Aquatic Resource Report Addendum for the Pennsylvania Pipeline Project, Southeast Region, Chester County, Pennsylvania

Prepared By:

Tetra Tech, Inc.

For

Sunoco Pipeline, LP

525 Fritztown Road

Sinking Spring, PA

November 2016

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FIGURES

APPENDICES

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
PEM	Palustrine Emergent
PFO	Palustrine Forested
Project	Pennsylvania Pipeline Project
PSS	Palustrine Scrub Shrub
SPLP	Sunoco Pipeline, LP
Tetra Tech	Tetra Tech, Inc.
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 Chester 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 Chester 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 1-2; USGS, 2009)
- Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey (Figures 2-1 to 2-2; NRCS, 2014)
- USFWS National Wetland Inventory (NWI) Mapping (Figures 3-1 to 3-2; 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 mapping. Wetland flagging was limited to the bounds of the Addendum Study Area and wetlands are shown as closed or partially closed systems on the detail maps (Figures 4-1 to 4-2).

Appendix A provides a list of hydric soils known to occur within Chester County. Resumes of project personnel are provided in Appendix B.

3.0 RESULTS

The field investigations identified did not identify any areas within Chester County, located within the Southeast Region of the proposed Project Addendum Study Area which met the wetland criteria outlined in the *1987 Manual*, as amended by the *Corps Regional Supplement*. No streams were identified within the Addendum Study Area. The detail maps, provided as Figures 4-1A and 4-2A, illustrate the evaluated Addendum Study Area.

3.1 WETLAND IDENTIFICATION AND DELINEATION

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

NWI mapping of the evaluated Addendum Study Area is included as Figure 3.

Based on field evidence and best professional judgment, it was determined that no wetlands are present within the Addendum Study Area.

3.2 STREAM IDENTIFICATION AND EVALUATION

Based on field evidence and best professional judgment, it was determined that no streams were identified within the Addendum Study Area.

4.0 CONCLUSIONS

During the field investigations in Chester County, located within the Southeast Region of the proposed Project, no areas were 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).

Additionally, no streams were identified within the Addendum Study Area.

REFERENCES

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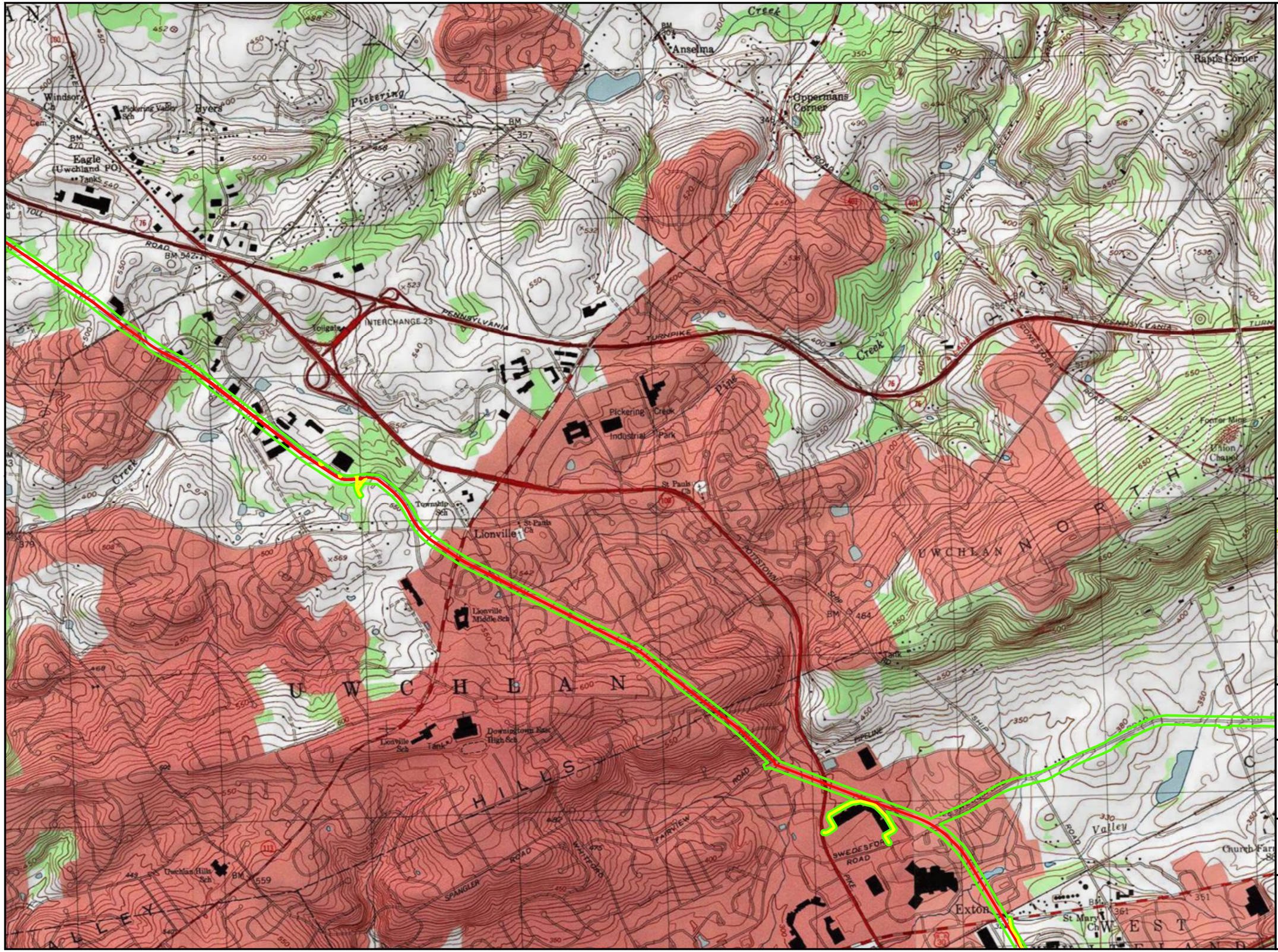
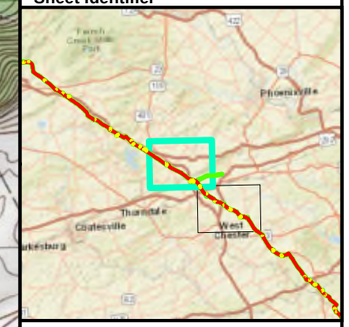
FIGURES



