessment, Schuylkill County, PA (2010-present)** - Mr. Nevin is responsible for the field collection, processing, identification, and reporting of macroinvertebrate kick samples throughout the Nesquehoning Creek watershed for a baseline study. *An Index of Biotic Integrity for Wadeable Freestone Riffle-Run Streams in Pennsylvania* (PA DEP, 2009) was utilized for field collection and laboratory processing protocols.

**West Point Stormwater Improvement Project - Aquatic Assessment, Westmoreland County, PA (2011)** - Mr. Nevin was responsible for the field collection, processing, identification, and reporting of macroinvertebrate kick samples throughout the Township Line Run watershed. The purpose of this assessment was to characterize the physical, chemical, and biological conditions of two tributaries to Township Line Run in order to establish baseline conditions prior to any rehabilitation efforts. *An Index of Biotic Integrity for Wadeable Freestone Riffle-Run Streams in Pennsylvania* (PA DEP, 2009) was utilized for field collection and laboratory processing protocols.

**Rosebud-Coral Graceton Site Aquatic Assessment, Indiana County, PA (2011)** - Mr. Nevin was responsible for the field collection, processing, identification, and reporting of several macroinvertebrate kick samples throughout the Manowing Creek watershed. The purpose of this assessment was to characterize the physical, chemical, and biological conditions within several headwater systems in order to qualitatively document historic acid mine drainage (AMD) influences throughout the project area. *An Index of Biotic Integrity for Wadeable Freestone Riffle-Run Streams in Pennsylvania* (PA DEP, 2009) was utilized for field collection and laboratory processing protocols.

**PennDOT U.S. 220 Roadway Improvement Project Surface Water Quality Monitoring/Benthic Macroinvertebrate Collection and ID, Blair and Centre Counties, PA (2007-2013)** - Mr. Nevin was involved with surface water monitoring throughout the South Bald Eagle Creek, North Bald Eagle Creek, and Buffalo Run watersheds. Monitoring included evaluations of stream flow, ambient water quality, aquatic biota, and fluvial geomorphologic conditions. He measured field pH, conductivity, salinity, and dissolved oxygen using YSI field water quality equipment. Mr. Nevin collected and transported water chemical samples for dissolved metals. He also collected and identified benthic macroinvertebrates using rectangular/D-frame kicknets for multi-habitat sampling.

**Maryland State Highway Administration (MD SHA) Keyser's Ridge Leachate Treatment System NPDES Permitting Project, Garrett County, MD (2007-2013)** - Mr. Nevin was involved with NPDES field monitoring for an active treatment system in conjunction with MD SHA near Keyser's Ridge, Maryland. Monitoring included stream flows, pH, total metals, and bio-toxicity.

**MD SHA Inter-County Connector (ICC) Project Maintenance of YSI In-Stream WQ Instrumentation (2008-2012)** - Mr. Nevin installed and maintained sonde units in order to measure real-time water quality parameters such as turbidity, pH, dissolved oxygen, and specific conductance. Instruments were installed to monitor possible construction impacts for a portion (Contract C) of a large-scale highway project in Prince George's County, Maryland.

# BENJAMIN T. BERRA, Environmental Scientist/Biologist

**EDUCATION:**
M.S., Geoenvironmental Studies, 1998, Shippensburg University

B.S., Geoenvironmental Studies, 1996, Shippensburg University

**PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS:**
Recognized Qualified Bog Turtle Surveyor - U.S. Fish and Wildlife Service (PA)/PA Fish and Boat Commission

Recognized Qualified Bog Turtle Surveyor - Maryland - MD Department of Natural Resources

**YEARS OF EXPERIENCE:**
17 Years

With over seventeen years of service at Skelly and Loy, Mr. Berra's project experience has focused primarily in the area of jurisdictional wetland identification and delineation, but also includes the study and evaluation of aquatic ecosystems, wetland mitigation design/monitoring, stream and river classification, threatened/endangered/rare species investigations, and environmental permitting and documentation.

## PROFESSIONAL EXPERIENCE

**Wetland Identification/Delineation** - Mr. Berra has completed many wetland identification/delineation, and permitting projects for transportation, rail, infrastructure, commercial, industrial, mining, energy (production, transmission, delivery), and residential development projects in Pennsylvania, New York, Maryland, Illinois, Indiana, and North Carolina. He has experience in wetland function evaluation using the USACE Wetland Evaluation Technique II, Hydrogeomorphic Classification, and New England USACE Descriptive Method. He has experience in the identification of potential wetland mitigation sites and their subsequent design, as well as experience in natural and constructed wetland monitoring.

