

Aquatic Resource Report Addendum  
for the  
Pennsylvania Pipeline Project,  
Dauphin County,  
Southcentral Region  
Pennsylvania



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For  
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November 2016

## TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE NO.</u>
<b>ACRONYMS</b> .....	iii
<b>1.0 INTRODUCTION</b> .....	1-1
<b>2.0 METHODOLOGY</b> .....	2-1
<b>3.0 RESULTS</b> .....	3-1
3.1 NEW FEATURES	
3.1.1 WETLAND IDENTIFICATION AND DELINEATION	
3.1.2 STREAM IDENTIFICATION AND EVALUATION	
3.2 MODIFIED FEATURES	
<b>4.0 CONCLUSIONS</b> .....	4-1
<b>REFERENCES</b> .....	R-1

### FIGURES

1	USGS PROJECT LOCATION MAPS
2	NRCS SOILS MAPS
3	NATIONAL WETLAND INVENTORY MAPS
4-IND	INDEX MAPS
4-1 to 4-3	DETAIL MAPS

### APPENDICES

A	WETLAND DETERMINATION DATA FORMS
B	WETLAND PHOTOGRAPHS
C	STREAM DATA SHEETS
D	STREAM PHOTOGRAPHS
E	MODIFIED WETLAND PHOTOGRAPHS
F	HYDRIC SOILS LIST
G	RESUMES

## 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
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
GIS	Geographic Information Systems
GPS	Global Positioning System
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate
PA	Pennsylvania
PADEP	Pennsylvania Department of Environmental Protection
PEM	Palustrine Emergent
PFO	Palustrine Forested
Project	Pennsylvania Pipeline Project
PSS	Palustrine Scrub Shrub
SF	Square Feet
SPLP	Sunoco Pipeline, LP
Tetra Tech	Tetra Tech, Inc.
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

On behalf of Sunoco Pipeline, LP (SPLP), Tetra Tech, Inc. (Tetra Tech), has prepared this Aquatic Resource Addendum Report for Dauphin County to support the Pennsylvania Pipeline Project (Project). Additional aquatic resource surveys were determined to be necessary to accommodate additional Project area changes. This addendum report will be the second addendum submitted since the original Aquatic Resource Report, prepared in August 2015. This addendum report reflects changes and additions to aquatic resources identified since the March 2016 Aquatic Resource Addendum Report was prepared for Dauphin County, Pennsylvania (PA). The three reports provide a comprehensive delineation of aquatic resources to be, or likely to be, impacted by the proposed Project. Wetland areas were delineated onsite using methodology outlined within 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 (Environmental Laboratory, 2012; *Corps Regional Supplement*).

The content of this report presents the methodology, results, and conclusions of wetland delineation and stream identification activities completed for Addendum Study Areas. This report provides additional baseline information on existing aquatic resources so that appropriate avoidance and minimization measures can be implemented. This report does not reference a detailed project description, present impacts, or discuss Clean Water Act jurisdiction.

## 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: 2016 Update of Wetland Ratings (Lichvar et al, 2016). 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)* - sometimes occurs in wetlands; estimated probability 1%-33%

*Upland (UPL)* - rarely occurs in wetlands; estimated probability <1%

Streams identified in the field were categorized as one of the following flow regimes: ephemeral, intermittent, or perennial.

Streams identified in the field were designated as ephemeral if they exhibited the following characteristics. Ephemeral streams typically exhibit short duration flow derived from precipitation and precipitation driven run-off from the localized surrounding landscape. Ephemeral streams are located above the groundwater table and are not augmented by groundwater sources. Ephemeral streams are often dry. Therefore, no permanent fish species persistently reside in streams

exhibiting this flow regime. Aquatic macroinvertebrates are also not common within this flow regime and the absence is often used to support the determination of a stream being ephemeral. As practical, the source of hydrology for a stream was identified. If the stream received no groundwater contributions then it was designated as ephemeral.

Streams identified in the field were designated as intermittent if they exhibited the following characteristics. Intermittent streams exhibit periods of flowing water during the wet season (winter through spring), but normally flow does not persist year-round. Intermittent streams derive at least a portion of their hydrology from ground water sources. Precipitation and precipitation driven run-off from the surrounding landscape serve supplemental hydrologic contributors. Only pioneer fish species potentially occupy streams of this flow regime when conditions are optimal. Aquatic macroinvertebrate populations in intermittent streams differ from season to season depending on stream flow fluctuations. As practical, the source of hydrology for a stream was identified. If the stream received groundwater contributions then it was designated as either an intermittent or perennial.

Streams identified in the field were designated as perennial if they exhibited the following characteristics. Perennial streams have continuous flow year-round during years of normal rainfall. Perennial streams, like intermittent streams, derive hydrology from ground water sources. Precipitation and precipitation driven run-off from the surrounding landscape serve supplemental hydrologic contributors. Usually numerous ephemeral and intermittent streams are tributaries to perennial streams. These tributaries allow for a large enough drainage area and groundwater inflow to allow for continuous flow year-round. Various fish and macroinvertebrate species may be present if suitable water quality parameters are present.

The Project field investigations addressing modifications or verifications to previously collected data were performed during numerous field visits occurring between March 2016 and November 2016. The Addendum Study Area was limited to the modification areas 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:

- United States Geological Survey (USGS) topographic mapping (Figures 1-1 to 1-3; USGS, 2009)
- Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey (Figures 2-1 to 2-3; NRCS, 2014)
- USFWS National Wetland Inventory (NWI) Mapping (Figures 3-1 to 3-3; USFWS, 2009)

The delineation consisted of the 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 and stream flagging was limited to the bounds of the investigated Addendum Study Area and wetlands are shown as closed or partially closed systems on the detail maps (Figures 4-1 to 4-3).

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. As a result of reevaluation per PADEP comments, photographs reflecting modifications made to wetlands since the March 2016 Aquatic Resource Addendum Report have been provided in the Modified Wetland Photographs (Appendix E). Appendix F provides a list of hydric soils known to occur within Dauphin County. Resumes of project personnel are included in Appendix G.

## 3.0 RESULTS

The field investigations identified one area within Dauphin County, located within the Southcentral Region of the proposed Pennsylvania Pipeline Project Addendum Study Area, which met the wetland criteria outlined in the *1987 Manual*, as amended by the *Corps Regional Supplement*. Additionally, one previously identified wetland was extended within of the Addendum Study Area. One new stream was identified within the Project Addendum Study Area. A narrative summary of field data collected for these features is presented below. The detail maps, provided as Figures 4-1 to 4-3, illustrate the wetland and stream locations in relation to the Addendum Study Area.

### 3.1 NEW FEATURES

#### 3.1.1 Wetland Identification and Delineation

Hydric soils and soils with hydric components are often associated with wetlands. The NRCS Soil Survey hydric soils list for Dauphin County, PA is included in Appendix F. The NRCS Soil Survey Saps are included as Figures 2-1 to 2-3. Confirmation of the soil mapping units was not performed during this site evaluation.

NWI mapped wetlands that fall within the Addendum Study Area are illustrated on the NWI Maps included as Figures 3-1 to 3-3.

Based on field evidence and best professional judgment, it was determined that one new wetland is present within the Addendum Study Area. This area 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  $\leq 3$ , the soils exhibited hydric characteristics, and the area contained wetland hydrology indicators.

USACE Wetland Determination Data Forms that detail the existing vegetation, soil characteristics, and hydrology were prepared for the wetland and its associated upland point (Appendix A).

#### **Wetland CC32**

Wetland CC32 (W-CC32) is a 10,956-square foot (SF) PEM wetland (Figure 4-2). Indicators of wetland hydrology include drainage patterns, geomorphic position, and microtopographic relief. Dominant vegetation consists of lamp rush (*Juncus effusus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 3/3) with a silt clay loam texture that contains redoximorphic features (10YR 4/6).

### **3.1.2 Stream Identification and Evaluation**

Based on field evidence and best professional judgment, it was determined that one stream was identified within the Addendum Study Area. A data sheet that details the bank and channel characteristics, substrate composition, aquatic habitat, and hydrology was prepared for the stream (Appendix C).

#### **Stream CJ1**

Stream S-CJ1 (S-CJ1) is a perennial unnamed tributary (UNT) to the Susquehanna River (Figure 4-1). The bank is approximately 20 feet in width. The left bank is 5 feet in height and the right bank is 4 feet in height. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation the stream had a water depth of 2 feet.

### **3.2 MODIFIED FEATURES**

Based on field evidence and best professional judgment, it was determined one previously identified wetland was modified within the Addendum Study Area

#### **Wetland A18**

W-A18 is a previously identified wetland that was modified within the Addendum Study Area (Figure 4-1). No new data was collected for this wetland extension.

## 4.0 CONCLUSIONS

During the field investigations in Dauphin County, PA, located within the Southcentral Region of the proposed Project, one new wetland was identified within the Addendum 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).

One new stream was identified within the evaluated Addendum Study Area. Additionally, one previously identified wetland was modified within the Addendum Study Area.

## REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe, 1979. Classification of Wetlands and Deepwater Habitats of the United States. United States Government Printing Office. Washington, D.C. GPO 024-010-00524-6. 103 pp.

Environmental Laboratory, 1987. Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1. United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Environmental Laboratory, 2012, Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, ERDC/EL TR-10-9, U.S. Army Engineers Research and Development Center, Vicksburg, Mississippi.

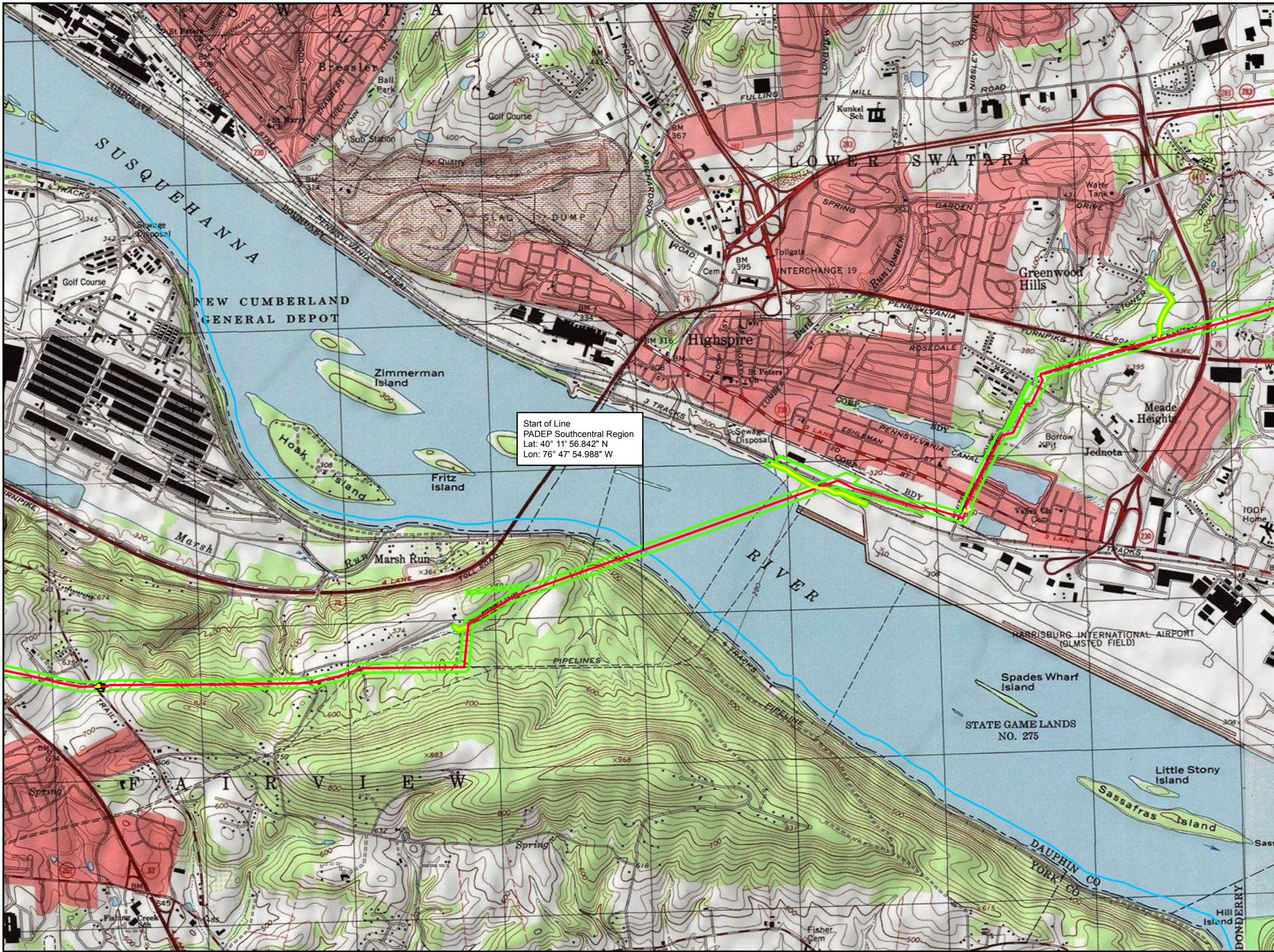
Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

Natural Resource Conservation Service, 2014. Hydric Soils of the United States, available at: <http://soils.usda.gov/use/hydric/>.

United States Fish and Wildlife Service, 2009. National Wetlands Inventory Mapping. Available at: <http://wetlandsfws.er.usgs.gov>.

United States Geological Survey, 2009, United States Geological Survey Topographical Mapping. available at: <http://nmviewogc.cr.usgs.gov/viewer.htm>.

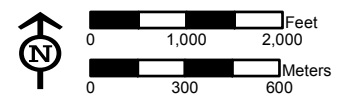
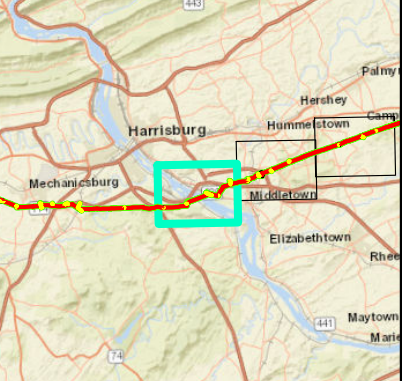
## FIGURES



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 Lat: 40° 11' 56.842" N  
 Lon: 76° 47' 54.988" W

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- Access Road
  - Alignment Centerline
  - Block Valve/Station
  - Study Area
  - County Boundary

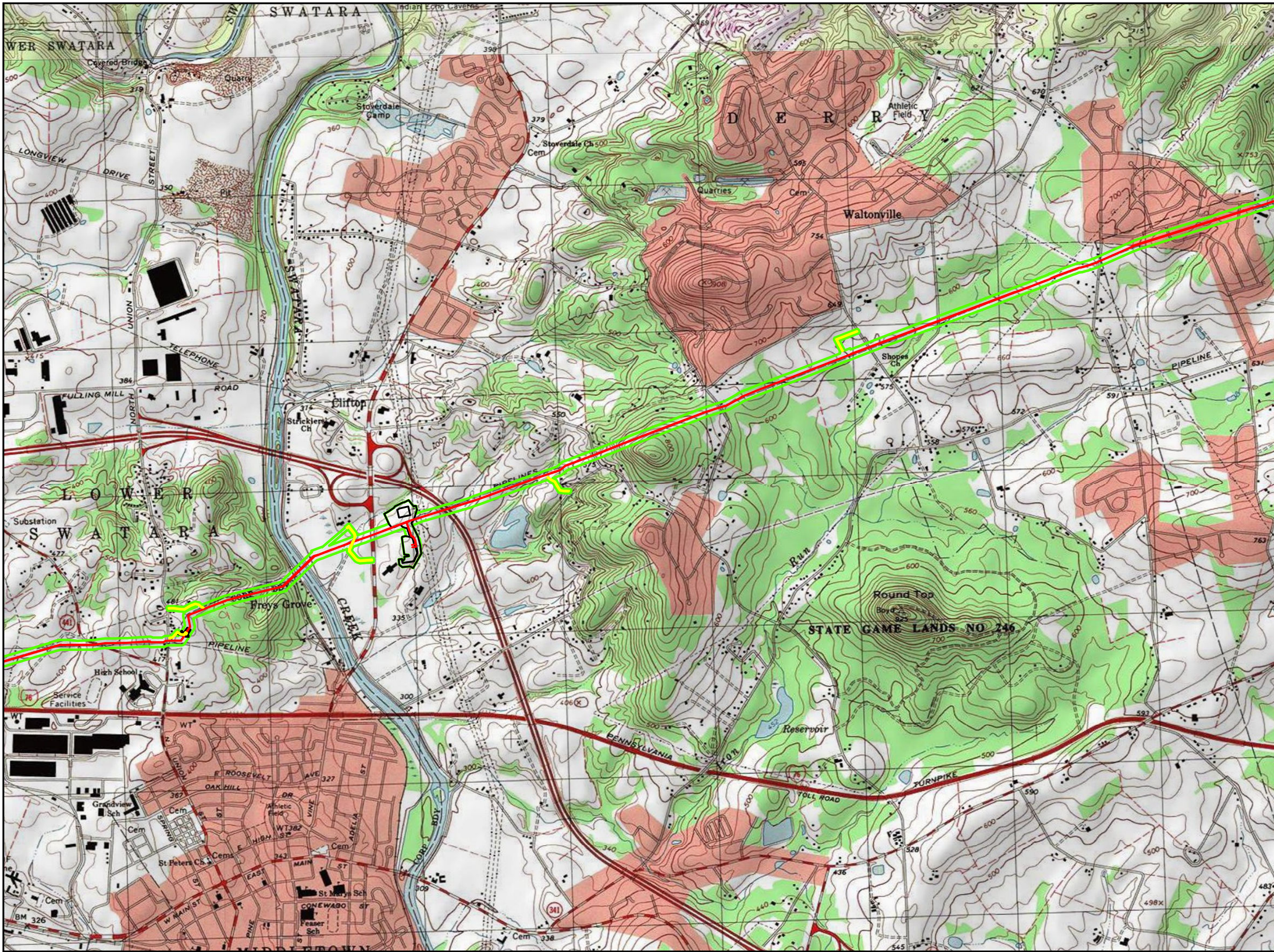
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**USGS PROJECT LOCATION MAP**  
**FIGURE 1-1**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**