Legend

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

Sheet Identifier



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

TETRA TECH

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

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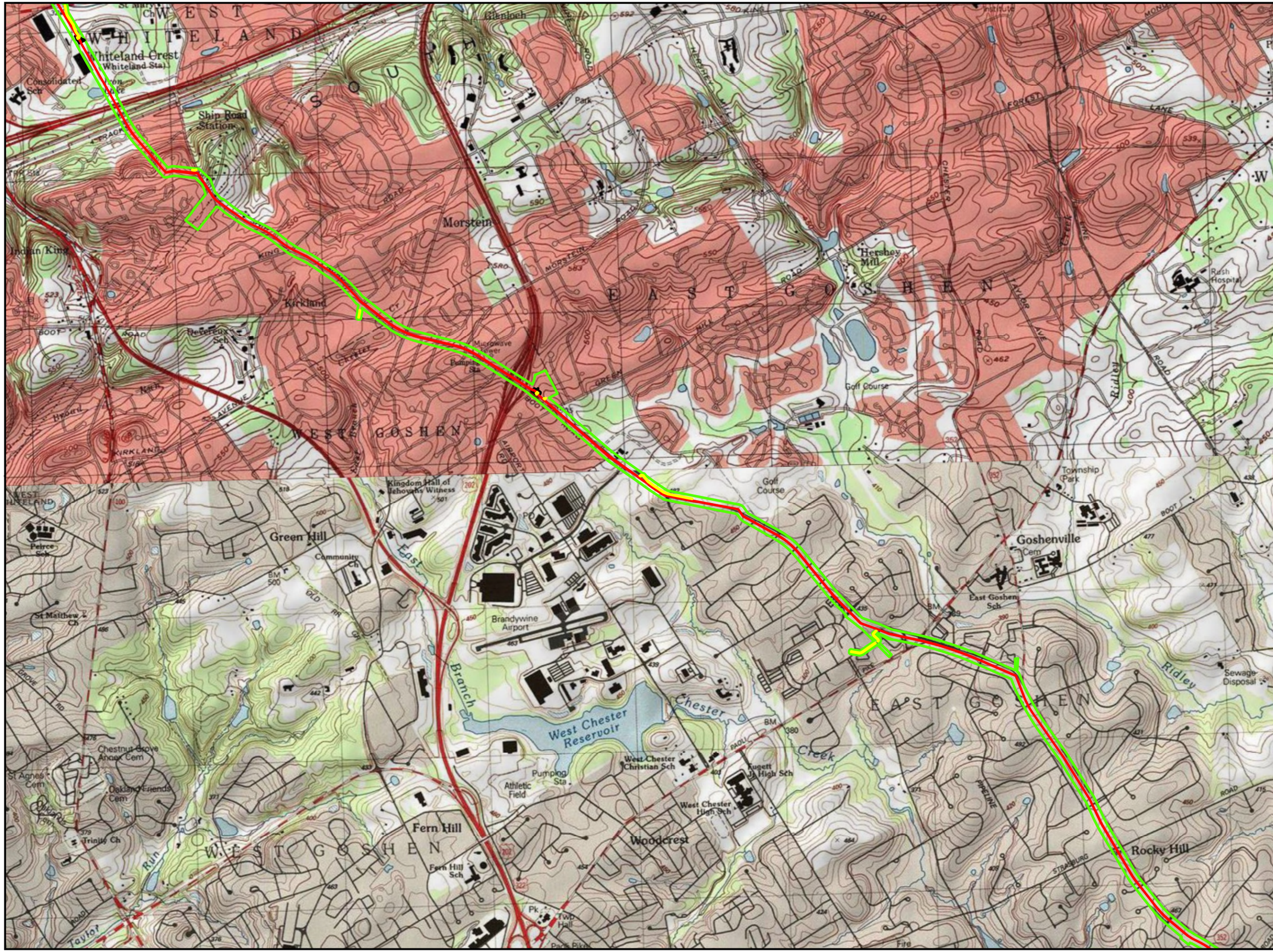

USGS PROJECT LOCATION MAP
FIGURE 1-2
PENNSYLVANIA PIPELINE PROJECT
NOVEMBER 12, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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

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Legend

- Access Road
- Alignment Centerline
- Block Valve/Station
- Study Area
- NRCS Soils and Codes
- County Boundary

Sheet Identifier

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

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

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- County Boundary

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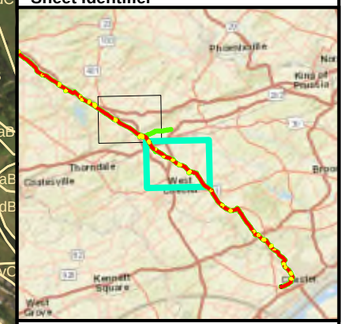

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NRCS SOILS MAP
FIGURE 2-2
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NOVEMBER 12, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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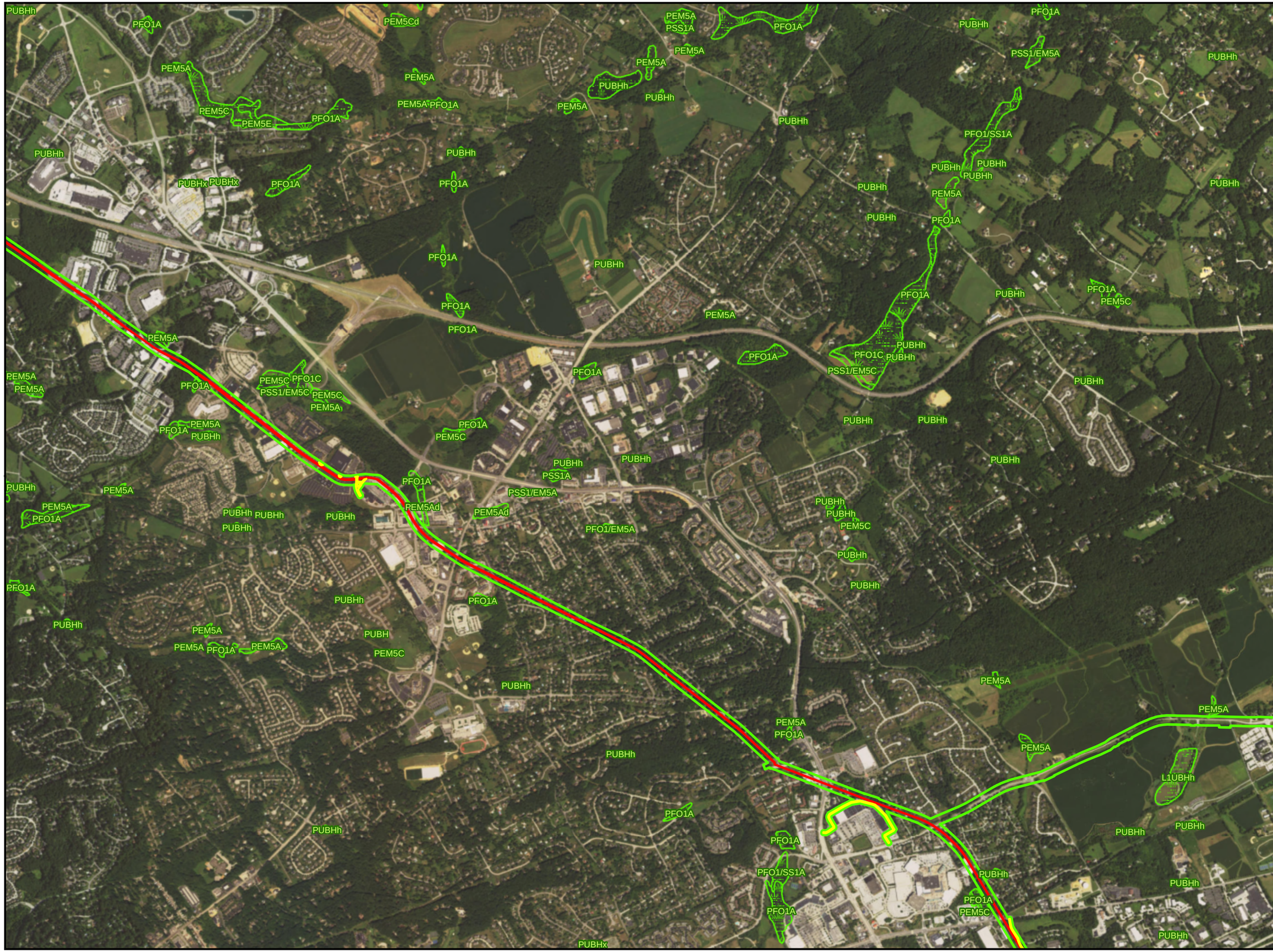