**Bog Turtle Species Specialist** - Mr. Berra is on the U.S. Fish and Wildlife Service (USFWS)/Pennsylvania Fish and Boat Commission (PFBC) and Maryland (MDDNR) list of Recognized Qualified Bog Turtle Surveyors (for Pennsylvania and Maryland). Mr. Berra has conducted numerous Phase 1 habitat assessments and field surveys for the bog turtle (*Clemmys/Glyptemys muhlenbergii*), a Federally listed threatened species and State listed endangered species. Investigations conducted include potential habitat investigations (Phase 1), field surveys for the species (Phase 2), trapping surveys (Phase 3), and radio telemetry research for the species throughout Pennsylvania, Maryland, and New Jersey. This includes characterization of the existing vegetative community, hydrologic regime, evaluation of the soils composition, metapopulation analysis, and hydrologic connectivity assessments. He has located numerous bog turtles at various sites, along with countless other herpetofauna. Mr. Berra has also received training from the USFWS, the PFBC, and the MDDNR regarding the species, its habitat, and field study techniques. He routinely coordinates with the resource agencies for specific projects as well as general species topics.

**Biological Evaluations** - Mr. Berra has also been involved with the biological evaluations for benthic macroinvertebrates, fish, mammals and freshwater mussel communities, ambient water quality evaluations, and physical aquatic habitat evaluations. He has participated in surveys and research for the green floater (Lasmigona subviridis), a State listed rare species and other freshwater mussels; the rough greensnake (*Opheodrys aestivus*) , a State listed threatened species, and numerous other amphibians and reptiles associated with wetlands, vernal pools, and waterways. He has assisted in the research of threatened and endangered bat species and their habitats as well. He has completed training seminars through the Maryland Department of Natural Resources' (MD DNR) Biological Stream Survey (MBSS) program for the collection and identification of macroinvertebrates (and participated in sampling efforts). Additionally, Mr. Berra has experience in the design, restoration, and enhancement of streams using the methodologies and techniques of Applied River Morphology (fluvial geomorphology).

## PROJECT EXPERIENCE

**Field Crew Leader, Wetland Delineator, and Water Quality/Aquatic Resources Assistant, Route 322-B02, Corridor O Project, Centre and**

**Clearfield County, Pennsylvania** - Mr. Berra was responsible for the daily organization and operation of wetland delineation crew, identification and delineation of wetlands within the project area, and assisting with the water quality and aquatic sampling evaluations. He conducted field views, coordination, and meetings with PennDOT, state and federal regulatory agencies, and the public regarding project development and alternative modification and selection. He also assisted staff and teaming consultants in the development of environmental documentation and reports. Approximately 1,300 wetlands and 200 watercourses were identified and delineated in the 12,000-acre study area.

**Project Manager, Field Crew Leader, and Principal Biologist, FirstEnergy Open-End - Pennsylvania** – Mr. Berra is the point-of-contact for Skelly and Loy's open-end with FirstEnergy. Services provided to FirstEnergy, Metropolitan-Edison (MetEd), and Pennelec under this contract focus primarily on wetland/watercourse identifications and delineations, threatened and endangered species coordination and surveys (bog turtle, plants, etc.), agency coordination and permitting. Skelly and Loy has consulted on over 20 projects for FirstEnergy, and in the past 3 years Skelly and Loy has worked on projects in Adams, Bedford, Berks, Monroe, Pike, Tioga, and York Counties. These projects typically involve transmission line, delivery line, and substation work. Mr. Berra works with FirstEnergy Environmental Managers, Engineers, and Field Crew Supervisors to achieve project objectives.

**Field Crew Leader and Project Coordinator, Tygart Valley Pipeline Natural Gas Transmission Line Project, West Virginia** – Mr. Berra served as the field crew leader and project coordinator for the approximately 32-mile long corridor study area associated with this project. Additionally, Mr. Berra advised the project engineer on avoidance/minimization strategies, including re-routes, for wetland and watercourse resources.