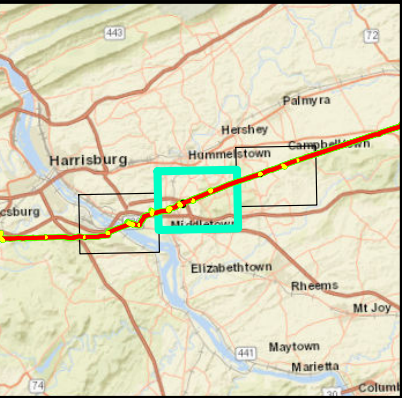


**Notes:**  
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).  
 2) Quadrangles being displayed are Lemoyne, Steelton



- Legend**
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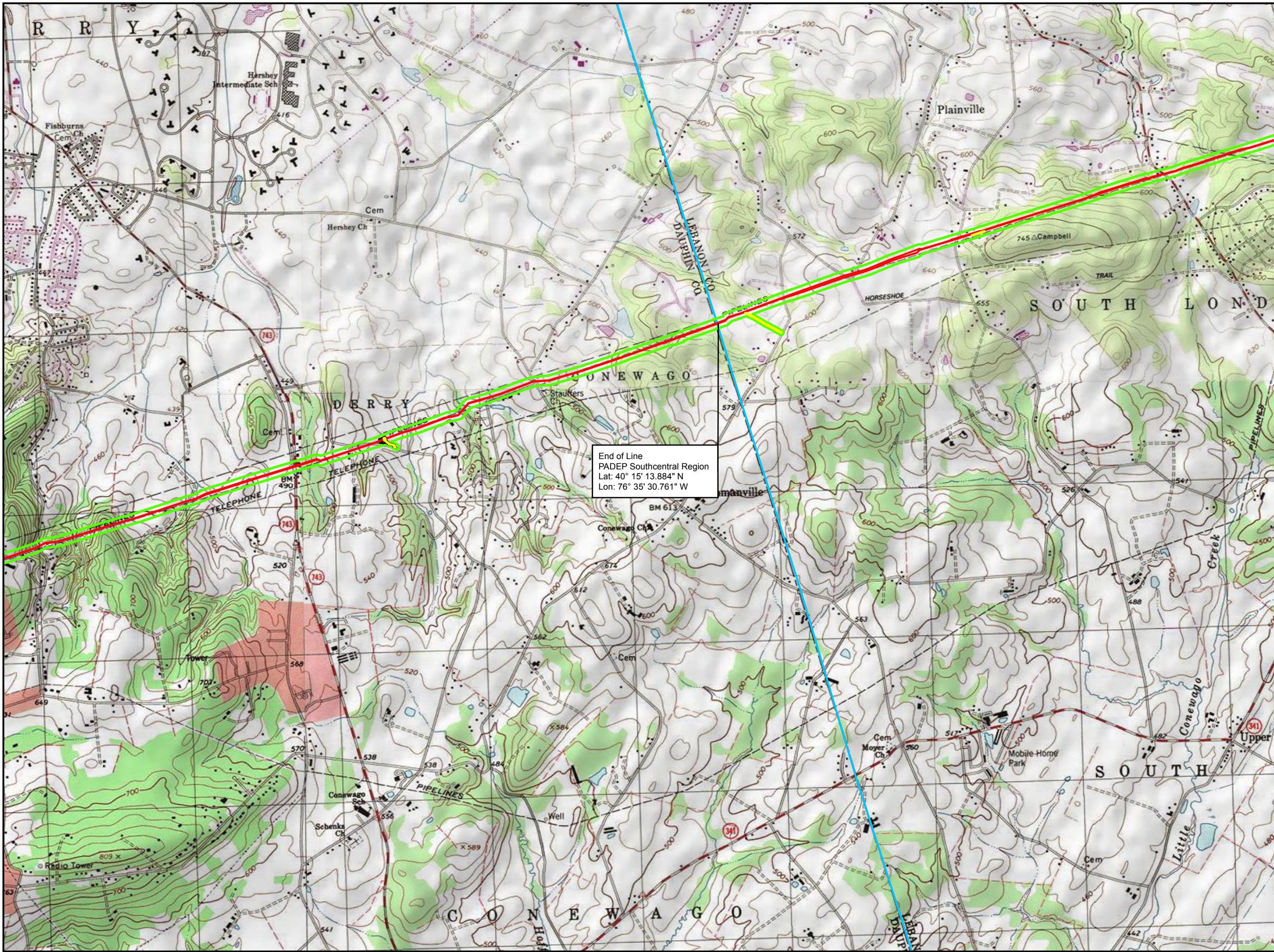
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**USGS PROJECT LOCATION MAP  
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DAUPHIN COUNTY, PA**



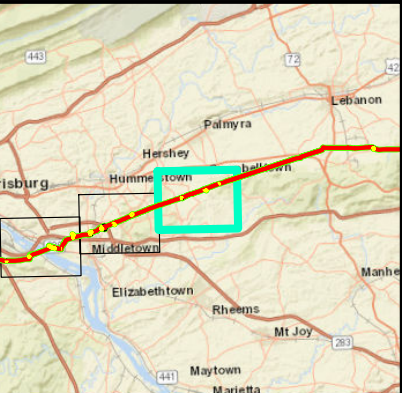
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 2) Quadrangles being displayed are Middletown, Steelton



- Legend**
- Access Road
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  - Study Area
  - County Boundary

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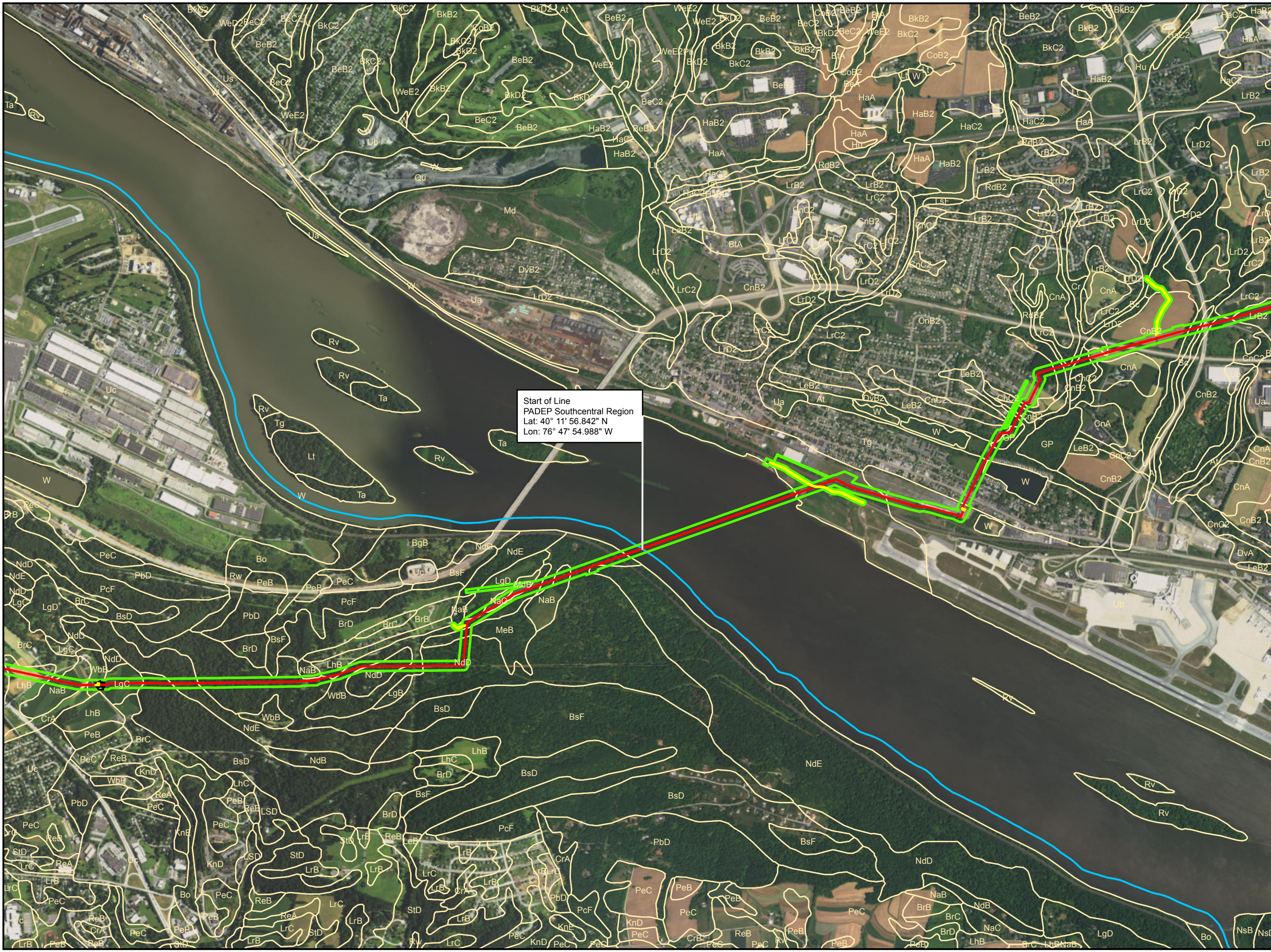
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**USGS PROJECT LOCATION MAP**  
**FIGURE 1-3**  
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**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**









**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 Elizabethtown, Hershey, Middletown, Palmyra

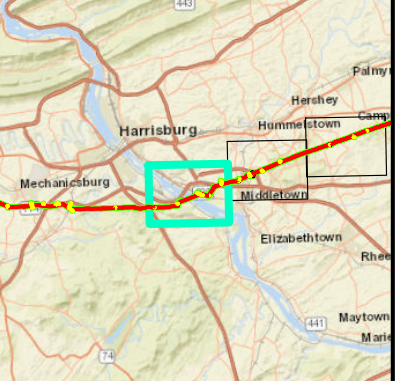


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-  NRCS Soils and Codes
-  County Boundary

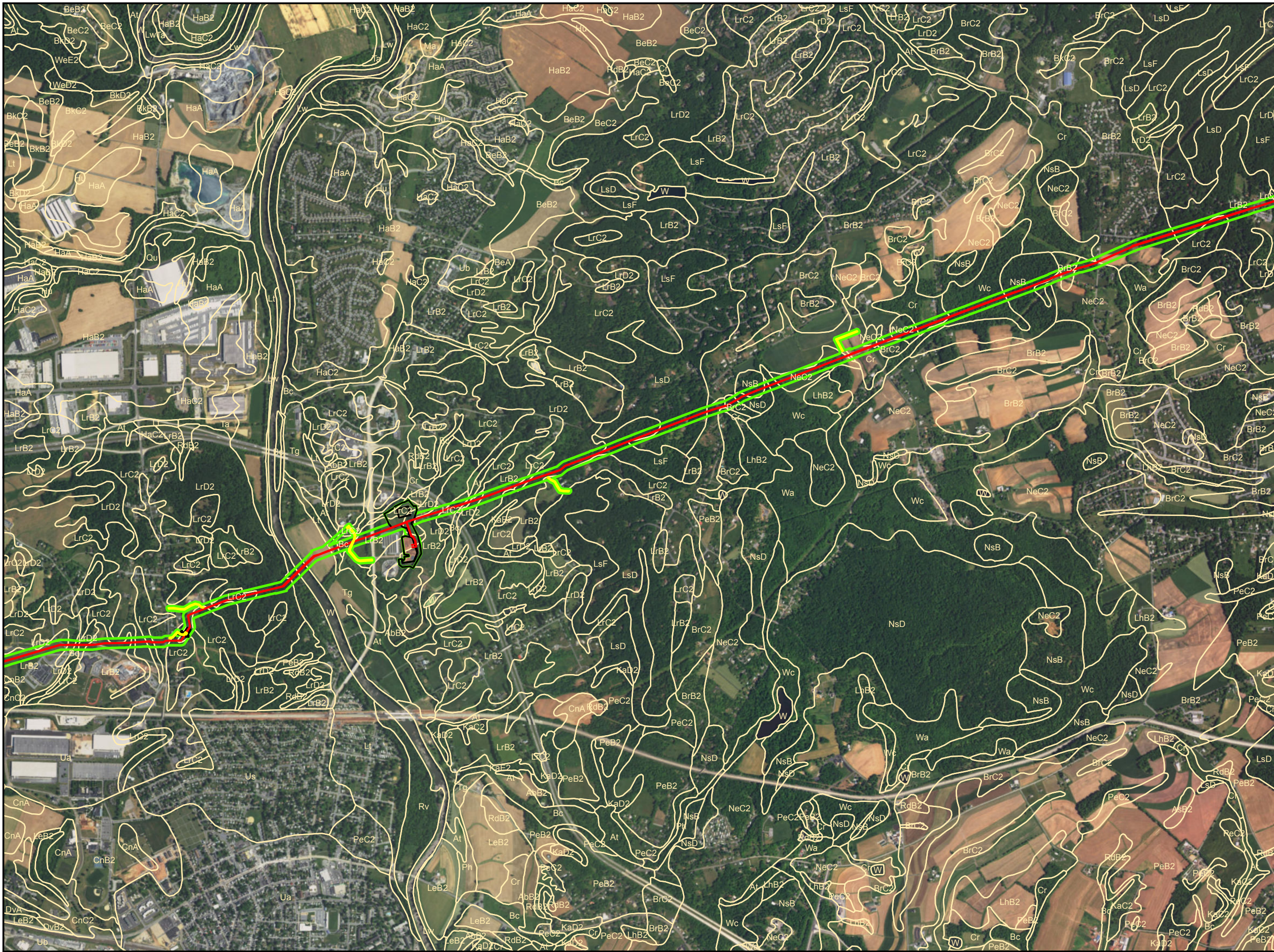
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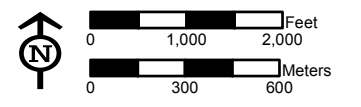
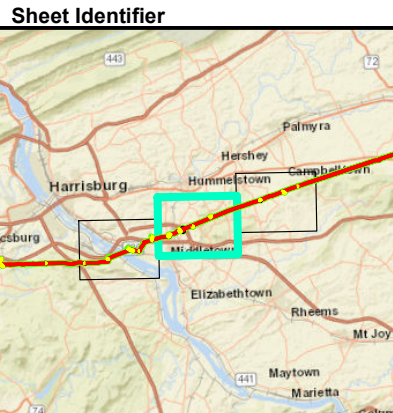
**NRCS SOILS MAP**  
**FIGURE 2-1**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**



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**NRCS SOILS MAP  
FIGURE 2-2  
PENNSYLVANIA PIPELINE PROJECT  
NOVEMBER 12, 2016 ALIGNMENT  
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DAUPHIN COUNTY, PA**

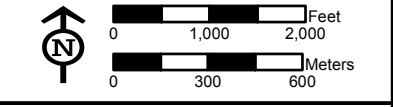
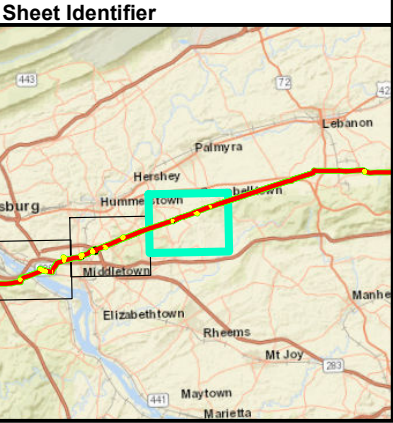


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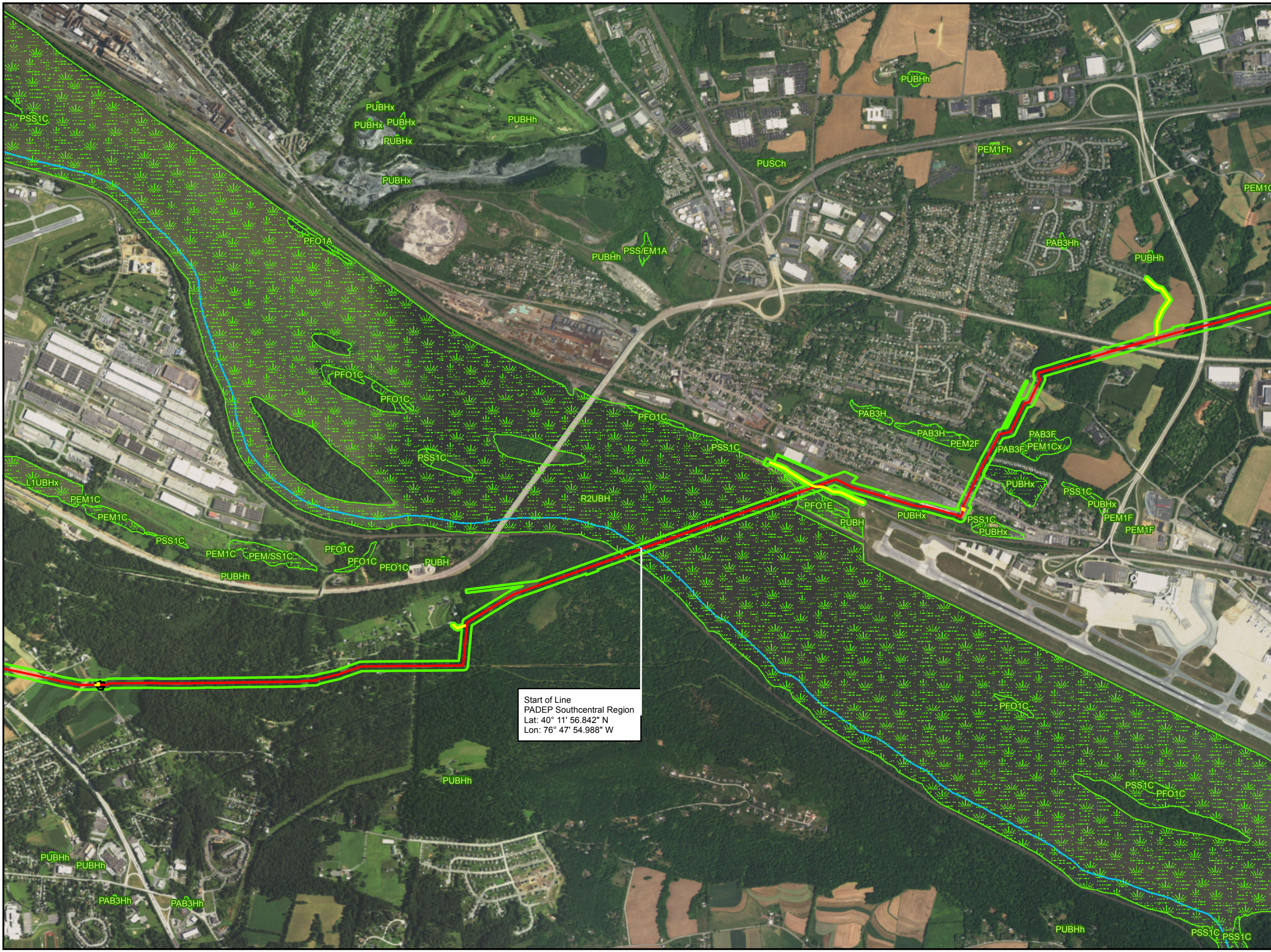