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- Access Road
- Alignment Centerline
- Block Valve/Station
- Study Area
- NWI Wetlands and Codes
- County Boundary

Sheet Identifier

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0 300 600 Meters

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

TETRA TECH

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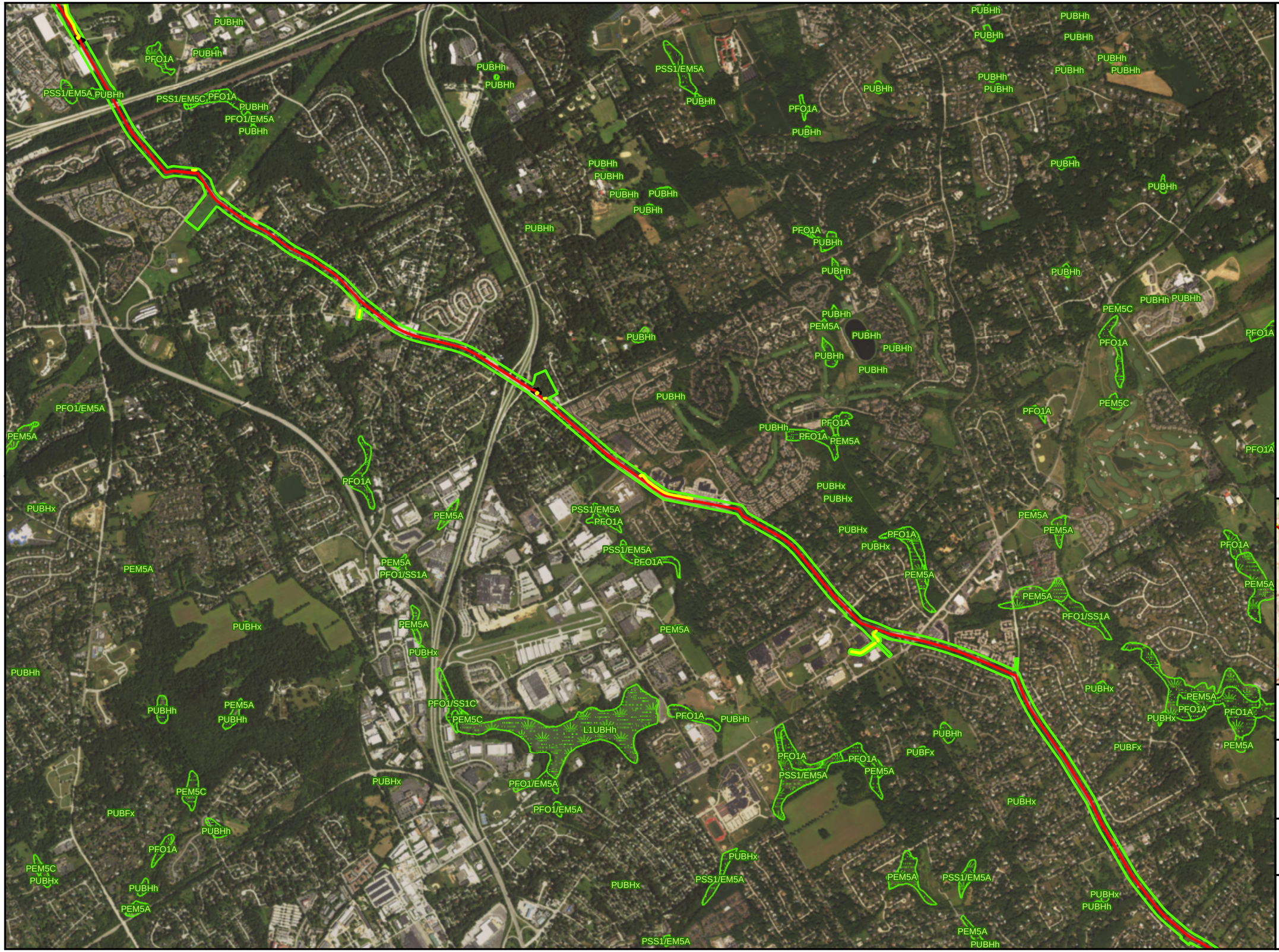