**Wetland Delineator, Bog Turtle Biologist, Norfolk Southern Railroad Projects, Pennsylvania** – Mr. Berra has conducted wetland and watercourse delineations, Phase 1 bog turtle habitat assessments, Phase 2 bog turtle species surveys, and permitting for several Norfolk Southern projects in southeastern Pennsylvania.

**Project Manager, Lead Biologist, PENNDOT District 5-0 Maintenance Environmental Open-End** – Mr. Berra manages and leads all work performed on this district-wide (Berks, Carbon, Lehigh, Monroe, Northampton, and Schulykill Counties) contract. A wide range of engineering and environmental services have been provided on over 30 projects in the past 5 years. Services typically provided are for County Maintenance Units within District 5, but are not limited to maintenance specific projects. Typical services provided include wetland and watercourse delineations, T/E coordination and surveys, culvert designs, H&H, E&S, permitting, construction supervision, SPCC plans, etc. Mr. Berra performs the wetland and watercourse associated tasks, permitting, and threatened and endangered species coordination (most of which is bog turtle related).

**Field Crew Leader, El Paso/Tennessee Gas Pipeline Natural Gas Transmission Line Projects, Pennsylvania -** Mr. Berra served as the field crew manager/project coordinator for the wetland and watercourse delineations associated with two major gas line projects located across the state. These projects covered several counties in the southcentral, eastern, northeastern, and northern tier portions of Pennsylvania. As part of one of these projects, he also coordinated and conducted Phase I bog turtle habitat assessments according to U.S. Fish and Wildlife Protocols for wetland habitats identified along the project corridor. Mr. Berra also advised the project engineer on avoidance/minimization strategies for critical wetland and watercourse areas associated with bog turtles.

**Field Crew Leader, Wetland Delineator, and Water Quality/Aquatic Resources Assistant, State Route 2001, Sections 401/402, Improvement Project, Pike County, Pennsylvania** - Mr. Berra was responsible for the daily organization and operation of wetland delineation crew, identification and delineation of wetlands, and assisting with the water quality and aquatic sampling evaluations. Approximately 125 wetlands and 40 watercourses were identified and delineated within the 17-mile long project area.

**Wetland Delineator, Surveyor, and Water Quality/Aquatic Resources Assistant, Route 15 Construction Project, Tioga County, Pennsylvania, and Steuben County, New York** - Mr. Berra was responsible for the identification and delineation of wetlands within the project area, the surveying of delineated wetlands, and assisting with the water quality and aquatic sampling evaluations. Mr. Berra also conducted the preliminary analysis and investigations for potential wetland mitigation sites.

**Project Manager and Wetland Delineator, Hershey Trust Property #148, Conewago Township, Dauphin** - Mr. Berra was responsible for the proposal development, initial field reconnaissance, wetland delineations on this 500+ acre site (with over 85 acres of wetlands). He was also responsible for the preparation of the Wetland I&D and Functional Assessment Report.

BENJAMIN T. BERRA, Environmental Scientist/Biologist

# DYLAN J. WOODWORTH, Environmental Scientist/Biologist

**EDUCATION:**
B.S., Geography with Concentration in Watershed Management, 2013, Mansfield University

**PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS:**
CPR Training

**YEARS OF EXPERIENCE:**
2 Year

Mr. Woodworth's project experience focuses primarily on jurisdictional wetland identification and delineation and also includes study and evaluation of aquatic ecosystems and threatened/endangered/rare species investigations.

## PROFESSIONAL EXPERIENCE

**Wetland Identification/Delineation** - Participated in many wetland identification / delineation investigations for transportation, developments, and mining projects in Pennsylvania. Experienced in wetland function evaluation using the USACE Wetland Evaluation Technique II, Hydrogeomorphic Classification, and New England USACE Descriptive Method.

**Bog Turtle Experience** - Participated in numerous potential habitat evaluations and field surveys for the bog turtle (*Clemmys/Glyptemys muhlenbergii)*, a federally listed threatened species and State listed endangered species. Investigations included potential habitat investigations (Phase 1 Surveys) and field surveys for the species (Phase 2 Surveys), focusing on characterization of the existing vegetative community, hydrologic regime, evaluation of the soils composition, and hydrologic connectivity assessments.

**Biological Evaluations** - Participated in biological evaluations for benthic macroinvertebrates, ambient water quality evaluations, and physical aquatic habitat evaluations. Also assisted in the research of threatened and endangered bat species and their habitats. Also has been part of a team that searched for the Northern Goshawk (*Accipiter gentilis*).