**NRCS SOILS MAP  
FIGURE 2-3  
PENNSYLVANIA PIPELINE PROJECT  
NOVEMBER 12, 2016 ALIGNMENT  
SUNOCO LOGISTICS, L.P.  
DAUPHIN COUNTY, PA**



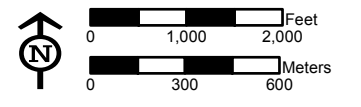
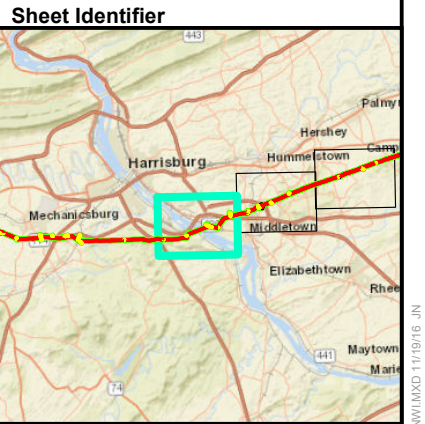
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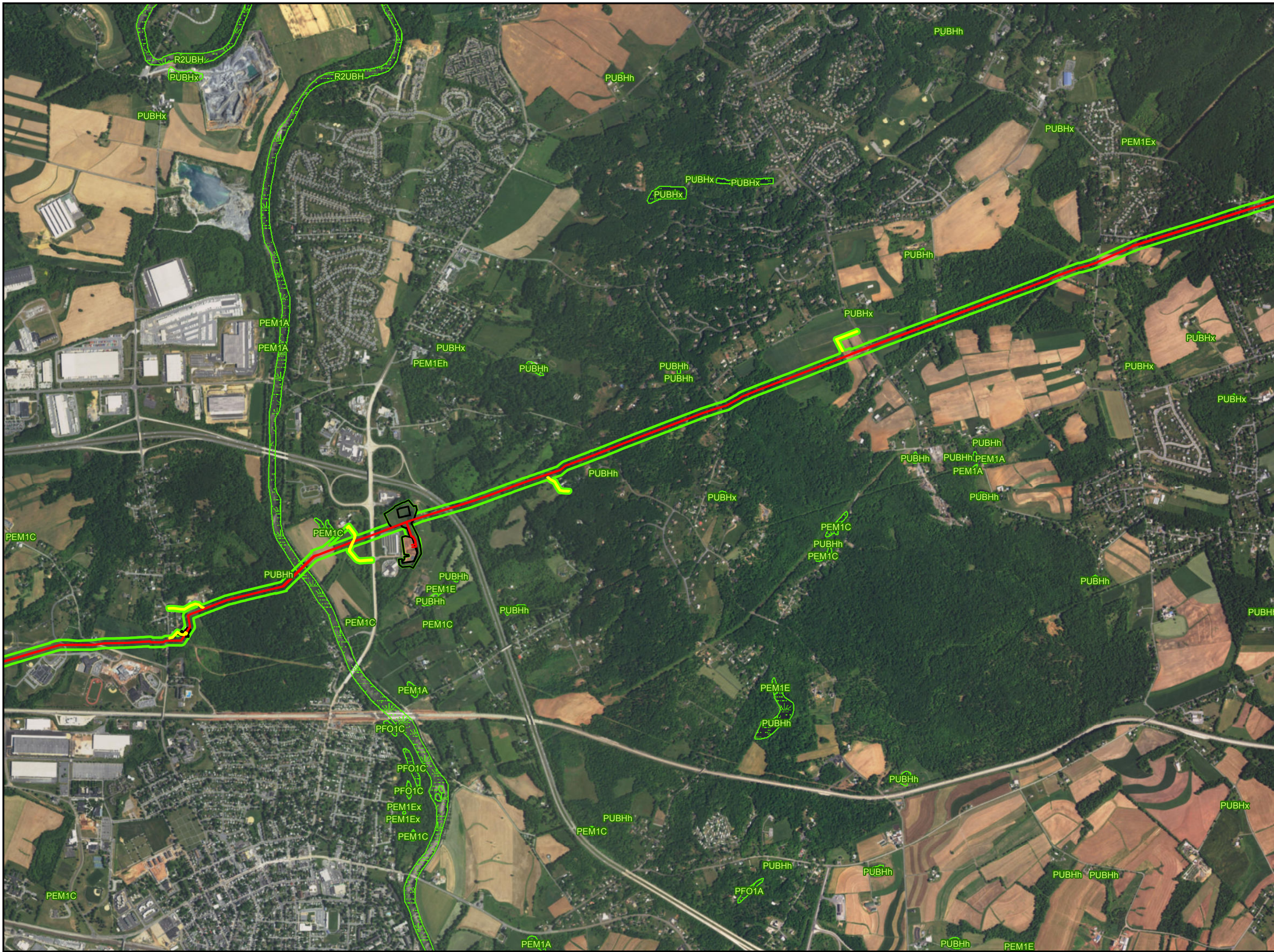


**NWI WETLANDS MAP**  
**FIGURE 3-1**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**



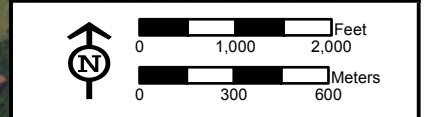
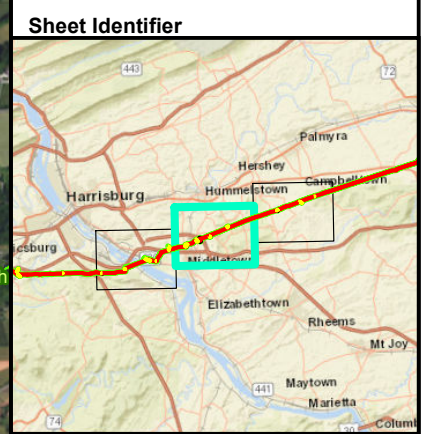
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**Legend**

- Access Road
- Alignment Centerline
- Block Valve/Station
- Study Area
- NWI Wetlands and Codes
- County Boundary



**NWI WETLANDS MAP  
FIGURE 3-2  
PENNSYLVANIA PIPELINE PROJECT  
NOVEMBER 12, 2016 ALIGNMENT  
SUNOCO LOGISTICS, L.P.  
DAUPHIN COUNTY, PA**



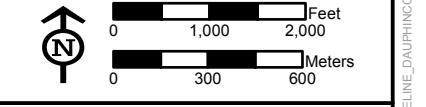
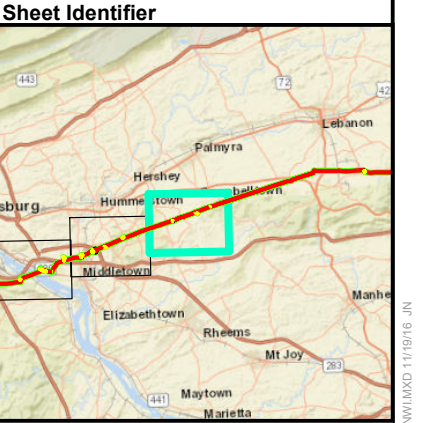
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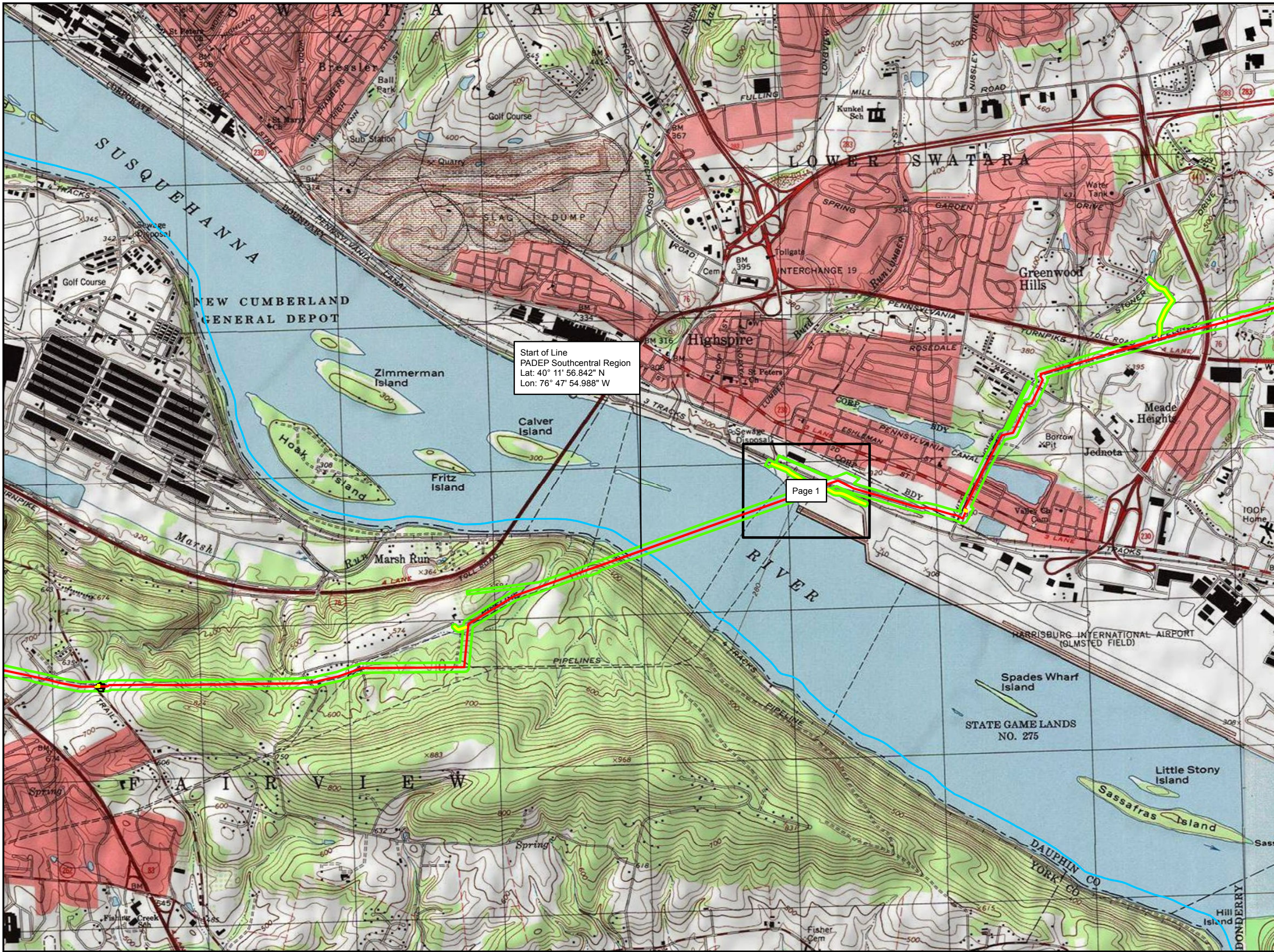


**NWI WETLANDS MAP  
FIGURE 3-3  
PENNSYLVANIA PIPELINE PROJECT  
NOVEMBER 12, 2016 ALIGNMENT  
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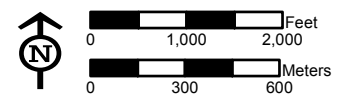
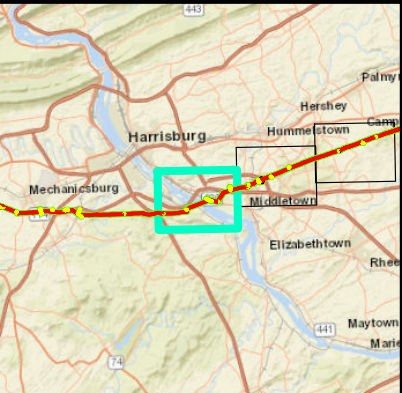


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Page 1

**Sheet Identifier**

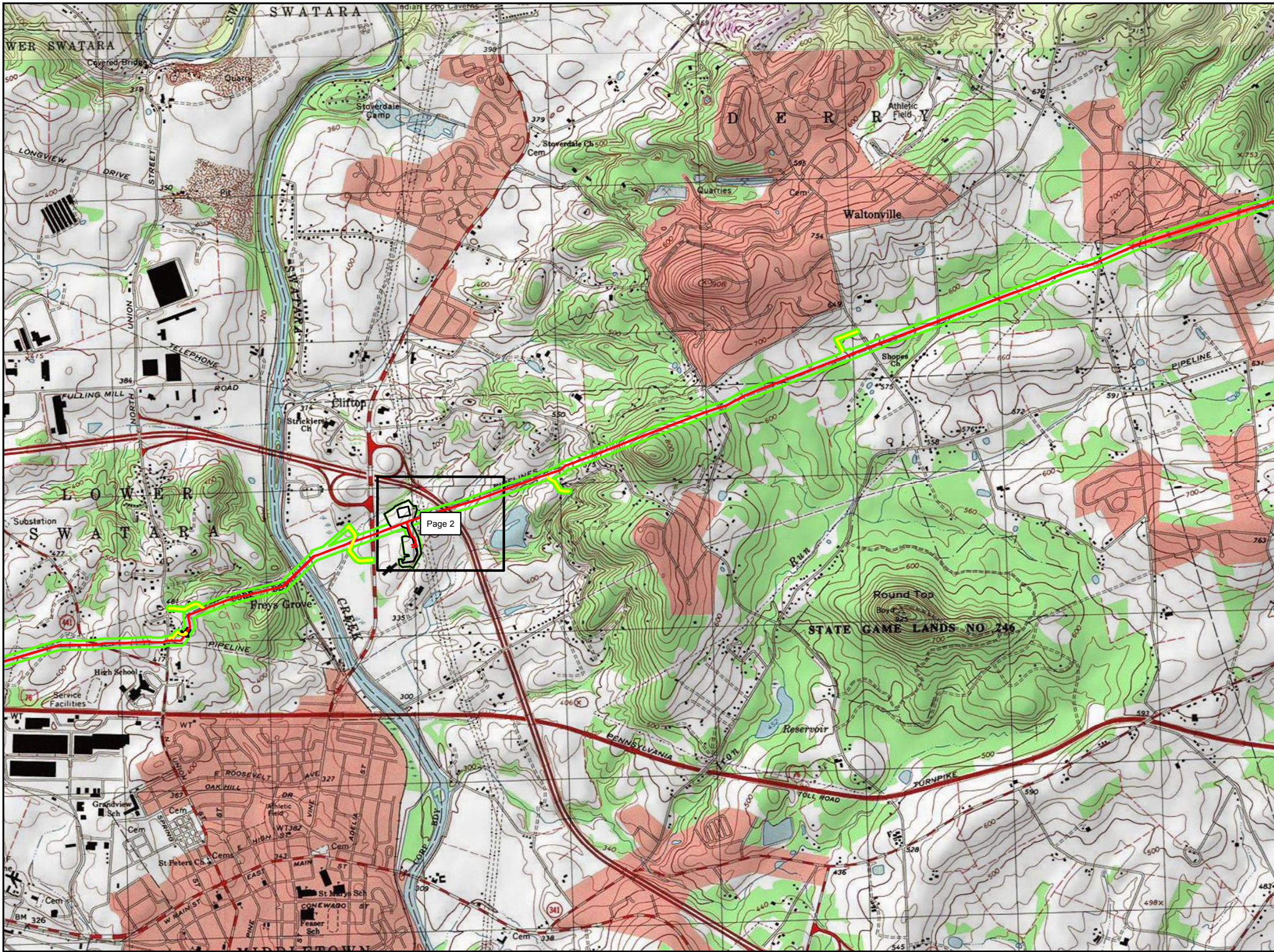


**INDEX MAP**  
**FIGURE 4 - INDEX-1**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**



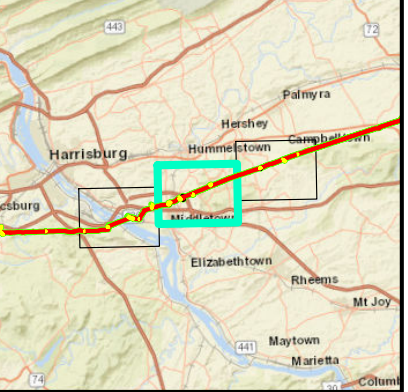
Notes:  
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).  
 2) Quadrangles being displayed are Lemoyne, Steelton

FGH-P:\GIS\SUNOCOMARINER\_EAST\_2\MXD\PPP\_WETLANDS\_SC-2\RENPIPELINE\_DAUPHINCO\_INDEX.MXD 11/18/16 JN



- Legend**
- Access Road
  - Alignment Centerline
  - Block Valve/Station
  - Study Area
  - Map Book Index
  - County Boundary