Legend

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

Sheet Identifier

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0 300 600 Meters

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

TETRA TECH

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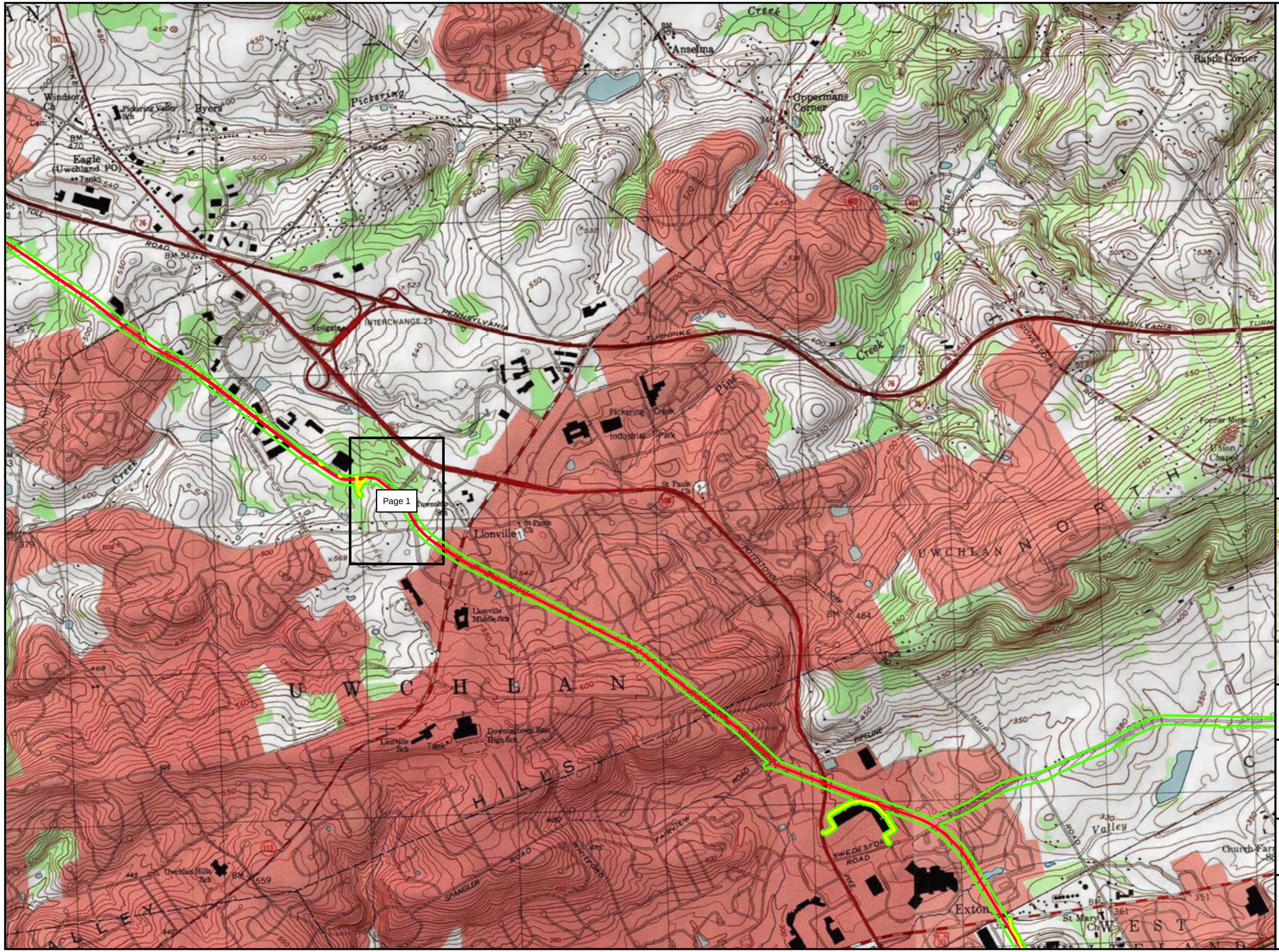

Legend

- Access Road
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- Block Valve/Station
- Study Area
- Index
- County Boundary

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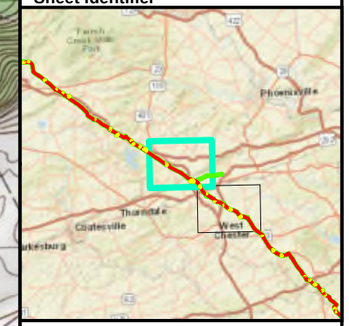

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USGS PROJECT LOCATION MAP
FIGURE 4-INDEX-1
PENNSYLVANIA PIPELINE PROJECT
NOVEMBER 12, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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2) Quadrangles being displayed are Downingtown, Malvern

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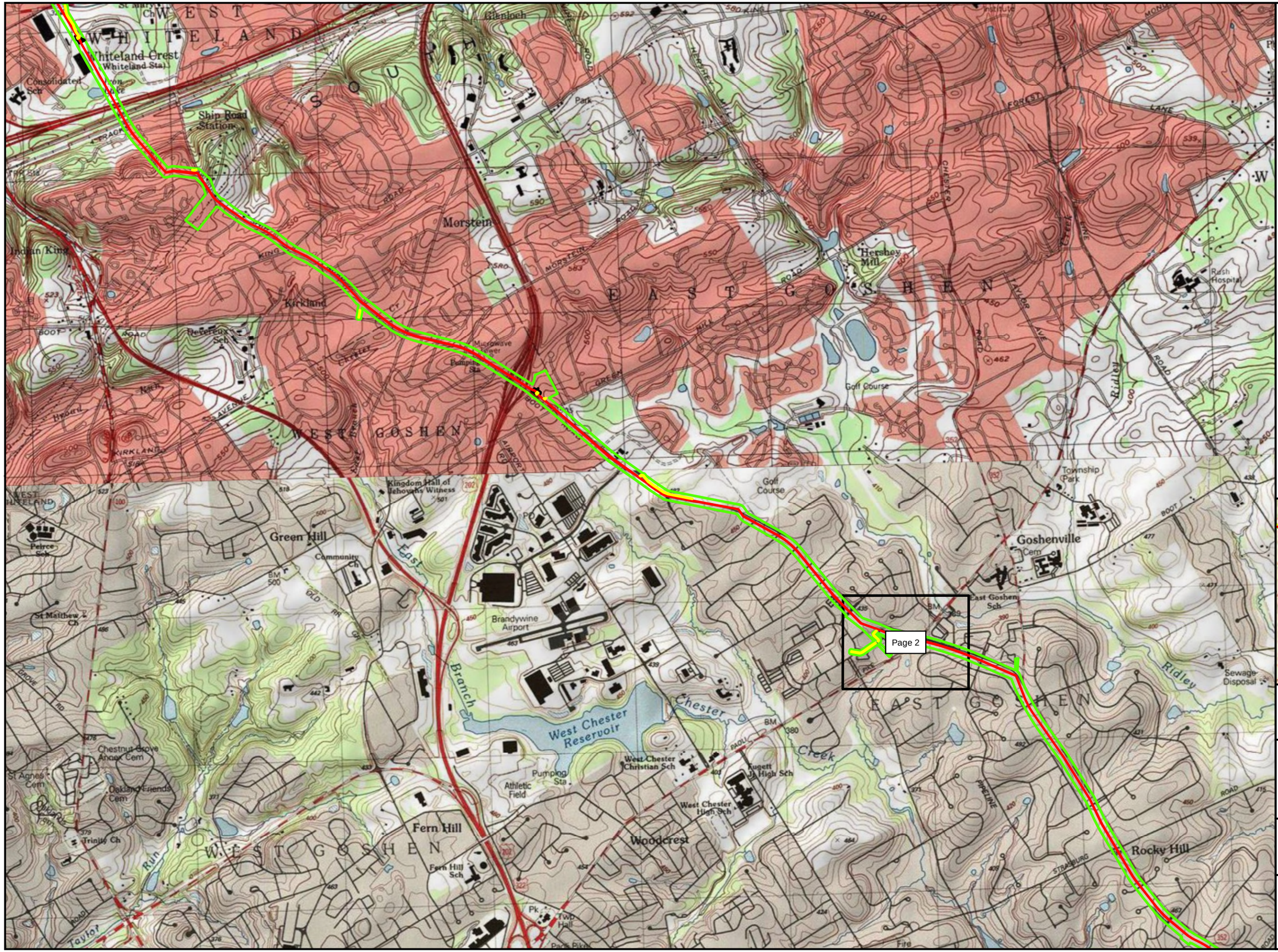