## PROJECT EXPERIENCE

**PennDOT Wetland and Watercourse Investigations, Pennsylvania** – Assisted with numerouse wetland and watercourse investigations throughout Pennsylvania for roadway improvement and bridge/culvert replacement projects. Activities associated with these projects included wetland and watercourse delineation, GPS survey, threatened and endangered species evaluations, and report preparation.

**Rosebud Mining, Indiana County and Clearfield County, Pennsylvania** - Assisted in identifying / delineating wetlands and watercourses on several Rosebud Mining properties and in report preparation for these sites.

**Bog Turtle Surveying, York County, Pennsylvania** - Team participant on Phase 2 Bog Turtle Surveys for various transportation projects in York County.

**Water Quality Monitoring, Tennessee** - Assisted in collection of data and grab samples from surface water systems in Tennessee as part of strip mine pollution monitoring. The data included pH, dissolved oxygen, specific conductance, and flow. Benthic macroinvertebrates were also collected and analyzed in order to determine the health of the insect communities living in the streams.

**Field Crew Member for Mist Net Surveying, Harrison County, West Virginia -** Participated on team identifying mist net survey locations and assisted with the actual mist net surveys. Bat handling, species identification, and data processing with a Qualified Indiana Bat Surveyor (QIBS) were key components to the project. Species caught included the Eastern Small-Footed Myotis (*Myotis Leibii*) and the Big Brown Bat (*Eptesicus Fuscus*).

DYLAN J. WOODWORTH, Environmental Scientist/Biologist

**Bat Emergence Surveys, Lackawanna County, Pennsylvania** – Assisted on a bat emergence count survey to monitor activity of bats in a mitigation site. Activities included the use of infrared camera equipment, Anabat audio recording devices, and various forms of data collection.

**Northern Goshawk Survey, Randolph County, West Virginia** – Assisted in a survey for the Northern Goshawk (*Accipiter gentilis*) associated with the Corridor H project. Activities included following transects to predetermined call-points from which call-back and visual surveys were conducted.

**South Valley Parkway, Mitigation Site Selection, Luzerne County, Pennsylvania** - Assisted with the selection of wetland mitigation sites and the installation of groundwater monitoring wells.

**Pennsylvania Pipeline Project Wetland and Watercourse Investigations, Pennsylvania** – Assistant with wetland and watercourse investigations throughout Pennsylvania for the instillation of the ME2 pipeline for Sunoco. Activities associated with this project include wetland and watercourse delineation, GPS survey, threatened and endangered species evaluations, and data form completion.

**Northeastern Bulrush Survey, Pennsylvania** – Assisted in conducting plant surveys for the Northeastern Bulrush (*Scirpus ancistrochaetus*). An unknown population was found during the field efforts.

**Northern Cricket Frog Survey, Pennsylvania** – Team participant on Phase 2 and 3 surveys for a confidential client. Activities included trapping/trap checking, opportunistic survey, and audio survey.

**Harp Trap Surveying, Lackawanna County, Pennsylvania** – Assisted with emergence harp trap surveying to determine presence or probable absence of the species within potential habitat sites.

DYLAN J. WOODWORTH, Environmental Scientist/Biologist

# EMMA C. RUTH, Environmental Scientist/Economist

**EDUCATION:**
M.S., Agriculture and Resource Economics, 2013, West Virginia University

B.A., Economics, 2011, LaSalle University

**PROFESSIONAL AFFILIATIONS:**
Society of Women Environmental Professionals Capital Chapter

**YEARS OF EXPERIENCE:**
<1 Year

Ms. Ruth is a recent addition to Skelly and Loy, Inc.'s Environmental Services Natural Resources Group. Her academic background at West Virginia University in agriculture and resource economics and LaSalle University in economics provides an excellent foundation for her future at Skelly and Loy. Ms. Ruth has been assisting with a wide range of multidisciplinary environmental projects since the beginning of her employment with Skelly and Loy in May 2014. Her responsibilities include wetland delineation studies, threatened and endangered species studies, permitting, and aquatic assessments. Her training involves wetland delineation, identifying the three parameters (hydric soil, hydrophytic vegetation, and hydrology), habitat assessments, species surveys, and proper sampling techniques for aquatic, terrestrial, and palustrine environments and wildlife.