**Sheet Identifier**

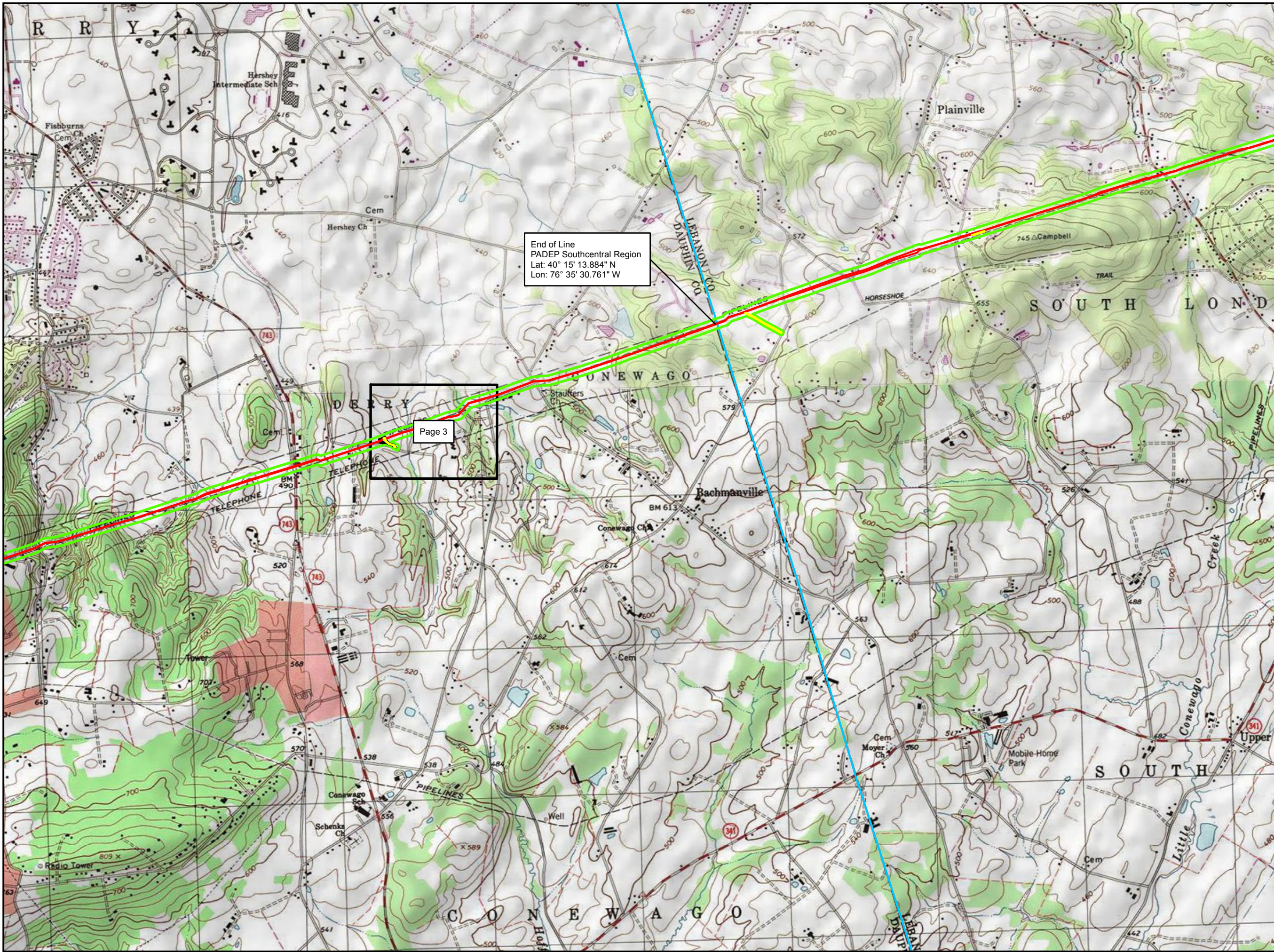


**INDEX MAP**  
**FIGURE 4 - INDEX-2**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**



**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 Middletown, Steelton







P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP\WETLANDS\SC-2\RENNPIPELINE\_DAUPHINCO\_INDEX.MXD 11/18/16 JN



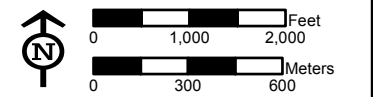
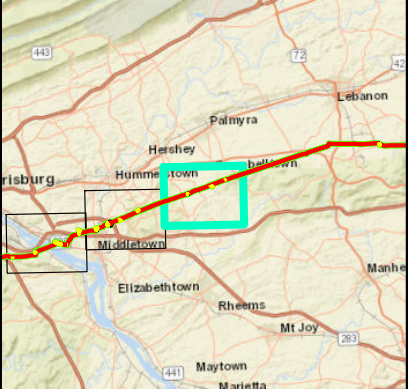
End of Line  
PADEP Southcentral Region  
Lat: 40° 15' 13.884" N  
Lon: 76° 35' 30.761" W

Page 3

**Legend**

-  Access Road
-  Alignment Centerline
-  Block Valve/Station
-  Study Area
-  Map Book Index
-  County Boundary

**Sheet Identifier**

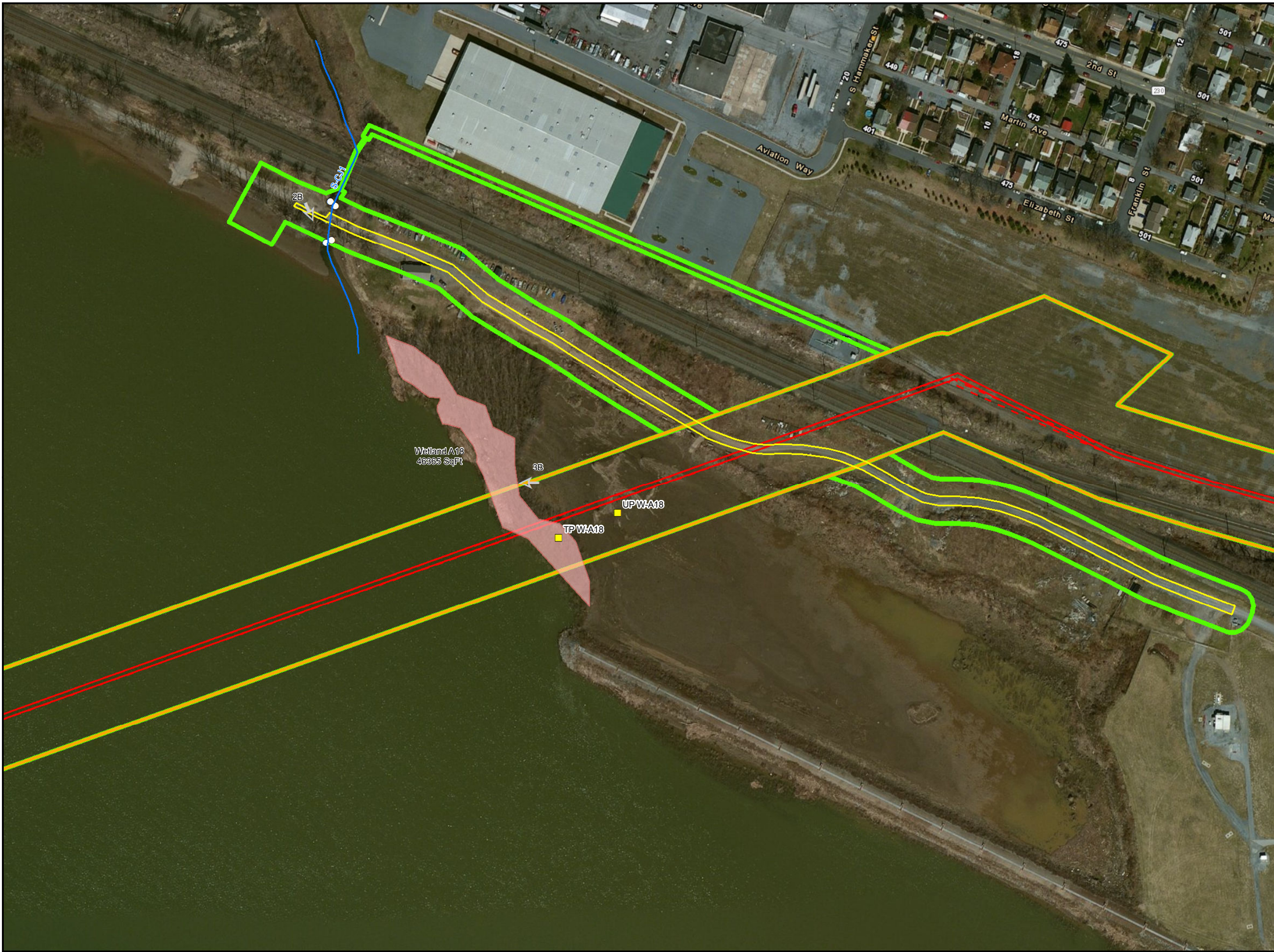


**INDEX MAP**  
**FIGURE 4 - INDEX-3**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**



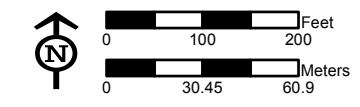
Notes:  
1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).  
2) Quadrangles being displayed are Elizabethtown, Hershey, Middletown, Palmyra

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- Legend**
- Photo Location
  - Sample Location
  - Stream**
  - NEW
  - New Wetland**
  - PFO
  - Culvert
  - Access Road
  - Alignment Centerline
  - Alignment Centerline (2/25/16)
  - Study Area
  - Study Area (2/25/16)
  - Block Valve/Station

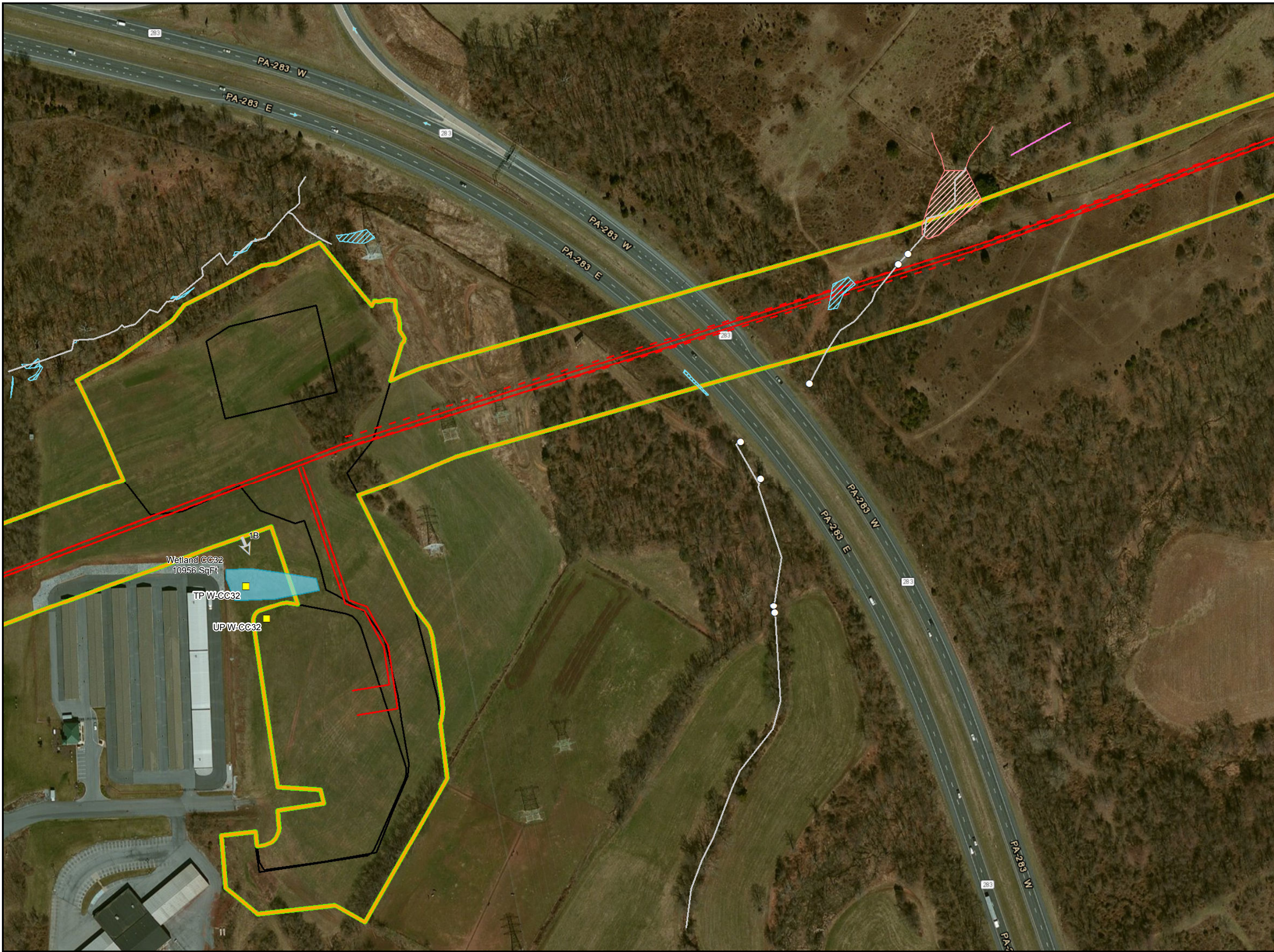
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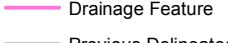
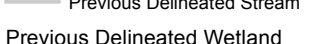


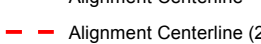
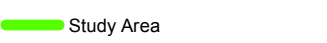

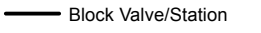



**ADDENDUM WETLANDS DETAIL MAP**  
**FIGURE 4-1**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**

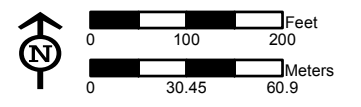
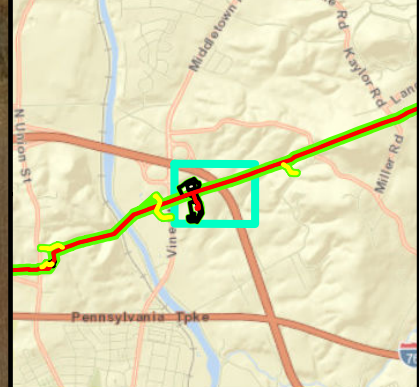


**Notes:**  
 1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2013 ESRI and its data suppliers).



- Legend**
-  Photo Location
  -  Sample Location
  - New Wetland**
  -  PEM
  -  Culvert
  -  Drainage Feature
  -  Previous Delineated Stream
  - Previous Delineated Wetland**
  -  PEM
  -  PFO
  -  Alignment Centerline
  -  Alignment Centerline (2/25/16)
  -  Study Area
  -  Study Area (2/25/16)
  -  Block Valve/Station

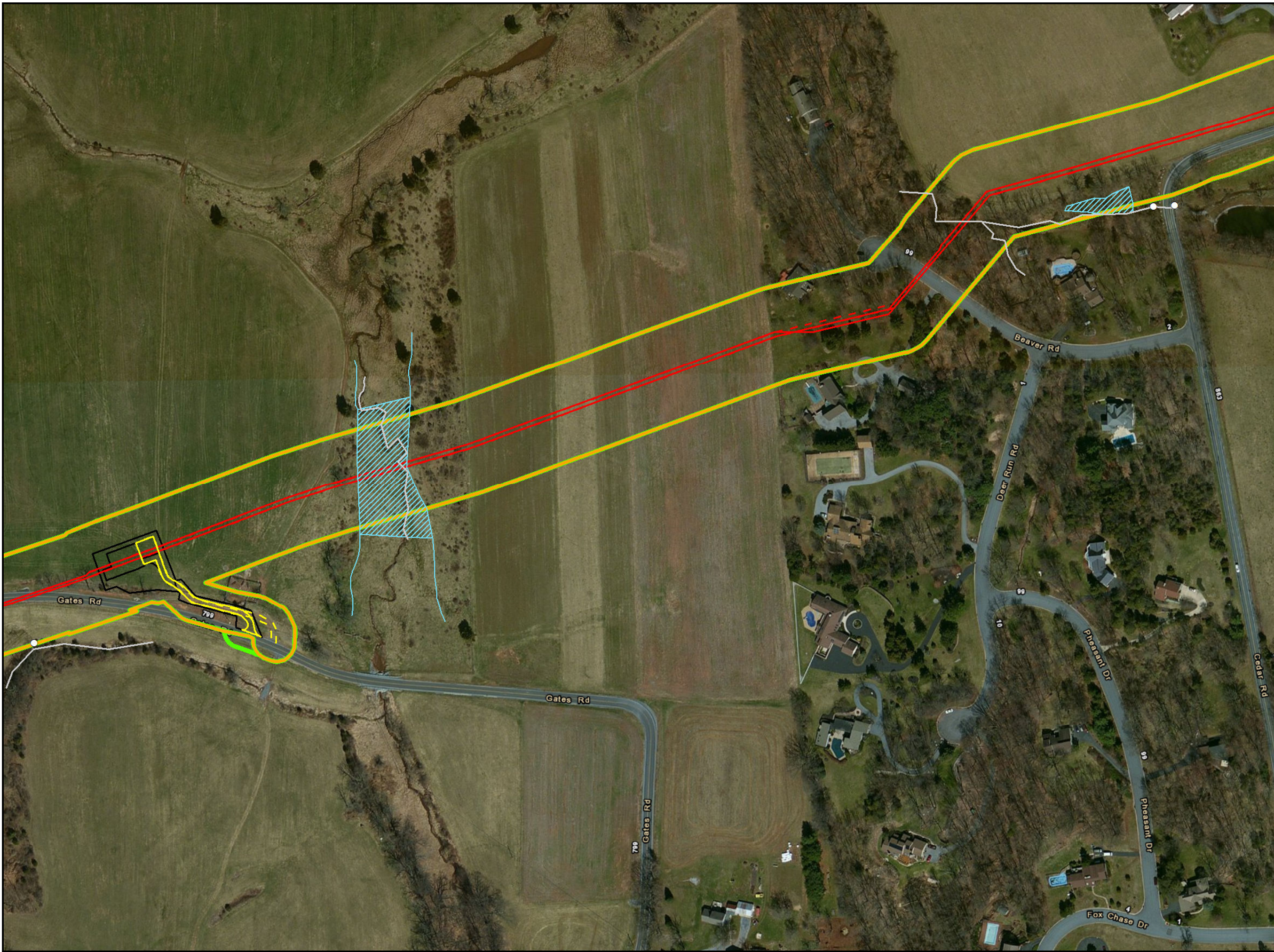
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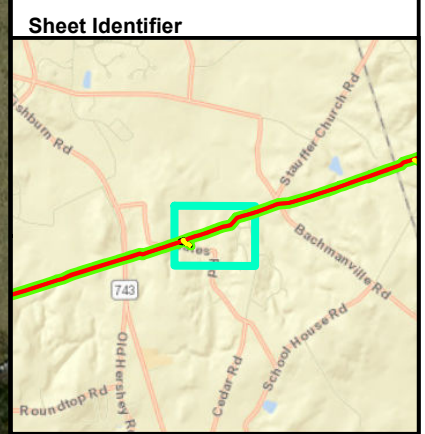
**ADDENDUM WETLANDS DETAIL MAP**  
**FIGURE 4-2**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**



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



- Legend**
- Photo Location
  - Culvert
  - Previous Delineated Stream
  - Previous Delineated Wetland
  - PEM
  - Access Road
  - Access Road (2/25/16)
  - Alignment Centerline
  - Alignment Centerline (2/25/16)
  - Study Area
  - Study Area (2/25/16)
  - Block Valve/Station



**ADDENDUM WETLANDS DETAIL MAP**  
**FIGURE 4-3**  
**PENNSYLVANIA PIPELINE PROJECT**  
**NOVEMBER 12, 2016 ALIGNMENT**  
**SUNOCO LOGISTICS, L.P.**  
**DAUPHIN COUNTY, PA**