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- Block Valve/Station
- Study Area
- Index
- County Boundary

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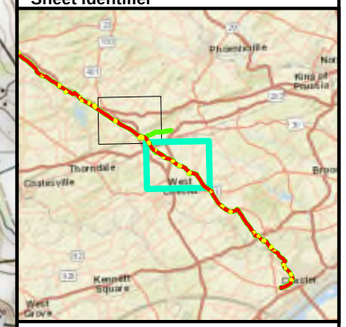

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Meters
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USGS PROJECT LOCATION MAP
FIGURE 4-INDEX-2
PENNSYLVANIA PIPELINE PROJECT
NOVEMBER 12, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

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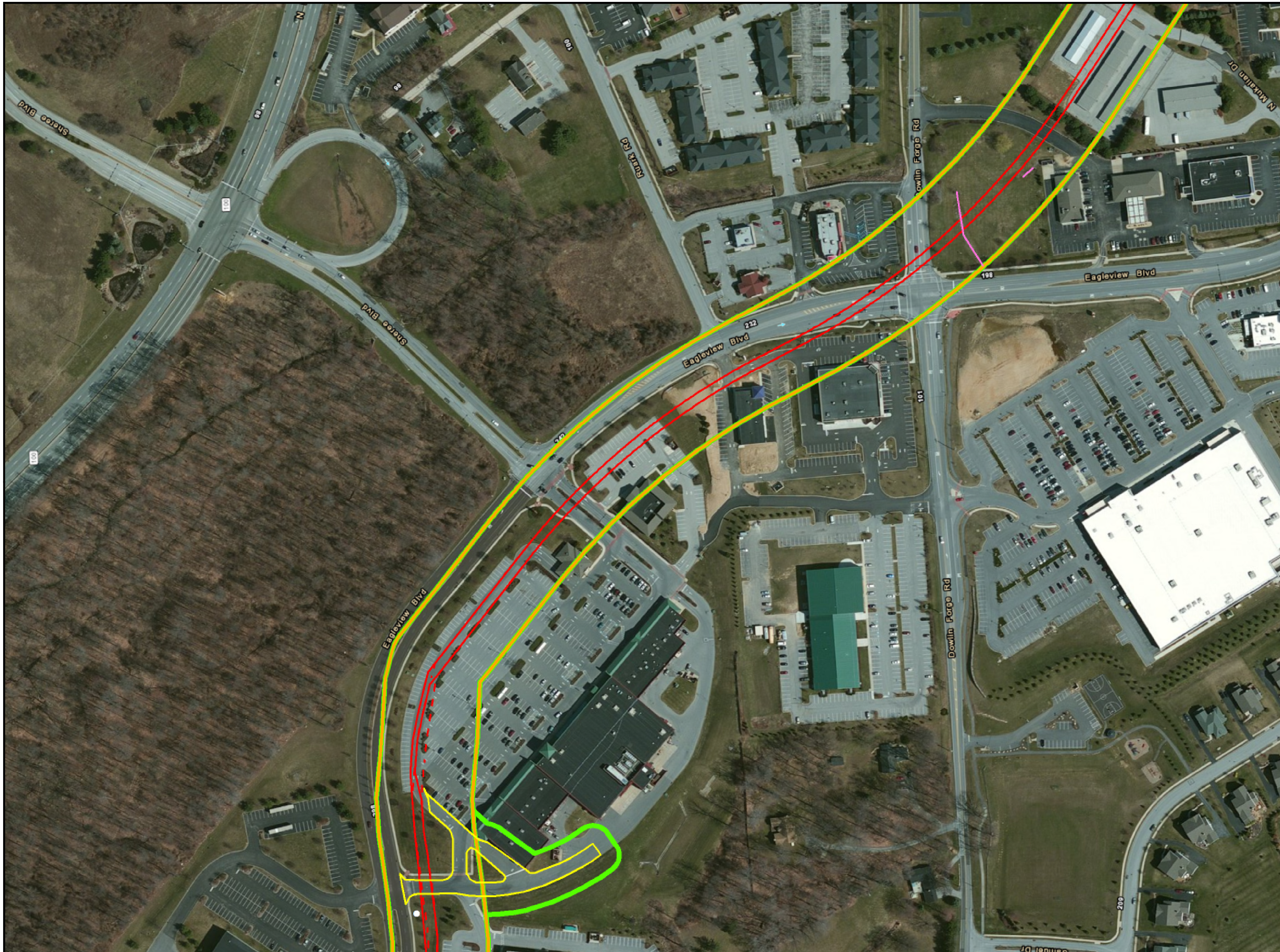

Legend

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- Drainage Feature
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- Study Area
- Study Area (2/25/16)
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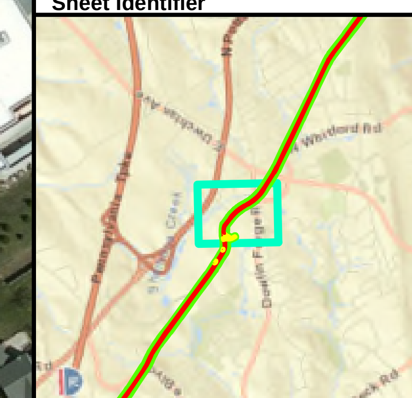