While at Skelly and Loy, she has gained experience performing wetland delineations, stream assessments and surveys, threatened and endangered species coordination, threatened and endangered plant habitat assessments, bat emergence surveys, and Phase 1 archaeology digs. She also has experience preparing various environmental documents for a variety of Pennsylvania Department of Transportation (PennDOT) projects.

## EDUCATIONAL EXPERIENCE

While at West Virginia University, Ms. Ruth gained experience in watershed, wetland, and forest management, data analysis and management, and environmental and resource economic analysis through classes such as Spatial Analysis, Spatial Statistics, Applied GIS, Natural Resource and Environmental Economics, and various resource management classes.

While at LaSalle University, Ms. Ruth gained experience in environmental science, geology, and environmental economics through classes such as Environmental Science, Introduction to Geology, and Environmental Economics.

Ms. Ruth interned with Trout Unlimited and the U.S. Forest Service in West Virginia during the Summer of 2013. She was a member of a three-person watershed crew conducting brook trout habitat surveys throughout the Monongahela National Forest which included electrofishing and cross-sectional surveys of streams. She was also involved in a large woody debris stream restoration project along the East Fork Greenbrier River during her internship with Trout Unlimited.

Ms. Ruth attended a wetland delineation training session hosted by the U.S. Army Corps of Engineers in 2012 and a hydric soils training session hosted by the Pennsylvania Association of Professional Soil Scientists in 2014.

## PROFESSIONAL EXPERIENCE

**Stream Assessments** - Ms. Ruth has assisted with mitigated stream monitoring for the PennDOT as well as the Pennsylvania Turnpike Commission (PTC).

**Wetland Assessments** - Ms. Ruth has assisted with wetland mitigation monitoring for PennDOT and the PTC.

**Bat Emergence Surveys** - Ms. Ruth assisted in the bat emergence survey efforts for the Valley View Business Park Project and the South Valley Parkway Project during July 2014. She also assisted with bat emergence surveys for the Central Susquehanna Valley Transportation project during June 2014.

# LOGAN T. ZUGAY, Wildlife Biologist/Environmental Scientist

**EDUCATION:**
B.S., Wildlife Biology, 2011, The Pennsylvania State University

**PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS:**
Recognized Qualified Bog Turtle Surveyor – U.S. Fish and Wildlife Service (PA)/PA Fish and Boat Commission

**YEARS OF EXPERIENCE:**
4 Years

Mr. Zugay's project experience has focused primarily in the area of jurisdictional wetland identification and delineation, but also includes the study and evaluation of aquatic ecosystems, water quality monitoring, and threatened/endangered/rare species investigations.

## PROFESSIONAL EXPERIENCE

**Wetland Identification/Delineation** - Mr. Zugay has completed many wetland identification / delineation, and permitting projects for transportation, mining, and energy projects in Pennsylvania and West Virginia. He has experience in wetland function evaluation using the USACE Wetland Evaluation Technique II, Hydrogeomorphic Classification, and New England USACE Descriptive Method.

**Bog Turtle Species Specialist** - Mr. Zugay is on the USFWS and PFBC qualified bog turtle surveyors list in Pennsylvania. He has been a part of numerous potential habitat evaluations and field surveys for the bog turtle (*Clemmys/Glyptemys muhlenbergii*), a Federally listed threatened species and State listed endangered species. Investigations conducted include potential habitat investigations (Phase 1 Surveys), field surveys for the species (Phase 2 Surveys), trapping surveys (Phase 3 Surveys), and radio telemetry research for the species throughout Pennsylvania. This includes characterization of the existing vegetative community, hydrologic regime, evaluation of the soils composition, metapopulation analysis, and hydrologic connectivity assessments. He has located numerous bog turtles at various sites, along with countless other herptofauna.

**Biological Evaluations** - Mr. Zugay has also been involved with the biological evaluations for benthic macroinvertebrates, ambient water quality evaluations, and physical aquatic habitat evaluations. He has also participated in surveys for Eastern box turtles (*Terrapene carolina*) in Maryland. Additionally, Mr. Zugay has experience in the design, restoration, and enhancement of streams using the methodologies and techniques of Applied River Morphology (fluvial geomorphology).