**Notes:**  
 1) 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\PPP WETLANDS SC-2\RENNPIPELINE\_DAUPHINCO\_ADDENDUMDETAIL\_REV.MXD 11/19/16 JN

**APPENDIX A**  
**WETLAND DETERMINATION DATA FORMS**

**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region**

Project/Site: PPP City/County: Dauphin Sampling Date: 01/21/2015  
 Applicant/Owner: Sunoco State: PA Sampling Point: W-CC32 PEM  
 Investigator(s): D. Bonomo, K. Keat Section, Township, Range: Londonberry  
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 1-2  
 Subregion (LRR or MLRA): LRRS Lat: 40.222609 Long: -76.712143 Datum: NAD 83  
 Soil Map Unit Name: LrB2 -Lewisberry gravelly sandy loam, 3-8% 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: Cowardin Code: PEM HGM: Slope WT: Isolate	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
--	---

<b>Field Observations:</b> Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>0"</u> Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>0"</u> Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
---	--

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-CC32 PEM

	Absolute % Cover	Dominant Species?	Indicator Status		
<b>Tree Stratum</b> (Plot size: <u>30'</u> )					
1. _____	_____	_____	_____	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>1</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)	
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
$\frac{0}{100} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				<b>Prevalence Index worksheet:</b> 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 = _____	
<b>Sapling/Shrub Stratum</b> (Plot size: <u>15'</u> )					
1. _____	_____	_____	_____		<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% _____ 3 - Prevalence Index is $\leq 3.0^1$ _____ 4 - Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
$\frac{0}{100} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				<b>Definitions of Four Vegetation Strata:</b>  <b>Tree</b> – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.  <b>Sapling/Shrub</b> – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.  <b>Herb</b> – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.  <b>Woody vine</b> – All woody vines greater than 3.28 ft in height.	
<b>Herb Stratum</b> (Plot size: <u>5'</u> )					
1. <u>Juncus effusus</u>	<u>100</u>	<input checked="" type="checkbox"/>	<u>FACW</u>		<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>Phalaris arundinacea</u>	<u>10</u>	_____	<u>FACW</u>		
3. <u>Agrostis gigantea</u>	<u>10</u>	_____	<u>FACW</u>		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
$\frac{120}{100} = \text{Total Cover}$ 50% of total cover: <u>60</u> 20% of total cover: <u>24</u>				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No _____	
<b>Woody Vine Stratum</b> (Plot size: <u>30'</u> )					
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
$\frac{0}{100} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>					

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

**SOIL**

Sampling Point: W-CC32 PEM

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-12	10YR 3/3	80	10YR 4/6	20	C	M	SiCL	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators:</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) ( <b>MLRA 147</b> )	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) ( <b>MLRA 147, 148</b> )	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) ( <b>MLRA 147, 148</b> )	<input type="checkbox"/> ( <b>MLRA 147, 148</b> )	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> ( <b>MLRA 136, 147</b> )	
<input type="checkbox"/> 2 cm Muck (A10) ( <b>LRR N</b> )	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) ( <b>LRR N, MLRA 147, 148</b> )	<input type="checkbox"/> Iron-Manganese Masses (F12) ( <b>LRR N, MLRA 136</b> )		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) ( <b>MLRA 136, 122</b> )		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) ( <b>MLRA 148</b> )		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) ( <b>MLRA 127, 147</b> )		

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if observed):</b> Type: _____ Depth (inches): _____	<b>Hydric Soil Present?</b> Yes <input checked="" type="checkbox"/> No _____
---	--

Remarks:

**WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region**

Project/Site: PPP City/County: Dauphin Sampling Date: 01/21/2015  
 Applicant/Owner: Sunoco State: PA Sampling Point: W-CC32 UPL  
 Investigator(s): D. Bonomo, K. Keat Section, Township, Range: Londonberry  
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 1-2  
 Subregion (LRR or MLRA): LRRS Lat: 40.222709 Long: 40.22066 Datum: NAD 83  
 Soil Map Unit Name: LrC2 -Lewisberry gravelly sandy loam, 8-15 % 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 <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: Upland	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
--	--

<b>Field Observations:</b> Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
--	---

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-CC32 UPL

	Absolute % Cover	Dominant Species?	Indicator Status	
<b>Tree Stratum</b> (Plot size: <u>30'</u> )				
1.				
2.				
3.				
4.				
5.				
6.				
7.				
50% of total cover: <u>0</u>		<u>0</u> = Total Cover		
20% of total cover: <u>0</u>				
<b>Sapling/Shrub Stratum</b> (Plot size: <u>15'</u> )				
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
50% of total cover: <u>0</u>		<u>0</u> = Total Cover		
20% of total cover: <u>0</u>				
<b>Herb Stratum</b> (Plot size: <u>5'</u> )				
1. Unknown Grass	100	✓	ND	
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
50% of total cover: <u>50</u>		<u>100</u> = Total Cover		
20% of total cover: <u>20</u>				
<b>Woody Vine Stratum</b> (Plot size: <u>30'</u> )				
1.				
2.				
3.				
4.				
5.				
50% of total cover: <u>0</u>		<u>0</u> = Total Cover		
20% of total cover: <u>0</u>				

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: \_\_\_\_\_ (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: \_\_\_\_\_ % (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 = \_\_\_\_\_

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**Hydrophytic Vegetation Indicators:**

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0<sup>1</sup>

4 - Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

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**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.

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**Hydrophytic Vegetation Present?** Yes \_\_\_\_\_ No

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

Mowed Agricultural Field.

ND - Not determined

\*Vegetation not ID'd down to species level not included in dominance test.

**SOIL**

Sampling Point: W-CC32 UPL

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-20	10YR 3/3	100					SiCL	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if observed):</b> Type: _____ Depth (inches): _____	Hydric Soil Present?    Yes _____    No <input checked="" type="checkbox"/>
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Remarks:



**Photograph Number:** 1B      **Feature Name:** W-CC32      **Date:** 01/21/2015  
**Direction:** E      **Plant Community:** PEM      **Remarks:** N/A

**APPENDIX C**  
**STREAM DATA SHEETS**

<b>STREAM ID</b> S-CJ1		<b>STREAM NAME</b> UNT to Susquehanna River	
<b>CLIENT</b> Sunoco Logistics, L.P.		<b>PROJECT NAME</b> PPP	
<b>LAT</b> 40.204639	<b>LONG</b> -76.786869	<b>DATE</b> 10/19/2016	<b>COUNTY</b> Dauphin
<b>INVESTIGATORS</b> KP			
<b>WATER TYPE</b> TNW <input type="checkbox"/> RPW <input checked="" type="checkbox"/> NRPW <input type="checkbox"/>		<b>FLOW REGIME</b> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/>	

<b>CHANNEL FEATURES</b>	<b>Estimate Measurements</b> Top of Bank Width: <u>20.0</u> ft Top of Bank Height: LB <u>5.0</u> ft RB <u>4.0</u> ft Water Depth: <u>24.00</u> in Water Width: <u>12.0</u> ft Ordinary High Water Mark (Width): <u>14.0</u> ft Ordinary High Water Mark (Height): <u>30.0</u> in Flow Direction: <u>South</u>	<b>Sinuosity</b> <input checked="" type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <b>Gradient</b> <input checked="" type="checkbox"/> Flat <input type="checkbox"/> Moderate <input type="checkbox"/> Severe (0.5/100 ft) (2 ft/100 ft) (10 ft/100 ft) <b>Stream Erosion</b> <input checked="" type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy <b>Artificial, Modified or Channelized</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <b>Within Roadside Ditch</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>Culvert Present</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Culvert Material: <u>Corrugated Metal</u> Culvert Size: <u>48</u> in
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<b>FLOW CHARACTERISTICS</b>	<b>Water Present</b> <input type="checkbox"/> No water, stream bed dry <input type="checkbox"/> Stream bed moist <input type="checkbox"/> Standing water <input checked="" type="checkbox"/> Flowing water <b>Velocity</b> <input type="checkbox"/> Fast <input type="checkbox"/> Moderate <input checked="" type="checkbox"/> Slow	<b>Proportion of Reach Represented by Stream Morphology Types</b> (Only enter if water present) Riffle 10 % Run 60 % Pool 30 % <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Other _____
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INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) <sup>100</sup>			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	15
Boulder	> 256 mm (10")	30			
Cobble	64-256 mm (2.5"-10")	20	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	10			
Sand	0.06-2mm (gritty)	20	Marl	grey, shell fragments	
Silt	0.004-0.06 mm	20			
Clay	< 0.004 mm (slick)				

<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Residential <input type="checkbox"/> ROW <input type="checkbox"/> Other:	<b>Floodplain Width</b> <input type="checkbox"/> Wide > 30ft <input type="checkbox"/> Moderate 15-30ft <input checked="" type="checkbox"/> Narrow <16ft
	<b>Canopy Cover</b> <input type="checkbox"/> Open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded	

<b>MACROINVERTEBRATES/OTHER WILDLIFE OBSERVED OR OTHER NOTES AND OBSERVATIONS</b>

**APPENDIX D**  
**STREAM PHOTOGRAPHS**



<b>Photograph Number:</b>	2B	<b>Feature Name:</b>	S-CJ1	<b>Date:</b>	10/19/2016
<b>Direction:</b>	SE, Downstream	<b>Flow Regime:</b>	Perennial	<b>Remarks:</b>	N/A

**APPENDIX E**  
**MODIFIED WETLAND PHOTOGRAPHS**



**Photograph Number:** 3B      **Feature Name:** W-A18      **Date:** 01/21/2015  
**Direction:** W      **Plant Community:** PFO      **Remarks:** N/A

**APPENDIX F**  
**HYDRIC SOILS LIST**

# Hydric Soils List

## Dauphin County, Pennsylvania

Map Unit Symbol	Map Unit Name	Component Name and Phase	Component Percent	Landforms
AbA	Albrights silt loam, 0 to 3 percent slopes	Andover	5	depressions
AbB2	Albrights silt loam, 3 to 10 percent slopes, moderately eroded	Andover	5	depressions
AbgB	Albrights silt loam, 3 to 8 percent slopes	Shelmadine	5	drainageways
AnB	Andover gravelly loam, 3 to 8 percent slopes	Andover	75	depressions
AnB	Andover gravelly loam, 3 to 8 percent slopes	Atkins	3	flood plains
AnB	Andover gravelly loam, 3 to 8 percent slopes	Swampy areas	3	depressions
AoB	Andover very stony loam, 0 to 8 percent slopes	Andover, very stony	90	mountain slopes
AogB	Andover gravelly loam, 0 to 8 percent slopes, extremely stony	Andover, extremely stony	85	depressions
AogB	Andover gravelly loam, 0 to 8 percent slopes, extremely stony	Andover, nonstony	4	depressions
At	Atkins silt loam	Atkins	85	flood plains
At	Atkins silt loam	Muck	2	depressions
Bb	Barbour silt loam	Atkins	7	flood plains

Bc	Basher silt loam	Atkins	7	flood plains
BrgA	Brinkerton silt loam, 0 to 3 percent slopes	Brinkerton	80	depressions
BrgA	Brinkerton silt loam, 0 to 3 percent slopes	Atkins	6	flood plains
BtA	Brinkerton and Armagh silt loams, 0 to 3 percent slopes	Brinkerton	45	depressions
BtA	Brinkerton and Armagh silt loams, 0 to 3 percent slopes	Armagh	45	depressions
BtB2	Brinkerton and Armagh silt loams, 3 to 8 percent slopes, moderately eroded	Brinkerton	45	depressions
BtB2	Brinkerton and Armagh silt loams, 3 to 8 percent slopes, moderately eroded	Armagh	45	depressions
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	Andover	10	depressions
BvB	Buchanan very stony loam, 0 to 8 percent slopes	Andover, very stony	10	mountain slopes
BxgB	Buchanan gravelly loam, 0 to 8 percent slopes, extremely stony	Andover, extremely stony	5	depressions
BxgD	Buchanan gravelly loam, 8 to 25 percent slopes, extremely stony	Andover, extremely stony	10	depressions
CkC2	Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded	Brinkerton	5	depressions
CkD2	Calvin-Klinesville shaly silt loams, 15 to 25 percent slopes, moderately eroded	Brinkerton	5	depressions
CkgD	Calvin-Klinesville channery silt loams, 15 to 25 percent slopes	Brinkerton	5	depressions
CoB2	Comly silt loam, 2 to 8 percent slopes, moderately eroded	Brinkerton	5	depressions
Cr	Croton silt loam	Croton	90	depressions
DP	Dump	Andover	1	depressions

DuB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded	Thorndale	2	depressions
HugB	Hustontown silt loam, 3 to 8 percent slopes	Brinkerton	2	depressions
HvgB	Hustontown silt loam, 0 to 8 percent slopes, very stony	Brinkerton soils	2	depressions
KaB2	Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded	Brinkerton	2	hills
KaC2	Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded	Brinkerton	2	hills
LdgF	Laidig gravelly loam, 25 to 60 percent slopes, extremely stony	Andover, extremely stony	5	depressions
LhB2	Lehigh silt loam, 3 to 8 percent slopes, moderately eroded	Croton	8	depressions
Lt	Lindside silt loam	Melvin	5	flood plains
Lw	Lindside silt loam, coal overwash	Atkins	5	flood plains
Ma	Made land, sanitary fill	Croton	2	depressions
MfgF	Meckesville gravelly loam, 25 to 35 percent slopes, extremely stony	Andover	1	depressions
Mu	Muck	Muck	85	swamps
Mu	Muck	Andover	8	depressions
PeB2	Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded	Croton	3	depressions
PeC2	Penn shaly silt loam, 8 to 15 percent slopes, moderately eroded	Croton	3	depressions
Ph	Philo silt loam	Atkins	10	flood plains
RdB2	Readington silt loam, 3 to 8 percent slopes, moderately eroded	Croton	6	depressions

St	Strip mine spoil	Brinkerton	3	depressions
UdgB	Udorthents, shale and sandstone, 0 to 8 percent slopes	Croton	1	depressions
UdgD	Udorthents, shale and sandstone, 8 to 25 percent slopes	Croton	5	depressions
Wa	Watchung silt loam	Watchung, silt loam	86	depressions
Wa	Watchung silt loam	Towhee	9	depressions
Wc	Watchung very stony silt loam	Watchung, extremely stony	90	depressions
WeC2	Weikert shaly silt loam, 5 to 15 percent slopes, moderately eroded	Markes	5	depressions
Modified from Hydric Soils of the United States (NRCS 2014)				

**APPENDIX G**  
**RESUMES**



## EXPERIENCE SUMMARY

Mr. Preston Smith is a Biologist with 14+ 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.

Additionally, Mr. Smith has served as an Ecological Risk Assessor for various DoD sites for the Navy and Air Force, and non-DoD sites for USEPA and commercial clients. His aquatic ecology and sediment toxicology experience has been utilized in several capacities for, a wetland remediation benthic monitoring program, sediment contamination delineation, and field sampling activities. Mr. Smith also served as a Project Manager for a USCG CERCLA sediment evaluation and the related sediment dredging and removal action and has been a Task Manager for several CERCLA sites at MCRD Parris Island. Additionally, he has served as the Project Manager for a Phase I and Phase II environmental site assessment. Before joining Tetra Tech, he was a Lab Manager and Research Assistant in an Aquatic Toxicology Lab where he managed the laboratory operations and several grant funded research projects. He has experience with *in situ* toxicity testing using caged organisms and benthic macroinvertebrate sampling and identification. He also has extensive experience with sediment collection, spiking and toxicity testing, as well as watershed assessments. He also has experience performing herpetological and small mammal surveys in Western Pennsylvania.

## EDUCATION

B.S. Biology (Environmental Science); University of Pittsburgh; Dec. 2000

M.S. Biological Sciences; Wright State University; March 2010

## ADDITIONAL TRAINING AND CERTIFICATION

OSHA 1910.120 40-Hour HAZWOPER Training; June 22, 2007

OSHA 1910.120(e)(4) 8-Hour HAZWOPER Supervisory; October 17, 2008

ACOE-based 40-hour Wetland Delineation Certification; June 26, 2009

## REPRESENTATIVE PROJECTS

### Oil and Gas

#### **Natural Resources Permitting Lead; Confidential Client; West Virginia and Virginia, 2014-present.**

As the Natural Resources Permitting Lead, Mr. Smith is responsible for preparing 404/Nationwide Permit applications for USACE Pittsburgh District and USACE Huntington District and WV DEP Individual 401 Water Quality Certification application for a 301 mile natural gas pipeline project. He is also responsible for the preparation of wetland delineation/stream identification reports, project impact calculations, and compensatory mitigation plans. He also participates in regulatory agency meetings.

#### **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 300+ miles of pipeline, 40+ well pads, 30+ water withdrawal locations.

#### **Natural Resources Lead; Confidential Client; Ohio and Pennsylvania, 2014-2015.**

As the Natural Resources Lead, Mr. Smith is responsible for scheduling and managing Wetland and Stream Surveys and reporting and Threatened and Endangered Species coordination for a FERC regulated gas pipeline repair project.

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**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 and report submittal. As part of this Project, Mr. Smith managed one of the largest bog turtle (*Glyptemys muhlenbergii*), a federally listed species, surveys ever conducted in PA. Additionally, he managed large surveys for other federally listed species including the Indiana bat (*Myotis sodalis*) and the northeastern bulrush (*Scirpus ancistrochaetus*). Other species surveys managed included numerous PA listed plant species, Allegheny woodrat (*Neotoma magister*), small-footed bat (*Myotis leibii*), and timber rattlesnake (*Crotalus horridus*).

**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 from the PA DCNR.

**Task Manager/Biologist; Confidential Client, Beaver and Butler County, PA, 2013-2014.** 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 from the PA DCNR.

**Natural Resource Permit Manager; Confidential Client; West Virginia; 2013-2015.** 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; 2012-2015.** 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; Wetland Restoration Plan, Construction, and Monitoring; Confidential Client; Eastern Ohio; 2012-present.** As a Project Manager, Mr. Smith is managing and contributed to a Wetland Restoration Plan for a large unauthorized wetland disturbance. The Restoration Plan was submitted and approved by the USACE. The construction, grading, and vegetation planting is complete and the wetland is currently recovering. Annual monitoring and progress reports are being completed and submitted to the USACE.

**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 from 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

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pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received from 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.

## **NEPA**

**NEPA Analyst/Environmental Scientist; FERC-regulated Environmental Assessment for a Natural Gas Pipeline; Pennsylvania; 2014-2015.** As a NEPA analyst, Mr. Smith is reviewing the Fish, Wildlife, and Vegetation Resource Report and will be drafting these sections of a FERC-regulated EA for a commercial Oil and Gas client for Marcellus Shale-related activities.