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ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-1
PENNSYLVANIA PIPELINE PROJECT
NOVEMBER 12, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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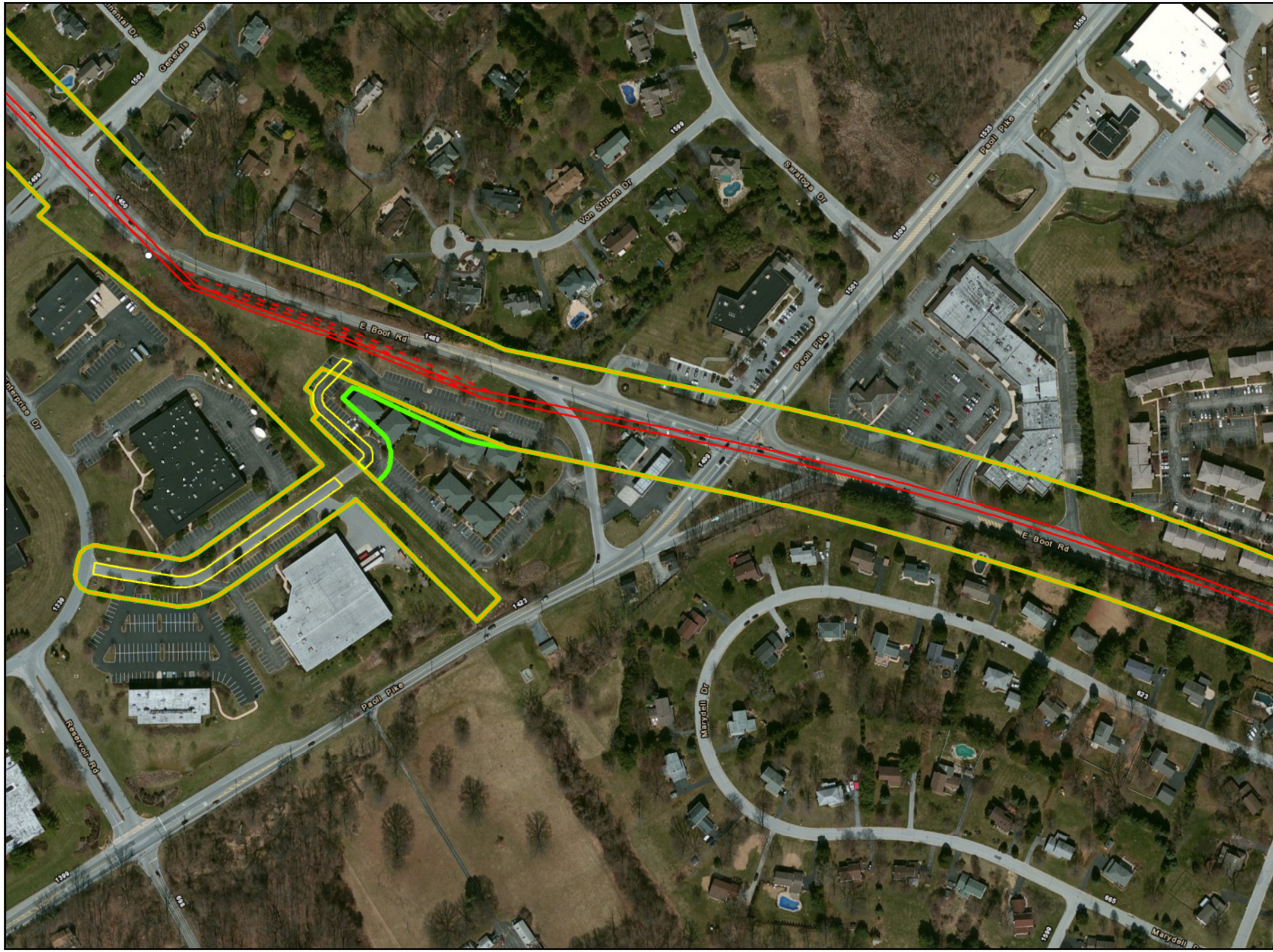

Legend

- Culvert
- Access Road
- Access Road (2/25/16)
- Alignment Centerline
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- Study Area
- Study Area (2/25/16)
- Block Valve/Station

Sheet Identifier

N

0 100 200 Feet

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

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APPENDIX A
HYDRIC SOILS LIST

Hydric Soils List
Chester County, Pennsylvania

Map Unit Symbol	Map Unit Name	Component Name and Phase	Component Percent	Landforms
Ba	Baile silt loam	Baile	85	Depressions
BaB	Baile silt loam, 3 to 8 percent slopes	Baile	85	Depressions
BbB	Baile silt loam, 0 to 8 percent slopes, very stony	Baile, very stony	100	Depressions
Bo	Bowmansville-Knauers silt loams	Knauers	40	Flood plains
CaA	Califon loam, 0 to 3 percent slopes	Holly	4	Flood plains
CaA	Califon loam, 0 to 3 percent slopes	Baile	3	Depressions
CaA	Califon loam, 0 to 3 percent slopes	Fluvaquents	3	Flood plains
CaB	Califon loam, 3 to 8 percent slopes	Baile	4	Depressions
CaB	Califon loam, 3 to 8 percent slopes	Hatboro	4	Flood plains
CaC	Califon loam, 8 to 15 percent slopes	Holly	3	Valley floors
CaC	Califon loam, 8 to 15 percent slopes	Fluvaquents	1	Flood plains
CbB	Califon loam, 0 to 8 percent slopes, extremely stony	Holly	3	Flood plains

CbB	Califon loam, 0 to 8 percent slopes, extremely stony	Fluvaquents	1	Flood plains
ClA	Clarksburg silt loam, 0 to 3 percent slopes	Thorndale	5	Depressions
ClB	Clarksburg silt loam, 3 to 8 percent slopes	Thorndale	5	Depressions
Co	Codorus silt loam	Hatboro	8	Flood plains
Co	Codorus silt loam	Baile	3	Depressions
CpA	Cokesbury silt loam, 0 to 3 percent slopes	Cokesbury	85	Depressions
CpA	Cokesbury silt loam, 0 to 3 percent slopes	Holly	3	Valley floors
CpB	Cokesbury silt loam, 3 to 8 percent slopes	Cokesbury	90	Depressions
CpB	Cokesbury silt loam, 3 to 8 percent slopes	Holly	3	Valley floors
CqB	Cokesbury silt loam, 0 to 8 percent slopes, very stony	Cokesbury, very stony	90	Depressions
CqB	Cokesbury silt loam, 0 to 8 percent slopes, very stony	Holly	3	Valley floors
Cs	Comus silt loam	Holly	8	Flood plains
CyA	Croton silt loam, 0 to 3 percent slopes	Croton	90	Depressions
CyB	Croton silt loam, 3 to 8 percent slopes	Croton	90	Depressions
DfA	Duffield silt loam, 0 to 3 percent slopes	Thorndale	2	Depressions
DfB	Duffield silt loam, 3 to 8 percent slopes	Thorndale	2	Depressions
EdB	Edgemont channery loam, 3 to 8 percent slopes	Andover	3	Drainageways

EdC	Edgemont channery loam, 8 to 15 percent slopes	Andover	3	Drainageways
EdD	Edgemont channery loam, 15 to 25 percent slopes	Andover	3	Drainageways
ExB	Edgemont channery sandy loam, 0 to 8 percent slopes, extremely stony	Andover, extremely stony	2	Drainageways
ExD	Edgemont channery sandy loam, 8 to 25 percent slopes, extremely stony	Andover, extremely stony	3	Drainageways
ExF	Edgemont channery sandy loam, 25 to 60 percent slopes, extremely stony	Andover, extremely stony	3	Drainageways
Gb	Gibraltar silt loam	Holly	5	Flood plains
GdA	Gladstone gravelly loam, 0 to 3 percent slopes	Cokesbury	1	Depressions
GdB	Gladstone gravelly loam, 3 to 8 percent slopes	Cokesbury	3	Depressions
GdC	Gladstone gravelly loam, 8 to 15 percent slopes	Cokesbury	5	Depressions
GdD	Gladstone gravelly loam, 15 to 25 percent slopes	Cokesbury	5	Depressions
GdE	Gladstone gravelly loam, 25 to 35 percent slopes	Cokesbury	3	Depressions
GfB	Gladstone gravelly loam, 0 to 8 percent slopes, very bouldery	Cokesbury	5	Depressions
GfD	Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery	Cokesbury	5	Depressions
GfF	Gladstone gravelly loam, 25 to 50 percent slopes, very bouldery	Cokesbury	5	Depressions
GlA	Glenville silt loam, 0 to 3 percent slopes	Baile	5	Depressions
GlB	Glenville silt loam, 3 to 8 percent slopes	Baile	5	Depressions
Ha	Hatboro silt loam	Hatboro	95	Flood plains