## PROJECT EXPERIENCE

**Wetland Delineator, Qualified Bog Turtle Surveyor, Project Coordinator, and Field Crew leader, Mariner East 2 Pipeline - Sunoco, Pennsylvania** –Mr. Zugay performed wetland and watercourse delineations in Westmoreland, Indiana, Cambria, Blair, Huntington, Perry, Cumberland, York, Lancaster, Lebanon, Berks, and Chester Counties. He also conducted over one-hundred Phase 1 bog turtle habitat assessments and assisted on dozens of Phase 2 bog turtle surveys. In addition to his field work responsibilities, Mr. Zugay also was responsible for the day-to-day operations of field crews, development of mapping, composition of wetland and stream data forms as well as Phase 1 bog turtle habitat assessment forms, daily coordination with land agents and project managers, and attendance at multiple project management meetings. The project is on-going.

**Assistant, Bog Turtle Surveying and Radio Telemetry, Chester County, Pennsylvania –** Mr. Zugay was part of a team that searched for bog turtles in wetlands in Chester County in order to perform a radio telemetry study. He located and positively identified multiple bog turtles, and assisted with data collection, scute notching, attachment of radio transmitters, and the weekly monitoring and GPS surveying of several turtles.

**Wetland Delineator and Assistant Project Coordinator, NM45 ECDA Dig Project, Mercer County, Pennsylvania** – Mr. Zugay delineated wetlands and

watercourses over an approximately 2-mile corridor along an existing natural gas line. In addition to his field work responsibilities, Mr. Zugay also was responsible for performing the GPS survey of aquatic resources, managing the development of the E&S plan and permit package composition, and attending a pre-application meeting on behalf of the client with the Pennsylvania Department of Environmental Protection.

**Field Crew Leader and Assistant Project Coordinator, Tygart Valley Pipeline Wetland and Watercourse Delineations, West Virginia** – Mr. Zugay delineated over fifty wetlands and over thirty watercourses in portions of the thirty-two mile long corridor. Soils, vegetation, and hydrology were analyzed and recorded. Mr. Zugay was also responsible for the daily organization of the delineation team.

**Wetland Delineator and Assistant Project Coordinator, FM100 Pipeline Replacement Project, Cameron County, Pennsylvania** - Mr. Zugay delineated wetlands and watercourses over an approximately 1.5-mile corridor along an existing natural gas line proposed for replacement. In addition to his field work responsibilities, Mr. Zugay also was responsible for managing the GPS survey of aquatic resources, development of the E&S plan, permit package composition, and other management activities associated with the project.

**Assistant, US 219 Bat Hibernacula Surveys, Somerset County, Pennsylvania** – Mr. Zugay was a member of a field team responsible for locating potential bat hibernacula portals and trapping those locations. Bat handling, species identification, and data processing with a Qualified Indiana Bat Surveyor (QIBS) were the key components to the job.

**Assistant, Water Quality Monitoring, Tennessee** - Mr. Zugay helped to collect data and grab samples from surface water systems in Tennessee as part of strip mine pollution monitoring. The data included pH, dissolved oxygen, specific conductance, and flow. Benthic macroinvertebrates were also collected and analyzed in order to determine the health of the insect communities living in the streams.

**Assistant, West Virginia Route 10 Wetland and Watercourse Delineations, West Virginia –** Mr. Zugay delineated over ten watercourses and over twenty wetlands along the two-mile study area. Soils, vegetation, and hydrology were analyzed and recorded. Additionally, high gradient streams were evaluated with the USACE data sheets for embeddedness, canopy cover, substrate size, detritus material cover, and more.

**Field Crew Member for Potential Indiana Bat Hibernacula and Mist Net Survey, Mingo County, West Virginia** - Mr. Zugay was part of a team that identified potential Indiana bat hibernacula and picked out mist net survey locations. He also participated in a mist net survey.

**Assistant, Eastern Box Turtle Surveyor, InterCounty Connector Highway Project, Maryland** - Mr. Zugay participated in field surveys for Eastern box turtles within the project area, collecting data on the turtles, notching scutes, and relocating the turtles outside of the project impact area.

**Assistant Stream Surveyor, Carbon County, Pennsylvania** - Mr. Zugay assisted in the surveying of water depths, bank heights, riffle/run lengths, and also evaluated substrate sizes. The data is used as a model for stream rehabilitations.

**Field Crew Leader, Water Quality/Flow Monitoring and Well Testing, Centre and Sullivan Counties, Pennsylvania** - Mr. Zugay was responsible for the monthly monitoring of watercourses for flow, pH, total suspended solids, and total dissolved solids. He was also responsible for the monitoring of well depths, pH, and field temperature.