**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. 2011-2013.** 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; 2010-2011.** As a NEPA analyst, Mr.

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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.

#### **Commercial Nuclear Licensing**

**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.

**Technical Reviewer; Aquatic Ecology Field Study in support of a Combined Construction Permit and Operating License Application for Summer Electric Generating Plant; SCE&G; South Carolina; 2007.** Mr. Smith served as a technical reviewer for the report of a baseline aquatic ecology field study at the proposed site of the Summer Electric Generating Plant in South Carolina. Technical recommendations and review of the data generated during the field study were part of the review.

**Report Data Validator; Environmental Report in support of a Combined Construction Permit and Operating License Application for Summer Electric Generating Plant; SCE&G; South Carolina; 2007.** Mr. Smith was responsible for validating statements of fact for numerous sections of an environmental report generated under the guidance of National Environmental Policy Act (NEPA) assessing the potential impacts of a Combined Construction Permit and Operating License Application. All statements of fact were verified by comparing the statements in the document to appropriate references. All statements of fact were documented for submittal to the client.

**Report Data Validator; Three Mile Island Nuclear Station Unit 1 License Renewal Environmental Report; 2007.** Mr. Smith was responsible for validating statements of fact for numerous sections of an

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environmental report generated under the guidance of National Environmental Policy Act (NEPA) assessing the potential impacts for operating license renewal and refurbishment activities at Three Mile Island Nuclear Station. All statements of fact were verified by comparing the statements in the document to appropriate references. All statements of fact were documented for submittal to the client.

**Report Data Validator; South Texas Project Combined Construction and Operating License Application Environmental Report; Bechtel; Texas; 2007.** Mr. Smith was responsible for validating statements of fact for numerous sections of an environmental report generated under the guidance of National Environmental Policy Act (NEPA) assessing the potential impacts of a Combined Construction Permit and Operating License Application for the South Texas Project. All statements of fact were verified by comparing the statements in the document to appropriate references. All statements of fact were documented for submittal to the client.

### **Risk Assessment**

**Risk Assessor/Task Manager; MCRD Parris Island; Technical Memorandum Post-Construction Risk Assessment for Site 3; Parris Island, SC; 2010-2012.** As a Risk Assessor, Mr. Smith served as the technical focal point for the completion of the Tech Memo, attended meetings with state and Federal regulators, responded to comments, and reviewed the document.

**Project Manager; USCG Baltimore Yard; Arundel Cove Sediment Characterization Study/Dredging Project; Baltimore, MD; 2009-2014.** As a Project Manager, Mr. Smith developed a sampling and analysis plan in coordination with USEPA Region 3 and Maryland Department of the Environment. Other tasks include securing subcontractors, developing and tracking project budget, coordinating and assisting in field collection of sediment, lab procurement, generating a summary report for submission to regulators, and updating an Ecological Risk Assessment. Dredging duties included permit applications, securing subcontractors, dredging oversight, and final report submittal.

**Ecological Risk Assessor; MCB Camp Lejeune, NAVFAC Mid-Atlantic; Onslow County, NC; 2009.** As an Ecological Risk Assessor, Mr. Smith prepared a screening level ecological risk assessment for a former small arms range. The analysis included evaluating ecological impacts from surface soil and groundwater (as surface water) to plants, soil invertebrates, and aquatic organisms. Food chain modeling was also conducted to evaluate risks to herbivorous and insectivorous birds and mammals.

**Ecological Risk Assessor; Safety Light Corporation, USEPA; South Centre Township, PA; 2009.** As an Ecological Risk Assessor, Mr. Smith prepared a screening level ecological risk assessment for the former Safety Light Corporation. The analysis included evaluating ecological impacts from surface soil and sediment to plants, soil invertebrates, and aquatic organisms. Food chain modeling was also conducted to evaluate risks to herbivorous, insectivorous, and piscivorous birds and mammals.

**Ecological Risk Assessor; Lockheed Martin, Dump Road Martin State Airport; Middle River, MD; 2009-2011.** As an Ecological Risk Assessor, Mr. Smith prepared a screening level ecological risk assessment for the Martin State Airport Dump Road Site. The analysis included evaluating ecological impacts from surface soil, sediment, surface water and groundwater (as surface water) to plants, soil invertebrates, and aquatic organisms. Food chain modeling was also conducted to evaluate risks to herbivorous and insectivorous birds and mammals.

**Ecological Risk Assessor; Dominion Resources; Salem, WV; 2009.** As an Ecological Risk Assessor, Mr. Smith evaluated the ecological risk from previous operations at a natural gasoline conversion facility in support of a voluntary removal action site closure/characterization report.

**Ecological Risk Assessor; Invertebrate and Small Mammal Bioavailability Study at the USDA Beltsville Agricultural Research Center; US Department of Agriculture; 2007-2008.** As an ecological risk assessor, Mr. Smith provided support through all phases of an invertebrate and small mammal study to determine the extent of pesticide contamination from previous activities at USDA

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Beltsville Agricultural Research Center and to develop preliminary remediation goals based on site specific data.

**Ecological Risk Assessor; U.S. Navy, EFANE/CLEAN, EFD NORTH/CLEAN and/or EFD SOUTH/CLEAN; NTC Great Lakes, Illinois; NSWC Crane, Indiana; NAS JRB Willow Grove, PA; Naval Station Newport, Newport Rhode Island, NAS Whiting Field, Milton, FL; NSF Indian Head, MD; NAS South Weymouth, Weymouth, Massachusetts; NCBC Davisville, North Kingstown, Rhode Island; EFAC Annapolis, MD; Charleston CNC, Charleston, SC; 2007-2011.** Prepared and contributed to several ecological risk assessments as part of RI/FS programs at DOD bases in Illinois, Indiana, Pennsylvania, Florida, Maryland, Massachusetts, South Carolina, and Rhode Island. The state and federal agencies reviewed and approved or are currently reviewing the procedures for conducting the risk assessments. Risk assessments included evaluation of surface water, sediment, and soil data. Some of the risk assessments involved the preparation of a baseline risk assessment and included the use of benthic data for evaluating impacts of site-related chemicals. Responses to regulator comments were also generated for several of the risk assessments.

**Ecological Risk Assessor; U.S. Air Force, Charleston AFB, Charleston, SC; 2007.** Mr. Smith prepared screening level ecological risk assessments at several sites at the base. Risk assessments included evaluation of surface water, sediment, and soil data.

**Project Manager; Assessment of the Impact of Fipronil on Benthic Communities; Bayer CropScience/BASF; Southeastern US; May 2005-May 2006.**

Mr. Smith was Project Manager of a study to determine the impact of the insecticide Fipronil on benthic organisms. Duties consisted of collecting sediments from a total of four sites in SC, GA, and AL and spiking the sediments with a high and low concentration of Fipronil. Sediments (spiked and reference) were then placed in window screen lined, mesh weave baskets and deployed at the collection sites. Conducted ten rounds of sampling throughout the project duration. Measured physical and chemical parameters including dissolved oxygen, turbidity, conductivity, hardness and alkalinity. Measured acute *in situ* toxicity using caged organisms on the deployed sediments during four sampling events. Assisted in generating the final technical report for the project.

**Project Manager; Flux of Sediment Associated Metals; Copper Development Association/Rio Tinto; Dayton, OH; October 2005-December 2006.**

Mr. Smith was Project Manager of a field study to determine the flux of sediment associated metals to pore water and the relationship to Acid Volatile Sulfides, Total Organic Carbon, Manganese and Iron. Duties consisted of collecting sediments from 6 sites and spiking with a high and low concentration of copper. Deployed sediments and conducted eight rounds of sampling throughout the project duration at four sites near Dayton, OH. Deployed Diffusion Gradient Thin Film (DGT) probes in the sediments to measure metal flux. Measured physical and chemical parameters including dissolved oxygen, turbidity, conductivity, hardness and alkalinity. Measured acute *in situ* toxicity using caged organisms on the deployed sediments during three sampling events. Assisted in generating the final technical report for the project.

**Project Assistant; Stormwater Effects on the Great Miami River; City Of Dayton; Dayton, OH; July 2005-October 2005.**

Project assistant for a study to determine the impact of stormwater runoff on the water quality of the Great Miami River. Duties consisted of assisting with *in situ* toxicity testing. Collected and identified benthic macroinvertebrates. Assessed habitat quality using the US EPA Qualitative Habitat Evaluation Index (QHEI) scoring summary. Contributed sections on benthic macroinvertebrate composition and habitat quality to the final project report.

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## Site Assessment

**Benthic Ecologist; U.S. Navy, NSF Dahlgren, VA; 2008-2011.** 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; Phase I and II Environmental Site Assessment 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 Environmental Site Assessment for a proposed site of a new USCG facility in Lake Charles, LA from kickoff to completion. His duties included client management, budget monitoring, workload delegation, subcontractor procurement, contributing to various sections of the document, and publishing and submittal of all documents. The Phase II Site Assessment included groundwater, surface and subsurface soil, and surface and subsurface sediment sampling.

**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.

## Sampling

**Sediment Specialist; U.S. Navy, NSWC Crane, Indiana; 2008.** As a Sediment Specialist, Mr. Smith identified sediment depositional areas and collected sediment samples for the delineation of the extent of chemical contamination along Boggs Creek.

**Task Manager; Interim Monitoring Program, U.S. Navy, EFANE/CLEAN; Portsmouth Naval Shipyard, Kittery, Maine; 2007-2009.** As a task manager, Mr. Smith aided the field operations leader and project manager for an Interim Monitoring Program for a Naval Shipyard (PNS) in USEPA Region I. Tasks associated with the monitoring program include oversight of subcontractors collecting sediment and preparing data reports for each sampling round and various data evaluation reports.

## R/ES

**Task Manager; UFP-SAP; Site 27; MCRD Parris Island, Parris Island, SC; 2010.** As a Task Manager, Mr. Smith coordinated completion of and wrote sections of the UFP-SAP for field sampling and analysis of soil and groundwater, as well as, attended meetings with state and Federal regulators, and responded to comments.

**Task Manager; UFP-SAP; Sites 55, 9, and 16; MCRD Parris Island, Parris Island, SC; 2010.** As a Task Manager, Mr. Smith coordinated completion of and wrote sections of the UFP-SAP for field sampling and analysis of soil and groundwater, as well as, attended meetings with state and Federal regulators, and responded to comments.

## Mining

**Project Manager/Aquatic Toxicologist; NPDES Biomonitoring Plan; Rosebud Mining, Garrett County, MD; 2010.** As a Project Manager/Aquatic Biologist, Mr. Smith developed a Biomonitoring Plan for a NPDES Permit for a mine discharge. The biomonitoring plan was developed using surrogate testing species not normally used for NPDES testing.

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**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.

**PUBLICATIONS:**

Biksey, T.M., A.M. Bernhardt, A.C. Schultz, B. Marion and P.R. Smith. 2010. Literature Review: Ecological and Human Health Risk Assessment. *Water Environment Research*. In press.

J.L. Slye, T.W. La Point, P. Smith, G. Burton Jr., 2008. Sediment Recolonization Study to Examine Potential Fipronil Effects on Benthic Macroinvertebrates in Freshwater Ecosystems in the Southern United States. Poster SETAC Annual Meeting.

A. Bernhardt, P. Smith, M. Bowersox, J. Roberts, D. Prevar, B. Pluta, K. Davis, J. Tuttle. 2008. Invertebrate and Small Mammal Bioavailability Study at the USDA Beltsville Agricultural Research Center. Poster SETAC Annual Meeting.

Biksey, T.M., A.M. Bernhardt, A.C. Schultz, B. Marion and P.R. Smith. 2008. Literature Review: Ecological and Human Health Risk Assessment. *Water Environment Research*. 80(10):1997-2025.

Taulbee, K., Burton, G.A., Smith, P., Custer, K., Kapo, K., Zhang, X., Airas, S., Delbeke, K., A field assessment of copper bioavailability and effects in freshwater sediments. Poster SETAC Europe Annual Meeting.

Biksey, T.M., A.M. Bernhardt, A.C. Schultz, B. Marion and P.R. Smith. 2007. Literature Review: Ecological and Human Health Risk Assessment. *Water Environment Research*. 79(10):2170-2191.

G. Allen Burton, Keith Taulbee and Preston Smith. 2007. A Field Assessment of Copper Bioavailability and Effects in Freshwater Sediments. Draft Final Report. Submitted to International Copper Association, Ltd., RioTinto, Inc., and Copper Development Association, Inc. July.

G. Allen Burton, Scott Ireland, Katherine Kapo and Preston Smith. 2007. Sediment testing. Chapter in *Aquatic Toxicology 3<sup>rd</sup> Edition*. Rand, Lewis, & Klaine, Editors. In press.

Burton, G.A., Kapo, K., Zhang, X. and Smith, P. 2005. An Assessment of Storm Water Quality in the Great Miami River, Dayton, OH. City of Dayton, Environmental Management Department. Final Report.

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Burton, G.A., Green, A., Baudo, R., Forbes, V., Hong, L., Janssen, C., Kukkonen, J., Leppanen, M., Maltby, L., Soares, A., Kapo, K., Smith, P., and Dunning, J. 2006. Characterizing Sediment Acid Volatile Sulfide Concentrations in European Streams. *Environ Toxicol Chem* 26:1-12.

Custer, K.W., Burton, G.A., Coelho, R.S., and Smith, P.R. 2006. Determining Stressor Presence in Streams Receiving Urban and Agriculture Runoff: Development of a Benthic *in situ* Toxicity Identification Evaluation (BTIE) Method. *Environ Toxicol Chem* 25:2299-2305.

Simmons, T. W. and Smith, P. R. 2002-2005. Acarina (Water Mite) Section in Current and Selected Bibliographies on Benthic Biology. North American Benthological Society Publication.

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### EXPERIENCE SUMMARY

Mr. Schumacher, M.Sc., specializes in ecology, with over 16 years of experience conducting environmental field studies and more than 8 years of experience preparing environmental permit applications for energy development projects (gas transmission, waterline, electric, wind) and environmental remediation projects throughout Pennsylvania, Ohio, West Virginia, and New York. He is experienced conducting fieldwork, preparing reports, preparing environmental permit applications, and coordinating with regulatory agencies for linear energy projects requiring line siting, wetland delineation, stream identification, post-construction environmental monitoring, invasive species monitoring, and rare species surveys.

Mr. Schumacher is accustomed to conducting fieldwork in remote locations in challenging conditions and has conducted field surveys for private clients in Pennsylvania, West Virginia, Ohio, Minnesota, Wisconsin, New York, New Jersey, Maryland, Virginia, Missouri, and in the Oil Sands of Alberta, Canada. He has conducted habitat surveys for federal and state listed bats, snakes, mammals, and migratory bird nesting sites, and presence/absence surveys for non-native invasive species and over 30 state and federal listed plant species.

Mr. Schumacher is a Certified Ecologist with the Ecological Society of America, a Professional Wetland Scientist, has USACE 1987 Manual certification, Ohio EPA Wetland Biocriteria certification, and holds a PADCNR Plant Collection Permit for surveying rare, threatened, and endangered plant species. In addition to his environmental consulting experience, Mr. Schumacher has conducted experimental and observational scientific field studies in Pennsylvania, West Virginia, Louisiana, Massachusetts, Panama, England, and Zimbabwe.

### RELEVANT EXPERIENCE

#### OIL/GAS

##### Mountain Valley Pipeline, LLC; Mountain Valley Pipeline Project

Prepared Nationwide Permit applications for USACE Pittsburgh District and USACE Huntington District and WV DEP Individual 401 Water Quality Certification application for a 301 mile natural gas pipeline project. Prepared wetland delineation/stream identification reports, project impact calculations, and compensatory mitigation plans. Participated in regulatory agency meetings. WV & VA.

##### Sunoco Logistics, L.P.; Pennsylvania Pipeline Project

Conducted a presence/absence survey for Northeastern bulrush (*Scirpus ancistrochaetus*), a federal and state-listed species, as part of a 561 mile natural gas pipeline project. Prepared reports for USFWS. USFWS #2014-0200. Perry Co., PA.

##### Dominion; PL-1 Transmission Line Project

Conducted a survey for invasive plant species along 40 miles of gas pipeline ROW in PA State Forests using the Montana Noxious Weed Survey & Mapping System. Assisted in preparation of the monitoring report and invasive species treatment recommendation report to meet regulatory requirements. Conducted post-construction wetland & stream monitoring along a 40-mile gas pipeline ROW in PA State Forests. Assisted in the evaluation of wetland & stream restoration success and in the preparation of the monitoring report to meet regulatory requirements.

#### EDUCATION

M.Sc. Ecology, University of Pittsburgh, 2008

Bachelors of Science, Ecology, Tulane University, 2000

#### AREA OF EXPERTISE

Botanical Surveys & Wetlands

#### REGISTRATIONS/AFFILIATIONS

*USFWS Qualified Surveyor for Northeastern Bulrush, 2012*

*USFWS Qualified Surveyor for Eastern Prairie-Fringed Orchid, 2009*

*PADCNR Wild Plant Management Permit No. 16-066,*

#### TRAINING/CERTIFICATIONS

*Professional Wetland Scientist, 5/6/2014*

*Certified Ecologist (Ecological Society of America), 6/1/2014*

*Ohio Rapid Assessment Methods (ORAM) for Wetlands, 5/12/15.*

*USACE 1987 Manual Wetland Delineation, 7/17/08*

*Field ID of Grasses, Sedges, & Rushes, 8/10/13*

*OSHA HAZWOPER 40-Hr Training, 12/21/13. 8-Hr Refresher, 1/20/15*

*Wilderness First Aid, 4/12/15*

*First Aid/CPR/AED, 1/11/16*

#### OFFICE

Pittsburgh, PA

#### YEARS OF EXPERIENCE

15

#### YEARS WITHIN FIRM

<1

#### CONTACT

Henry.Schumacher@tetratech.com

**MarkWest Liberty Midstream and Resources, LLC; Fox to Midway-Candor Pipeline Project**

Conducted a wetland delineation & stream survey along 14-mile proposed natural gas pipeline. USACE Eastern Mountains and Piedmont Region. Washington Co., PA.

**MarkWest Liberty Midstream and Resources, LLC; Hunter to Majorsville Pipeline Major Modification Project**

Conducted a wetland delineation & stream survey in a 6-acre area for a proposed natural gas pipeline route modification project. USACE Eastern Mountains and Piedmont Region. Washington Co., PA.