Ho	Holly silt loam	Holly	94	Flood plains
Ho	Holly silt loam	Brinkerton	2	Depressions
JoB	Joanna loam, 3 to 8 percent slopes	Croton	5	Depressions
JoC	Joanna loam, 8 to 15 percent slopes	Croton	5	Depressions
JoD	Joanna loam, 15 to 25 percent slopes	Croton	5	Depressions
JpB	Joanna loam, 0 to 8 percent slopes, extremely stony	Croton	4	Depressions
JpD	Joanna loam, 8 to 25 percent slopes, extremely stony	Croton	2	Depressions
JpF	Joanna loam, 25 to 50 percent slopes, extremely stony	Croton	2	Depressions
LbA	Lamington silt loam, 0 to 3 percent slopes	Lamington	85	Terraces
LcB	Lawrenceville silt loam, 3 to 8 percent slopes	Doylestown	3	Drainageways
LhB	Lehigh channery silt loam, 3 to 8 percent slopes	Croton	3	Depressions
LhB	Lehigh channery silt loam, 3 to 8 percent slopes	Doylestown, extremely stony	1	Drainageways
LhC	Lehigh channery silt loam, 8 to 15 percent slopes	Croton	2	Depressions
LhC	Lehigh channery silt loam, 8 to 15 percent slopes	Doylestown	1	Drainageways
LkB	Lehigh channery silt loam, 0 to 8 percent slopes, extremely stony	Croton, extremely stony	1	Depressions
Ln	Lindside silt loam	Holly	12	Flood plains
MaB	Manor loam, 3 to 8 percent slopes	Hatboro	2	Flood plains

MaC	Manor loam, 8 to 15 percent slopes	Hatboro	2	Flood plains
McA	Mattapex silt loam, 0 to 3 percent slopes	Othello	1	Terraces
McA	Mattapex silt loam, 0 to 3 percent slopes	Hatboro	1	Flood plains
MlA	Mount Lucas silt loam, 0 to 3 percent slopes	Towhee	7	Depressions
MlB	Mount Lucas silt loam, 3 to 8 percent slopes	Towhee	6	Depressions
MlC	Mount Lucas silt loam, 8 to 15 percent slopes	Towhee	5	Depressions
MnB	Mount Lucas silt loam, 0 to 8 percent slopes, extremely stony	Towhee, extremely stony	9	Depressions
MuB	Murrill gravelly loam, 3 to 8 percent slopes	Thorndale	2	Depressions
NeB	Neshaminy silt loam, 3 to 8 percent slopes	Towhee	3	Depressions
NeC	Neshaminy silt loam, 8 to 15 percent slopes	Towhee	5	Depressions
NeD	Neshaminy silt loam, 15 to 25 percent slopes	Towhee	5	Depressions
NfB	Neshaminy gravelly silt loam, 0 to 8 percent slopes, extremely bouldery	Towhee, extremely stony	5	Depressions
NfD	Neshaminy gravelly silt loam, 8 to 25 percent slopes, extremely bouldery	Towhee, extremely stony	3	Depressions
NfF	Neshaminy gravelly silt loam, 25 to 60 percent slopes, extremely bouldery	Towhee, extremely stony	3	Depressions
PfC	Penn channery silt loam, 8 to 15 percent slopes	Croton	3	Depressions
RaB	Raritan silt loam, 3 to 8 percent slopes	Knauers	2	Flood plains
ReA	Readington silt loam, 0 to 3 percent slopes	Croton	3	Depressions

ReB	Readington silt loam, 3 to 8 percent slopes	Croton	6	Depressions
Ro	Rowland silt loam	Knauers	8	Flood plains
Th	Thorndale silt loam	Thorndale	100	Depressions
ToA	Towhee silt loam, 0 to 3 percent slopes	Towhee	96	Depressions
ToB	Towhee silt loam, 3 to 8 percent slopes	Towhee	88	Depressions
ToB	Towhee silt loam, 3 to 8 percent slopes	Watchung, silt loam	2	Depressions
TxB	Towhee silt loam, 0 to 8 percent slopes, very stony	Towhee, very stony	90	Depressions
Udp	Udorthents, sanitary landfill	Croton	2	Depressions
UdsB	Udorthents, schist and gneiss, 0 to 8 percent slopes	Hatboro	1	Flood plains
UdsD	Udorthents, schist and gneiss, 8 to 25 percent slopes	Hatboro	1	Flood plains
UdtB	Udorthents, shale and sandstone, 0 to 8 percent slopes	Croton	1	Depressions
UrbB	Urban land-Baile complex, 0 to 8 percent slopes	Baile	30	Depressions
UrfB	Urban land-Cokesbury complex, 0 to 8 percent slopes	Cokesbury	30	Depressions
UrfD	Urban land-Cokesbury complex, 8 to 25 percent slopes	Cokesbury	30	Depressions
UrhB	Urban land-Duffield complex, 0 to 8 percent slopes	Thorndale	2	Depressions
UrkB	Urban land-Edgemont complex, 0 to 8 percent slopes	Andover	2	Drainageways
UrkD	Urban land-Edgemont complex, 8 to 25 percent slopes	Andover	2	Drainageways

UrlB	Urban land-Gladstone complex, 0 to 8 percent slopes	Cokesbury	5	Depressions
UrlD	Urban land-Gladstone complex, 8 to 25 percent slopes	Cokesbury	5	Depressions
Uro	Urban land-Hatboro complex	Hatboro	30	Flood plains
Urp	Urban land-Holly complex	Holly	30	Flood plains
UruB	Urban land-Neshaminy complex, 0 to 8 percent slopes	Towhee	5	Depressions
UrxB	Urban land-Penn complex, 0 to 8 percent slopes	Croton	4	Depressions
UrxD	Urban land-Penn complex, 8 to 25 percent slopes	Croton	4	Depressions
UryB	Urban land-Towhee complex, 0 to 8 percent slopes	Towhee	30	Depressions
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	Baile	1	Depressions
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	Baile	1	Depressions
WaA	Watchung silt loam, 0 to 3 percent slopes	Watchung, silt loam	86	Depressions
WaA	Watchung silt loam, 0 to 3 percent slopes	Towhee	9	Depressions
WaB	Watchung silt loam, 3 to 8 percent slopes	Watchung, silt loam	80	Depressions
WaB	Watchung silt loam, 3 to 8 percent slopes	Towhee	7	Depressions
WaB	Watchung silt loam, 3 to 8 percent slopes	Croton	3	Depressions
Modified from Hydric Soils of the United States (NRCS 2014)				

APPENDIX B
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.

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 form 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 form 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 form the PA DCNR.