**Assistant, Bat Emergence Surveys, Lackawanna County, Pennsylvania** - Mr. Zugay assisted on a bat emergence count survey to monitor activity of bats in a mitigation site. Activities included the use of infrared camera equipment, Anabat audio recording devices, and various forms of data collection.

**Field Crew Leader, Well Water and Surface Water Sampling and Monitoring, Indiana County, Pennsylvania** – Mr. Zugay was responsible for the collection of well water and surface water samples for baseline data for the site of a future rock quarry. The well samples were acquired by using the Low Stress (low flow) Purging method.

LOGAN T. ZUGAY, Wildlife Biologist/Environmental Scientist

# MEGAN HINKLE, Biologist

**EDUCATION:**
B.S., Biology and Chemistry, 2011, Wilson College

**YEARS OF EXPERIENCE:**
3 Years

Ms. Hinkle has gained a vast amount of experience and knowledge since she started working for Skelly and Loy in the spring of 2012. She has become very familiar with all the services that Skelly and Loy offers and is currently focusing her work efforts on permitting. She also has experience and training in jurisdictional wetland identification, agency coordination, data management, threatened and endangered species studies and aquatic assessments.

## PROFESSIONAL EXPERIENCE

**Permit Preparation** - In her time at Skelly and Loy, Ms. Hinkle has prepared and submitted permits including Pennsylvania Department of Environmental Protection (PA DEP) General Permits, PA DEP and United States Army Corps of Engineers (USACE) Joint Permits, Individual Permits, Small Projects Permits, Nationwide Permits and Emergency Permits. These permits have been submitted on behalf of state governments, private companies, and private individuals for various transportation, commercial, and residential projects.

**Threatened and Endangered Species Surveys** - Ms. Hinkle has participated in many threatened and endangered species surveys for the bog turtle and Indiana bat as well as assisting in surveys for several avian species. She has experience with Phase II bog turtle assessments in Pennsylvania and Maryland.

**Wetland Delineation and Mitigation Monitoring** - Ms. Hinkle assisted with the delineation and monitoring of wetland mitigation sites for both PennDOT and private projects. She used Global Positioning Systems to gather field data to help map the wetlands as well as in-field information to prepare wetland data sheets and the corresponding Wetland Identification and Delineation Reports.

**Phase I Archaeological Assessment** - As an assistant, Ms. Hinkle helped to complete Phase I Archaeological Assessments on several projects. The base of these assessments included digging of soil pits and determination of pit contents. Historic and site background research was also done to complete these Phase I Assessments.

## PROJECT EXPERIENCE

**Quittie Nature Park Stream Restoration, Lebanon County, Pennsylvania** - Ms. Hinkle aided in the preparation and submission of the Chapter 404/Section 105 Joint Permit application required for the stream improvements in the Quittie Nature Park.

**Valley Green Road Stream Stabilization Project, Philadelphia County, Pennsylvania** - Ms. Hinkle was responsible for the preparation and submission of the Chapter 404/Section 105 Joint Permit application needed to stabilized Valley Green Road.

**I-84 Improvement Project, Pike County, Pennsylvania** - Ms. Hinkle was responsible for the assembly and submission of the General Permit 11 needed for the improvements to I-84.

**Equitrans, LP, Permitting, Pennsylvania** - Ms. Hinkle has assisted in several EQT projects that have required multiple General Permits. Her responsibilities include agency coordination and preparing the General Permits for submission.

**Corridor H Studies, Elkins, West Virginia** - Ms. Hinkle has assisted on many field teams throughout the Corridor H project. She has helped survey for the Long-eared Owl and the Goshawk as well as being a part of the habitat assessment field crew.

**Bat Emergence Surveys, Lackawanna Country, Pennsylvania** - Ms. Hinkle assisted on a bat emergence survey to monitor activity of bats in a mitigation site. Activities included use of infrared camera equipment, Anabat audio recording devices, and various forms of data collection.

**Eastern Box Turtle Surveyor, InterCountry Connector Highway Project, Maryland** - Ms. Hinkle participated in field surveys for Eastern box turtles within the project area, collected data in turtles, assisted in notching scutes and relocated the turtles outside the project impact area.

**U.S. 219 Bat Hibernacula Surveys, Somerset County, Pennsylvania** - Ms. Hinkle was a member of a field team responsible for locating potential bat hibernacula portals.