**MarkWest Liberty Midstream and Resources, LLC; Lehman to Stewart Pipeline Major Modification Project**

Conducted a wetland delineation & stream survey in a 20-acre area for a proposed natural gas pipeline route modification project. USACE Eastern Mountains and Piedmont Region. Washington Co., PA.

**MarkWest Liberty Midstream and Resources, LLC; 3 Brothers to Simmons Pipeline Major Modification Project**

Conducted a wetland delineation & stream survey in a 25-acre area for a proposed natural gas pipeline route modification project. USACE Eastern Mountains and Piedmont Region. Washington Co., PA.

**Travis Peak Resources, LLC; Well Pads AH & Y Projects**

Conducted a wetland delineation & stream survey in a 120-acre area for two proposed natural gas well pad projects. USACE Northcentral and Northeast Region. Tioga Co., PA.

**Superior Appalachian Pipeline, LLC; Snow Shoe Pipeline Project**

Conducted a wetland delineation/stream survey & a survey for Northeastern bulrush (*Scirpus ancistrochaetus*), a federal and state-listed species, for a 14 mile natural gas pipeline and compressor station project. Prepared reports for PA state regulatory agencies. PNDI #20267. Centre Co., PA.

**Columbia Gas; Line 1360**

Conducted surveys for PA state-listed species including great Indian-plantain (*Cacalia muehlenbergii*) and leafcup (*Smallanthus uvedalius*) for a natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 20043. Washington Co., PA.

**Chief Oil & Gas; Korban to Phelps Pipeline Project**

Conducted a wetland delineation/stream survey and a survey for PA state-listed species including bog rosemary (*Andromeda polifolia*) and soft-leaved rush (*Carex disperma*) for a 7 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI #20558. Wyoming, Susquehanna, & Lycoming Co., PA.

**Laurel Mountain Midstream LLC; Shamrock Compressor Station and Dogleg Natural Gas Pipelines**

Conducted a wetland delineation/stream survey and a survey for PA state-listed species including wild oat (*Chasmanthium latifolia*) and heart-leaved meehania (*Meehania cordata*) for a 10-acre compressor station and 10 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 20609. Fayette Co., PA

**Williams; Guardasoni Pipeline Project**

Conducted surveys for PA state-listed species including snow trillium (*Trillium nivale*), harbinger-of-spring (*Erigenia bulbosa*), and white trout-lily (*Erythronium albidum*) for a 4 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 20110217283784. Westmoreland Co., PA.

**Williams; Gamelands to Jordan Pipeline Project**

Conducted surveys for PA state-listed species including shining ladies' tresses (*Spiranthes ovalis*), wild senna (*Senna marilandica*), leaf-cup (*Smallanthus uvedalius*), sourwood (*Oxydendron arboreum*), crested dwarf iris (*Iris cristata*), St. Andrew's cross (*Hypericum stragulum*), harbinger-of-spring (*Erigenia bulbosa*), lobed spleenwort (*Asplenium pinnatifidum*), puttyroot (*Aplectrum hyemale*), single-headed pussytoes (*Antennaria solitaria*), and blue monkshood (*Aconitum uncinatum*) for a 6 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 20556. Greene Co., PA.

**Confidential Client; Confidential Project**

Conducted a habitat assessment survey for Kirtland's snake (*Clonophis kirtlandii*), a PA state-listed species for a commercial development project. Prepared reports for PA state regulatory agency review. Allegheny Co., PA.

**Williams; Jury to 6-inch Pipeline Project**

Conducted surveys for PA state-listed species including purple rocket (*Iodanthus pinnatifidus*), scouring rush (*Equisetum x ferrissii*) and Torrey's sedge (*Juncus torreyi*) for a 4 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 20110202280993. Westmoreland Co., PA.

**Williams; Hoehn to Crable Pipeline Project**

Conducted a wetland delineation/stream survey and a survey for PA state-listed species including wild oat (*Chasmanthium latifolium*) and heartleaf meehania (*Meehania cordata*) for a 3 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 20110629304606. Fayette Co., PA.

**XTO; North Discharge/Indiana Extension Pipeline Project**

Conducted a wetland delineation/stream survey and a survey for PA state-listed species including purple fringeless orchid (*Platanthera peramoena*), bushy bluestem (*Andropogon glomeratus*), shining ladies' tresses (*Spiranthes lucida*), leafcup (*Smallanthus uvedalius*), and eastern coneflower (*Rudbeckia fulgida*) for a 12 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 21307. Westmoreland & Indiana Co., PA.

**Williams; Huczko to Clark Pipeline Project**

Conducted surveys for PA state-listed species including purple fringeless orchid (*Platanthera peramoena*), bushy bluestem (*Andropogon glomeratus*), shining ladies' tresses (*Spiranthes lucida*), and mountain bugbane (*Actea podocarpa*). Prepared reports for PA state regulatory agencies. PNDI # 21603. Westmoreland Co., PA.

**Dominion; Appalachian Gateway TL-492 Project**

Conducted surveys for PA state-listed species including puttyroot (*Aplectrum hyemale*), harbinger-of-spring (*Erigenia bulbosa*), white trout-lily (*Erythronium albidum*), and crane fly orchid (*Tipularia discolor*) for a 40 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies. PNDI # 19950. Greene, Washington, & Westmoreland Co., PA.

**Dominion East Ohio; Franklin 20" Storage Pipeline Project**

Conducted surveys for federal-listed species including eastern prairie-fringed orchid (*Platanthera leucophaea*) and northern monkshood (*Aconitum noveboracensis*) for a natural gas pipeline storage project. Prepared reports for USFWS. USFWS 2008-TA-0548. Wayne & Summit Co., OH.

**Columbia Gas; Line 1278/Line K Replacement**

Conducted surveys for NY & PA state-listed species including checkered rattlesnake plantain (*Goodyera tessalata*), prickly pear cactus (*Opuntia humifusa*), and roseroot stonecrop (*Sedum rosea*) and four habitats of concern for a 12 mile natural gas pipeline replacement project. PNDI # 20474. Prepared reports for NY & PA state regulatory agencies. Pike Co., PA & Orange Co., NY.

**Superior Appalachian Pipeline, LLC; Pittsburgh Mills Pipeline Project**

Conducted a survey for federal-listed Indiana bat (*Myotis sodalis*) roost trees along a proposed 9-mile gas pipeline in Allegheny Co., PA for winter tree clearing. Coordinated with USFWS on results of the surveys. Allegheny Co. PA.

**Shell; Pierre River Mine Environmental Impact Assessment**

Conducted an ecological field assessment for a proposed Canadian Oil Sands mine development project Environmental Impact Assessment (EIA), including vegetation reconnaissance, rare plant and rare plant community survey, invasive species survey, and traditional use species survey. Alberta, Canada.

**MEG Energy; Christina Lake Regional Project Pre-Disturbance Assessment**

Conducted a pre-disturbance ecological field assessment for a proposed Steam Assisted Gravity Drainage oil recovery project in the Canadian Oil Sands, including vegetation reconnaissance, rare plant and rare plant community survey, invasive species survey, and merchantable timber assessment. Alberta, Canada.

**Suncor - Firebag Project Pre-Disturbance Assessment**

Conducted a pre-disturbance ecological field assessment for a proposed Steam Assisted Gravity Drainage oil recovery project in the Canadian Oil Sands, including vegetation reconnaissance, rare plant and rare plant community survey, and invasive species survey. Alberta, Canada.

**Cenovus - Foster Creek Project Pre-Disturbance Assessment**

Assisted in a geohazard assessment of 100+ miles of natural gas pipeline including: subsurface investigations (DCPTs - direct cone penetration tests); crack monitoring; and site characterization (delineation, headscarp monitoring stakes, alignment stakes, and geodetic monitoring stakes). Alberta, Canada.

**NiSource; Crawford Storage Field Expansion Project**

Conducted a survey for potential migratory bird nest holes and crevices in trees along a potential natural gas pipeline ROW for winter clearing of potential nest trees. Assisted in the preparation of the survey report. USFWS Permit # MB213433-0. Fairfield & Hocking Co., OH.

**Dominion; Ross Rd Forest Mitigation Project**

Co-designed monitoring protocols, conducted monitoring, prepared report, and evaluated reforestation success to meet regulatory requirements of compensatory mitigation reforestation project. Calvert Co., MD.

**Dominion; Swann Wetland Mitigation Project**

Co-designed monitoring protocols, conducted monitoring, prepared report, and evaluated functional wetland status to meet regulatory requirements of a compensatory mitigation wetland project. Calvert Co., MD.

**Confidential Client; Confidential Natural Gas Well Pad Project**

Conducted a post-construction forensic review of a well pad site to determine the pre-construction location and extent of wetland & stream resources and the approximate environmental impacts of project construction. Prepared report for EPA review. USACE Eastern Mountains and Piedmont Region. WV.

**Keys Energy; Keys Pipeline Project**

Conducted a wetland delineation & stream survey along 7-mile proposed ROW for a waterline and a 12-mile proposed ROW for a natural gas pipeline. USACE Atlantic and Gulf Coastal Plain Region. Charles & Prince George's Co., MD.

**TRANSPORTATION****Canadian National Railway Company (CN); - Steelton Yard Project**

Conducted a wetland delineation & stream survey along a 7-mile area for a proposed railroad track upgrade project. Prepared a report for USACE and MN state regulatory agency review. USACE Northcentral and Northeast Region. St. Louis Co., MN.

**Canadian National Railway Company (CN); - Ladysmith Project**

Conducted a wetland delineation & stream survey along a 2-mile area for a proposed railroad track upgrade project. Prepared a report for USACE and WI state regulatory agency review. USACE Northcentral and Northeast Region. Rusk Co., WI.

**Wisconsin Central, Ltd; - Waterbury Siding Project**

Conducted a wetland delineation & stream survey along a 2-mile area for a proposed railroad siding project. Prepared a report for USACE and WI state regulatory agency review. USACE Northcentral and Northeast Region. Jackson Co., WI.

**Wisconsin Central, Ltd; - Deer Lane Realignment Project**

Conducted a wetland delineation & stream survey within a 115-acre area for a proposed road realignment project. Prepared a report for USACE and WI state regulatory agency review. USACE Northcentral and Northeast Region. Portage Co., WI.

**PennDOT; Interstate I-99 Project**

Assisted in the evaluation of impacts on natural wetlands by the construction of Interstate I-99 in central PA. Assisted in the monitoring and functional evaluation of compensatory mitigation wetlands. Blair & Centre Co., PA.

**Norfolk Southern Railroad; Midlands Project**

Conducted a wetland delineation & stream survey along 2-miles of existing railroad for a railroad maintenance project. Prepared reports and permit application for USACE and PA state regulatory agency review. USACE Eastern Mountains and Piedmont Region. Beaver Co., PA.

**ENVIRONMENTAL REMEDIATION****Pfizer; American Cyanamide Bound Brook Remediation Project**

Conducted habitat assessments for the ecological risk assessment component of the pre-design investigations for the planned Remedial Action at a CERCLA facility. Somerset Co., NJ.

**Freeport-McMorhan; Satralloy Remedial Investigation Project**

Conducted surface water quality sampling and assisted with geophysical survey for the remedial investigation of a former ferrochromium alloy facility. Jefferson Co., OH.

**PA Department of Environmental Protection; Vinton No. 6 to Wehrum Connect Project**

Conducted a wetland delineation & stream survey along a 1-mile proposed water line and 5 acres of proposed work space for a proposed mine water treatment project. USACE Eastern Mountains and Piedmont Region. Cambria Co., PA.

**EMPLOYMENT HISTORY**

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**Tetra Tech, Inc.** – Senior Ecologist IV (2015 – present)

**Golder Associates, Inc.** – Project Ecologist (2012 to 2015)

**Pennsylvania Soil & Rock, Inc.** – Lead Environmental Specialist (2011 to 2012)

**GAI Consultants, Inc.** – Lead Environmental Specialist (2008 to 2010)

**SCIENTIFIC/TECHNICAL PUBLICATIONS**

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Gora, E, L Battaglia, H Schumacher and W Carson. Patterns of coarse woody debris volume among 18 late-successional and mature forest stands in Pennsylvania. *Journal of the Torrey Botanical Society*, 141 (2014), 151 – 160.

Schumacher, H and W Carson. Biotic homogenization of the sapling layer in 19 late-successional and old-growth stands in Pennsylvania. *Journal of the Torrey Botanical Society*, 140 (2013), 313 - 328.

Reese, GT; AJ Baumert; HB Schumacher. 2009. Natural Gas Pipelines: Impacts of Broken Canopies on Forest Habitat and Interior Species. Prepared for INGAA Foundation, Inc.

Bradford, MA, HB Schumacher, S Catovsky, T Eggers and GM Tordoff. Impacts of invasive plant species on riparian plant assemblages: interactions with elevated atmospheric carbon dioxide and nitrogen deposition. *Oecologia*, 152 (2007), 791 - 803.

**MEMBERSHIPS**

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Society of Wetland Scientists

Botanical Society of Western Pennsylvania (Vice President 2016 – present)

Ecological Society of America

### EXPERIENCE SUMMARY

Mr. Korey McCluskey a wetland/environmental scientist - technical lead with 9+ years of experience in wetland delineation, stream evaluation, State and Federal 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, Small Whorled Pogonia, and Virginia Spirea in West Virginia. 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, 401, 404, 105 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

#### PERMITTING (OIL/GAS)

**Wetland/Environmental Scientist IV - Department Technical Lead; Stonehenge Appalachia, L.L.C.; Renick to Shields Natural Gas Pipeline Project, Butler County, Pennsylvania; January 2016 to present.** Responsibilities included co-preparing the Joint Permit application and all associated agency documentation to permit anticipated impacts along a 7.9 mile proposed pipeline.

**Wetland/Environmental Scientist IV - Department Technical Lead; Equitrans, L.P. (Equitrans); Equitrans Expansion Project (EEP), Allegheny, Washington, and Greene Counties, Pennsylvania; March 2016 to present.** Responsibilities included assisting in preparing permit documents for the 401 Water Quality Certification. Additional work included preparation of many of the required components of a Joint Permit.

**Wetland/Environmental Scientist IV - Department Technical Lead; Sunoco Logistics; S P L P Houston Tank Farm Project, Washington County, Pennsylvania; May 2015 to present.** Responsibilities included performing a supplemental wetland delineation, functions and values assessment, wetland report, and Joint Permit preparation for the proposed wetland impacts at the 21 acre proposed tank farm Project.

#### 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, since 2013, Permit # 16-624  
 USFWS Certified Qualified Surveyor for the Federally Listed Running Buffalo Clover, Small Whorled Pogonia, and Virginia Spirea in West Virginia. Since May 2015

#### AREA OF EXPERTISE

Wetland Delineation and Stream Identification & State and Federal 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 Olen tangy 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

9+

#### YEARS WITHIN FIRM

3+

#### CONTACT

Korey.McCluskey@TetraTech.com

**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, stream assessments, and report preparation 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 43+ PA State listed species 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, and preparing Botanical Reports, Conservation Plans, and Monitoring for the Project. Also aided in conducting a RTE survey for the federally listed Running Buffalo Clover in the WV segment of OPP.

**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 Reservoir 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; Boy Scout 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 Endangered 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

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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

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- N/A

### MEMBERSHIPS

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- Society of Wetland Scientists (SWS)

### AWARDS

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- N/A



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

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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

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## SCIENTIFIC/TECHNICAL PUBLICATIONS

- McGuirk, J, M, "Walleye (*Sander vitreus*) spawning movements and habitat utilization in Otsego Lake, NY, 2011

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## MEMBERSHIPS

- N/A

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## AWARDS

- David E. Moorehouse Award for Outstanding Junior in Fisheries and Aquaculture B.T.

## EXPERIENCE SUMMARY

Mr. Vleno 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. Vleno'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.Vleno@TetraTech.com

**Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineation and Endangered 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

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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

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N/A

## MEMBERSHIPS

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- Society of Wetland Scientists

### EXPERIENCE SUMMARY

Ms. Stephanie Zabowski Lieb is a wetland/environmental scientist with 5+ years of experience in wetland delineation and stream evaluation, and rare, threatened & endangered botanical surveying and assessment, throughout Pennsylvania, Ohio, and West Virginia. This includes preparation of wetland delineation and stream evaluation reports, botanical reports, US Army Corps Joint and Nation Wide Permits, and PA Department of Environmental Protection General Permits. Stephanie has additional experience performing geographic information systems (GIS) data processing and figure creation using ArcGIS10.1. She also has experience performing bat hibernaculum and summer roost tree habitat surveys in West Virginia.

### RELEVANT EXPERIENCE

**Wetland/Environmental Scientist III; Sunoco Logistics; OPP Natural Gas Pipeline Projects, Ohio and West Virginia; August 2015 to present.** Responsibilities included aiding in wetland delineations and stream assessments for the proposed 70 miles of the Ohio Pipeline and West Virginia Pipeline Projects.

**Wetland/Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Fox to Houston Natural Gas Pipeline Project, Washington County, PA; August 2015 to present.** Responsible for conducting wetland delineations and stream assessments for the approximate 1 mile of proposed pipeline.

**Environmental Scientist; Pittsburgh Botanic Garden; Kentucky Hollow Site, Allegheny County, PA; 2015.** Responsible conducting wetland delineations and stream assessments for the approximate 40 acre area for proposed construction of trails and passive acid mine drainage treatment system. Prepared wetland delineation and stream assessment reports and associated GIS data processing and figure creation.

**Environmental Scientist; EQT Gathering; NIMC S001 Pipeline Project, Allegheny & Washington Counties, PA; 2015.** Responsible for conducting botanical survey for wild hyacinth (*Cammasia scilloides*) and snow trillium (*Trillium nivale*), PA state-listed species. Responsible for preparing a botanical survey report.

**Environmental Scientist; Grace Baptist Church Additions; Grace Baptist Church, Allegheny County, PA; 2015.** Responsible for compiling components of the NPDES permit package and GIS figure creation for church additions.

**Environmental Scientist; NiSource Midstream Services, LLC; East Washington Gathering Pipeline Project, Washington County, PA; 2015.** Assisted in the transplanted of Short's sedge

### EDUCATION

B.S. Environmental Resource Management, The Pennsylvania State University, May 2009

Minors: Wildlife and Fisheries Science, May 2009; Watershed and Water Resources, May 2009

### REGISTRATIONS

Wild Plant Management Permit, PA, 2015  
Permit # 15-650

### 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.

USACE 1987 Manual and Regional Supplement Wetland Delineation Training, Swamp School, 2013.

Ohio Rapid Assessment Method for Wetlands Training, Ohio EPA, 2013.