MEGAN HINKLE, Biologist

# Seth P. Hoover, Environmental Scientist

**EDUCATION:**
B.S., Biology, 2015,
Millersville University

**YEARS OF EXPERIENCE:**
2 Years

Over the past two years, Mr. Hoover has gained experience primarily focused in the area of jurisdictional wetland identification and delineation, and the study and evaluation of aquatic and terrestrial ecosystems. Mr. Hoover has also participated in several threatened and endangered species field surveys for Northeastern Bulrush (*Scirpus ancistrochaetus*), Running Buffalo Clover (*Trifolium stoloniferum*), Bog Turtle (*Glyptemys muhlenbergii*), Northern Cricket Frog (*Acris crepitans*), Eastern Small-footed Myotis (*Myotis leibii*), and the Northern Goshawk (*Accipiter gentilis*).

## PROFESSIONAL EXPERIENCE

**Wetland Identification/Delineation** - Mr. Hoover has participated in various wetland identification / delineation investigations for transportation, land development, and mining projects throughout Pennsylvania. Experienced in wetland functional evaluation using the United States Army Corps of Engineers (USACE) Wetland Evaluation Technique II, Hydrogeomorphic Classification and New England USACE Descriptive Method.

**Threatened and Endangered Species** – Mr. Hoover's threatened and endangered species experience is within several diverse fields. Botanically, he has been an assistant with the surveys for two federally listed species; Northeastern Bulrush (*Scirpus ancistrochaetus*) and Running Buffalo Clover (*Trifolium stoloniferum*). His survey experience has also extended to two listed amphibian species; presence/absence surveys for the Bog Turtle (*Glyptemys muhlenbergii*) and the Northern Cricket Frog (*Acris crepitans*). Mr. Hoover has also assisted in emergence surveys for the Eastern Small-footed Myotis (*Myotis leibii*) and acoustic call surveys for the Northern Goshawk (*Accipiter gentilis*).

## PROJECT EXPERIENCE

**PENNDOT Wetland and Watercourse Investigations (2013-2015)** – Assisted with numerous wetland and watercourse investigations throughout Pennsylvania for roadway improvement and bridge/culvert replacement projects. Activities associated with these projects included wetland and watercourse delineation, GPS survey, threatened and endangered species evaluations, and report preparation.

**Corridor H Project (WVDOT) Northern Goshawk Survey, Randolph County, West Virginia (2013)** – Assisted in a survey for the Northern Goshawk (*Accipiter gentilis)* associated the with Corridor H project. Activities included following transects to predetermined call-points from which call-back and visual surveys were conducted.

**Corridor H Project (WVDOT) Running Buffalo Clover Survey, Randolph County, West Virginia (2013)** – Assisted in a survey for Running Buffalo Clover (*Trifolium stoloniferum*) associated with the Corridor H project. Related activities included traversing proposed access roads and developing composite plant lists for the associated area.

**Valley View Bat Emergence Surveys, Lackawanna County, Pennsylvania (2013)** – Mr. Hoover assisted on a bat emergence count survey to monitor activity of bats in an industrial development park. Activities included the use of infrared camera equipment, Anabat audio recording devices, and various forms of data collection.

**PENNDOT District 2-0, S.R. 0322 Northeastern Bulrush Presence/Probable Absence Survey, Center County, PA (2013)** – Mr. Hoover assisted in a large scale field survey effort for this federally listed species within a project area encompassing 740 acres along a 3.5-mile-long section of existing highway in Centre County, Pennsylvania. The species in question was not encountered; however, three relatively common bulrush species were observed.

**Phase 2 Bog Turtle Surveys, Pennsylvania (2015)** – Mr. Hoover has assisted in various Phase 2 bog turtle surveys associated with pipeline projects in Pennsylvania.

**South Valley Parkway Project (PENNDOT) Eastern Small-Footed Myotis Emergence Surveys, Luzerne County, PA (2015)** – Mr. Hoover was responsible for assisting the USFWS Qualified Indiana Bat Surveyor (QIBS) with setting up equipment, emergence counts, and data collection.

**Northern Cricket Frog Survey, Pennsylvania (2015)** – Team participant on Phase 2 and 3 surveys for a confidential client. Activities included trapping/trap checking, opportunistic survey, and audio survey.

Seth P. Hoover, Environmental Scientist