Grasses, Sedges and Rushes Identification Workshop. Taught by Sarah Chamberlain, 2013.

Sedge Identification Workshop. Taught by Dr. Timothy Block and Dr. Ann Rhoads, 2013.

### OFFICE

Pittsburgh, PA

### YEARS OF EXPERIENCE

5+

### YEARS WITHIN FIRM

0

### CONTACT

Stephanie.ZabowskiLieb@TetraTech.com

(*Carex shortiana*), a PA state-listed species, as part of mitigation request by PA DCNR. Responsible for associated GIS data processing and figure creation.

**Environmental Scientist; West Newton Borough; 100 Pemberton Place Retaining Wall, Westmoreland County, PA; 2015.** Responsible for compiling joint permit registration package and associated GIS figure creation for a 130 foot long retaining wall.

**Environmental Scientist; Plum Borough School District; Regency Park Elementary School, Allegheny County, PA; 2015.** Responsible for conducting wetland delineations and stream assessments for the approximate 5 acre school property. Prepared wetland delineation and stream assessment reports and associated GIS data processing and figure creation.

**Environmental Scientist; Freeport Area School Athletic Field; Freeport Area School District, Butler County, PA; 2015.** Responsibilities for compiling components of the NPDES permit package and associated GIS figure creation.

**Environmental Scientist; EQT Corporation; Above Ground Storage Tank Inspection/Registration, various Counties, WV; 2014.** Responsible for GIS data processing, shapefile creation, organization, progress tracking, and mapping of 1600+ above ground storage tanks.

**Environmental Scientist; Sunoco Logistics; Pennsylvania Pipeline Project, Cambria County, PA; 2014.** Responsible for conducting botanical survey for federally listed Northeastern Bulrush (*Scirpus ancistrochaetus*) along the 23 mile pipeline route in Cambria County, PA and associated data processing.

**Environmental Scientist; Bethel Park Municipal Authority; Bethel Park Wastewater Treatment Plant Expansion, Allegheny County, PA; 2014.** Responsible for compiling joint permit registration package and associated GIS figure creation for wastewater treatment plant expansion.

**Environmental Scientist; EQT Gathering; Yablonski Well Line Project, Washington & Greene Counties, PA; 2014.** Responsible for conducting botanical survey for fringed bluets (*Houstonia canadensis*) and tall larkspur (*Delphinium exaltatum*), PA state-listed species, and preparing associated botanical report for 3 mile pipeline project.

**Environmental Scientist; Y-Grade Pipeline Project; Hilcorp Energy Company, Columbiana County, OH; 2014.** Responsible for conducting wetland delineations and stream assessments of access roads for proposed pipeline project. Prepared wetland delineation and stream assessment report. Assisted in erosion and sediment control monitoring during pipeline construction.

**Environmental Scientist; various projects; Antero Resources, various counties, WV; 2014.** Responsible for conducting wetland delineations and stream assessments for various proposed pipeline projects. Prepared wetland delineation and stream assessment reports.

**Biologist II; NRG Homer City Services, LLC; Homer City Ash Landfill Expansion, Indiana County, PA; 2013.** Responsible for conducting wetland delineations and stream assessments for the approximate 130 acre proposed ash landfill expansion. Prepared wetland delineation and stream assessment reports and associated GIS data processing and figure creation.

**Biologist II; MarkWest Liberty Midstream & Resources, LLC; Burg to Wack Pipeline, Butler County, PA; 2013.** Responsible for conducting wetland delineations and stream assessments for the approximate 2.5 mile proposed pipeline. Prepared wetland delineation and stream assessment reports, associated GIS data processing and figure creation, and PA DEP general permit package.

**Biologist II; MarkWest Liberty Midstream & Resources, LLC; Bame to Bluestone Pipeline, Butler County, PA; 2013.** Responsible for conducting wetland delineations and stream assessments for the approximate 3 mile proposed pipeline. Prepared wetland delineation and stream assessment reports, associated GIS data processing and figure creation, and PA DEP general permit package.

**Biologist II; MarkWest Liberty Midstream & Resources, LLC; Stebbins to McElhinney Pipeline, Butler County, PA; 2013.** Responsible for conducting wetland delineations and stream assessments for the approximate 3 mile proposed pipeline. Prepared wetland delineation and stream assessment reports, associated GIS data processing and figure creation, and PA DEP general permit package.

**Biologist II; EQT Gathering, LLC; NIJU S026 Pipeline, Washington County, PA; 2013.** Responsible for conducting wetland delineations and stream assessments for the approximate 2.5 mile proposed pipeline. Prepared wetland delineation and stream assessment reports, associated GIS data processing and figure creation, and PA DEP general permit package. Assisted with archeology field work and GIS figure creation.

**Biologist II; MarkWest Liberty Midstream & Resources, LLC; Lynn to Stebbins Pipeline, Butler County, PA; 2013.** Responsible for conducting a wetland delineation and stream investigation, as well as a botanical survey for a PA state-listed species. Prepared a wetland delineation and stream identification report, botanical survey report, associated GIS data processing and figure creation, and PA DEP general permit package.

**Biologist II; EQT Gathering, LLC; MOME S007 Pipeline, Harrison County, WV; 2012.** Responsible for preparing nationwide permit package. Also assisted in Indiana Bat habitat assessment and report preparation.

**Environmental Scientist; Williams; Huczko to Clark Pipeline Project, Westmoreland County, PA; 2012.** Assisted in surveys for PA state-listed species including purple fringeless orchid (*Platanthera peramoena*), bushy bluestem (*Andropogon glomeratus*), shining ladies' tresses (*Spiranthes lucida*), and mountain bugbane (*Actea podocarpa*). Prepared reports for PA state regulatory agencies and associated GIS figure creation.

**Environmental Scientist; Williams; Jury to 6-inch Pipeline Project, Westmoreland County, PA; 2011.** Assisted in botanical surveys for PA state-listed species including purple rocket (*Iodanthus pinnatifidus*), scouring rush (*Equisetum x ferrissii*), and Torrey's sedge (*Juncus torreyi*) for a 4 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies and associated GIS figure creation.

**Environmental Scientist; XTO; North Discharge/Indiana Extension Pipeline Project, Westmoreland & Indiana Counties, PA; 2011.** Assisted in a wetland delineation/stream survey and a survey for PA state-listed species including purple fringeless orchid (*Platanthera peramoena*), bushy bluestem (*Andropogon glomeratus*), shining ladies' tresses (*Spiranthes lucida*), leafcup (*Smallanthus uvedalius*), and eastern coneflower (*Rudbeckia fulgida*) for a 12 mile natural gas pipeline project. Prepared reports for PA state regulatory agencies and associated GIS figure creation.

**Environmental Scientist; Williams; Gamelands to Jordan Pipeline Project, Greene County, PA; 2011.** Assisted in surveys for state-listed species including shining ladies' tresses (*Spiranthes ovalis*), wild senna (*Senna marilandica*), leaf-cup (*Smallanthus uvedalius*), sourwood (*Oxydendron arboreum*), crested dwarf iris (*Iris cristata*), St. Andrew's cross (*Hypericum stragulum*), harbinger-of-spring (*Erigenia bulbosa*), lobed spleenwort (*Asplenium pinnatifidum*), puttyroot (*Aplectrum hyemale*), single-headed pussytoes (*Antennaria solitaria*), and blue monkshood (*Aconitum uncinatum*). Prepared reports for PA state regulatory agencies.

**Environmental Scientist; Range Resources; Multiple Temporary and Permanent Water Pipelines; Washington County, Pennsylvania. 2010 to 2011.** Responsible for wetland delineations and stream evaluations on dozens of temporary and permanent water pipelines linking frac water impoundments in the Washington County area. Also prepared wetland delineation and stream assessment reports.

## CHRONOLOGICAL HISTORY

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Wetland/Environmental Scientist III; Tetra Tech, Inc.; Pittsburgh, PA, August 2015 – Present.

Environmental Scientist – Part-time; Pennsylvania Soil and Rock, Inc. Monroeville, PA, March 2015 – August 2015

Environmental Scientist; Dawood Engineering Inc., Canonsburg, PA, February 2014 – January 2015

Biologist II; AECOM Technical Services, Inc.; Pittsburgh, PA, August 2012 – February 2014

Environmental Scientist; Pennsylvania Soil and Rock, Inc.; Monroeville, PA, April 2010 – August 2012

Black Fly Suppression Program Intern; Pennsylvania Department of Environmental Protection; Pittsburgh, PA, May 2008 – August 2008

### SCIENTIFIC/TECHNICAL PUBLICATIONS

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- N/A

### MEMBERSHIPS

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- Botanical Society of Western Pennsylvania

### AWARDS

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- N/A



EXPERIENCE SUMMARY

Cody R. Stoliker has approximately 2 years of professional experience in wetland delineation, permitting, and stream assessments and classification in Pennsylvania, New York, Ohio, Virginia and West Virginia. With 4 years of fisheries and wildlife management experience, specializing in large game conservation, Mr. Stoliker has technical expertise working with bear, elk, moose, deer, and wolves in Wyoming, as well as lead biologist experience working 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. He acts as Fleet Supervisor overseeing routine and preventative maintenance over department vehicles. Cody R. Stoliker's educational background is in Wildlife Management with a certified training in wetland assessment/delineation and fisheries.

RELEVANT EXPERIENCE

**Environmental Scientist September-October 2015, Ninnescah Wind Farm, Platt, Kingman, and Sedgewick Counties, KS**  
Conducted wetland and stream delineation for a proposed windfarm infrastructure that included turbines, access roads, electrical collection lines, and transmission lines. Specific tasks included micro-siting turbines to avoid water resources on-the-fly, wetland delineation using methods outlined in the USACE wetland delineation manual, and consultation with the Kansas Department of Water Resources and Kansas Department of Agriculture regarding construction in and around Waters of the United States and FEMA mapped flood zones. Specific tasks existed to monitor for potential habitat for threatened and endangered species, specifically, Arkansas darter, Strecker's Chorus Frog, Plains Minnow, and Arkansas River Speckled Chub. Field and desktop analysis were reported in several peer-reviewed reports.

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

3

YEARS WITH TETRA TECH

2

**Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; West Virginia.** Responsible for performing and assisting with wetland delineations and report drafting/review for various proposed natural gas pipeline projects in West Virginia. Specific tasks included field survey, report preparation, and wetland functional assessments.

**Environmental Scientist II , March–February 2016**

**Equitrans, Mountain Valley Pipeline Project, West Virginia, Virginia, and Pennsylvania**

Responsible for performing and assisting with wetland delineations for a proposed 42-inch natural gas pipeline project. Assisted with project start up and procedure implementation, acted as fleet manager for vehicles used during surveys, performed safety inspections and supervised upkeep and maintenance. Wetlands and streams were mapped using Trimble® software, data collected on Apple I-Pads, and worked as part of a team to review/revise collected data for QA/QC. Worked as part of a team reviewing, correcting, drafting, and creating Aquatic Resource Reports for 17 counties detailing +1000 collected features.

**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.

## **SCIENTIFIC/TECHNICAL PUBLICATIONS**

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N/A

## CHRONOLOGICAL HISTORY

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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



EXPERIENCE SUMMARY

Ms. Quinn has five years' experience as an environmental scientist/ wildlife biologist with a background in wildlife and fisheries resource management. 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

**Mountain Valley Pipeline, LLC; Mountain Valley Pipeline Project**

Prepared wetland delineation/stream identification reports for proposed 301 mile natural gas pipeline project.

**Sunoco Logistics, Ohio-Pennsylvania Pipeline Project, Spanning from Delaware County, PA through Harrison County, Ohio.**

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.

**Gulfport Energy; Various Natural Gas Well Pad Sites; Belmont County, Ohio.**

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.

**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.

CHRONOLOGICAL HISTORY

**Tetra Tech, Inc.** -Environmental Scientist II (2013-present) Pittsburgh, PA  
**The University of Pittsburgh** –Animal Husbandry Services Technician I, (2013) Pittsburgh, PA

EDUCATION

BT Wildlife Management, 2011, SUNY Cobleskill  
AAS Animal Sciences & Ecology, 2009, SUNY Delhi

REGISTRATIONS

*PADCNR Wild Plant Management Permit No. 16-652*

TRAINING/CERTIFICATIONS

Certified Wetland Assessment Delineator, 2010, NY  
First Aid/CPR/AED, 1/11/16

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

5

YEARS WITH TETRA TECH

3 year 4 months

CONTACT

Deanna.Quinn@tetrattech.com

**National Parks Service**-Wildlife Ranger (2012) Yosemite, CA

**Loomacres Wildlife Management** -Wildlife Biologist (2010-2012) Cobleskill, NY

**The University of Florida** -Avian Research Technician (2011) Abaco, Bahamas

**New York State Department of Environmental Conservation**-Predator Research Technician (2010)  
Batavia, NY

## **MEMBERSHIPS**

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- The Wildlife Society
- Society of Wetland Scientists

### EXPERIENCE SUMMARY

Jennifer Bittner has four years of experience in the environmental field. Her experience includes wetland delineation and stream assessments, wetland and stream mitigation monitoring, rare plant species surveys, and report preparation for longwall mining, natural gas pipeline, water withdrawal, and facility projects in Pennsylvania, West Virginia, and Ohio. She also has experience inspecting and recommending corrective actions for erosion and sedimentation issues on post-construction pipeline right-of-ways and facilities in PA and WV.

### RELEVANT EXPERIENCE

#### ENERGY

- **Environmental Scientist I; Equitrans, LP; Mountain Valley Pipeline Project; May 2015 to Present.** Assisted with wetland delineations, stream assessments, and report preparation for the proposed 300 mile pipeline stations beginning in Wetzel County, WV to Pittsylvania County, VA.
- **Environmental Scientist I; Sunoco; Pennsylvania Pipeline Project; December 2014 – Present.** Assisted with wetland delineations, stream assessments, and report preparation for the proposed 300 mile pipeline beginning in Washington County, PA to Delaware County, PA.
- **Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; January 2014 to Present.** Assisted with wetland delineations, stream assessments, and report preparation for multiple pipeline proposed pipeline projects and re-routes in Washington County, PA.
- **Environmental Scientist I; Range Resources; January 2014 to December 2015.** Assisted with wetland delineations, stream assessments, and report preparation for various proposed water withdrawal locations in Southwestern PA.
- **Environmental Scientist I; PADEP; December 2015.** Assisted with wetland delineations and stream assessments for a proposed pipeline in Indiana County.
- **Environmental Scientist I; Peoples TWP, LLC; September 2014 to October 2015.** Assisted with wetland delineations and stream assessments for a proposed distribution line in Cambria County.
- **Environmental Scientist I; Sunoco; Ohio Pipeline Project; December 2014 – April 2015.** Assisted with report preparation for wetland and stream delineations.
- **Environmental Scientist I; Rice Energy Inc.; December 2014.** Assisted with stream field surveys in Belmont County, OH.
- **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, coordinating with other compliance monitors on how to effectively inspect all assigned pipeline and facilities each week, and completing weekly E&S inspection reports.

#### EDUCATION

M.S. Environmental Science and Management, Duquesne University

B.S. Marine Biology, Waynesburg University

#### TRAINING/CERTIFICATIONS

40 Hour Army Corps of Engineers Wetland Delineation Training, Richard Chinn Environmental Training, Inc., 2015

CPR / First Aid / AED

#### REGISTRATIONS/AFFILIATIONS

PADCNR Wild Plant Management Permit Permit No. 16-701 (2016)

Society of Wetland Scientists (SWS)

Environmental Professional Intern  
Institute of Environmental Professional Practice  
License 00210713

#### AREA OF EXPERTISE

Environmental Science

#### OFFICE

Pittsburgh, PA

#### YEARS OF EXPERIENCE

4

#### YEARS WITHIN FIRM

1

- **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 preparation.
- **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 preparation.

## SAMPLING

- **Water Quality Intern; Clearwater Marine Aquarium, May 2010 – August 2010.** Maintained water quality and appearance for all exhibits. Tasks included daily water testing using a YSI meter, recordkeeping, backwashing pumps, and feeding fish, sharks, and stingrays.

## CHRONOLOGICAL HISTORY

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- 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

## EXPERIENCE SUMMARY

Mr. Kevin Pulver has 2 years of professional experience in wetland delineation and stream assessment and classification throughout Pennsylvania, Ohio, Virginia, and West Virginia. As a Wetland Environmental Scientist I, Mr. Pulver had the opportunity to perform numerous wetland delineations under the supervision of seasoned professionals within the Wetlands and Ecological Services Department of Tetra Tech. Delineations were primarily performed for natural gas pipeline projects. Mr. Pulver's educational background includes watershed management/stream restoration and environmental science. He is also versed in GIS and AutoCAD software application.

## RELEVANT EXPERIENCE

### OIL/GAS

**Environmental Scientist II; Equitrans, LP; Field Operations Coordinator; Mountain Valley Pipeline Project – 2015 to Present.** Responsible for the management and oversight of all wetland and stream delineation activities for the proposed Mountain Valley Pipeline Project.

**Environmental Scientist II; Sunoco Logistics; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects Pennsylvania – 2014 to Present.** 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 II; Sunoco Logistics; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects Pennsylvania – 2014 to Present.** 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 II; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania – 2014 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.

## EDUCATION

B.A. Environmental Studies, 2011,  
Penn State University - Altoona

B.S. Geography: Watershed  
Management; Environmental  
Science, 2013, Mansfield University  
of Pennsylvania

## REGISTRATIONS/ AFFILIATIONS

PADCNR Wild Plant Management,  
Permit No. 16-673 (2016)

## TRAINING/CERTIFICATIONS

Certificate in Wetland Delineation  
from Wetland Training Institute  
(2013)

CPR / First Aid / AED (2015)

## OFFICE

Pittsburgh, PA

## YEARS OF EXPERIENCE

2

## YEARS WITH TETRA TECH

2

## CONTACT

Email: [kevin.pulver@tetratech.com](mailto:kevin.pulver@tetratech.com)

Direct: 412.920.7024

**Environmental Scientist II; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio – 2014 to Present.** 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.

**Environmental Scientist II; Travis Peak Resources, LLC; Wetland Delineations for a Proposed Water Withdrawal on Pine Creek and a Proposed Tank Farm Location in Tioga County, PA; Pennsylvania – 2016.** Responsible for performing and assisting with wetland delineations on a proposed water withdrawal and tank farm area in Tioga County, PA. Specific tasks included field survey and report preparation.

### **EMPLOYMENT HISTORY**

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- Wetland/Environmental Scientist II, 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**

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- N/A

### **MEMBERSHIPS**

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- Society of Wetland Scientists