Task Manager; Confidential Client; Armstrong County, PA, July 2012. As a Task Manager/Biologist, Mr. Smith scheduled field crews for a Rare, Threatened and Endangered Plant survey for a natural gas

pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

Project Biologist; Confidential Client; Fayette County, PA; 2010. As a Project Biologist, Mr. Smith completed a field survey for presence/absence and potential habitat survey for the Allegheny woodrat, *Neotoma magister*, and submitted the report to the PA Game Commission for expedited review for Marcellus Shale-related activities. The survey was approved by the PA Game Commission.

Biologist/Wetland Delineator; Confidential Clients; Western PA/Northern West Virginia/Eastern Ohio; 2009-present. As a Biologist/Wetland Delineator, Mr. Smith has conducted and assisted with wetland investigations based on the 1987 US Army Corps of Engineers Wetland Delineation Manual and Regional Supplements. The investigations involved identifying wetland vegetation, soils, and hydrology along linear pipelines, water withdrawal sites, and well pad sites and preparing Wetland Reports for Marcellus/Utica Shale-related activities.

Biologist; Confidential Client; Eastern OH; 2012. As a Biologist, Mr. Smith assisted with a habitat survey for Indiana Bat roost tree suitability. The investigations involved identifying suitable habitat for the Indiana bat (*Myotis sodalis*) and preparing a report for submittal with a Nationwide Permit 12 to the Army Corps of Engineers.

Natural Resource Permit Manager; Confidential Client; West Virginia; 2011. As the Project Permitting Manager, Mr. Smith coordinated with USFWS and WV Department of Natural Resources (WV DNR) to secure the permitting for Nationwide Permit 12 for a natural gas pipeline project. Mr. Smith also prepared a Stream Activity Application Report for submittal to the WV DNR as part of this project.

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.

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

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

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.

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.

RI/FS

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.

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 3rd 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.

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 (B*i*TIE) 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.

TETRA TECH

Jason McGuirk
Wetland/Environmental Scientist IV

EXPERIENCE SUMMARY

Mr. Jason McGuirk has six years of professional experience in wetland delineation, permitting, fisheries and wildlife, and stream assessments and classification in Pennsylvania, New York, Ohio, and Alaska. Mr. McGuirk has conducted hundreds of wetland delineations, stream evaluations as well as conducted and produced habitat assessments, and post monitoring impact statements and assessments on over 800 miles of proposed natural gas pipeline, and fifty plus proposed well pad sites. He has extensive knowledge in watercourse classification and assessment including the Rosgen method. In particular attention of his has been focused on fisheries habitat and macro-invertebrate work, with over fifty miles of stream classifications in Alaska. Mr. McGuirk's educational background is in Fisheries and Aquaculture with a minor focus in Marine Biology and Wildlife management.

RELEVANT EXPERIENCE

Environmental Scientist III; Sunoco Logistics; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects, Engendered Species Surveys; Reptilia (*Glyptemys muhlenbergii*), Plantae (*Ellisia nyctelea*); Pennsylvania. Segments 1, 2, and 3 wetlands field lead, and crew leader. Responsibilities include organizing and conducting all field work operations for multiple wetlands crews, wetland delineations and stream assessments for the proposed 450 mile Pennsylvania Pipeline Project. Additional work included proposing potential re-route on an environmental basis.

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

Environmental Scientist III; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio. Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

EDUCATION

B.T. Fisheries and Aquaculture, SUNY Cobleskill, 2011T

REGISTRATIONS

Wild Plant Management Permit, PA, 2014, Permit # 14-651

AREA OF EXPERTISE

Wetland Delineation and Stream Identification, Fisheries, and Botanical Surveys

TRAINING/CERTIFICATIONS

Winter Vegetation ID, Rutgers University, 2012

Amtrak Contractor Certification, 2014

Certified Wetland Assessment Delineator, NY, 2009

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

6+

YEARS WITH TETRA TECH

2+

Environmental Scientist III; Gulfport Energy Corporation; Wetland Delineations for Miscellaneous Natural Gas Well Pad Projects; Ohio. Responsible for performing and assisting with wetland delineations for various proposed natural well pads southeastern Ohio. Specific tasks included field survey, report preparation, PCN preparation, and completion of Ohio EPA specific wetland and stream assessments.

Environmental Scientist III; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineation and Engendered Species Survey (*Ranunculus flabellaris and Alopecurus aequalis*) for Vanport to Butler Gas Pipeline; Butler County, Pennsylvania. Responsible for performing and assisting with wetland delineation and endangered species survey along pipeline right-of-way. Specific tasks included field survey and report preparation.

Environmental Scientist III; Antero Resources Appalachian Corp.; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ritchie and Doddridge Counties, West Virginia. Responsible for performing and assisting with wetland delineations for various proposed natural gas well pads and access roads in northern West Virginia. Specific tasks included field survey and report preparation.

Wetland & Watercourse Biologist; Chesapeake Energy; Schoharie County, PA; November 2011 to October 2012. Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 30 miles of pipeline in Northeastern Pennsylvania.

Wetland & Watercourse Biologist; Southwest Energy L.P; Schoharie County, PA; November 2011 to October 2012. Responsible for conducting wetland delineations on proposed Well pad and compressor sites. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 15 proposed well pad locations in Northeastern Pennsylvania.

Wetland & Watercourse Biologist; Southwest Energy L.P; Susquehanna County, PA; November 2011 to October 2012. Responsible for conducting wetland delineations on proposed Well pad and compressor sites. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 20 proposed well pad locations in Northeastern Pennsylvania.

Wetland & Watercourse Biologist; Chesapeake Energy; Carroll, Jefferson County, OH; November 2011 to October 2012. Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed ORAM and QHEI Assessments, and preparation of wetland report for 30 miles of pipeline in Eastern Ohio.

Wetland & Watercourse Biologist; Shell Oil; Butler County, PA; November 2011 to October 2012. Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 40 miles of pipeline in Western Pennsylvania.

Wetland & Watercourse Biologist; Chesapeake Energy; Schoharie County, PA; November 2011 to October 2012. Responsible for conducting Indiana Bat habitat surveys on multiple proposed natural gas pipelines in Northeastern Pennsylvania.

Wetland & Watercourse Biologist; Chesapeake Energy; Schoharie County, PA; November 2011 to October 2012. Responsible for conducting post construction habitat monitoring and assessment of constructed natural gas pipelines in Northeastern Pennsylvania.

CHRONOLOGICAL HISTORY

Wetland Environmental Scientist IV; Tetra Tech, Inc.; Pittsburgh, PA, June 2014 - Present

Wetland Environmental Scientist III; Tetra Tech, Inc.; Pittsburgh, PA, February 2013 - June 2014

Wetland & Watercourse Biologist; Hanover Engineering & Associates; Towanda, PA, November 2011 - October 2012

Assistant Hatchery Manager; SUNY Cobleskill; Cobleskill, NY, September – May of 2009- 2011

Biological Fisheries Technician, US Forest Service; Thorne Bay, AK, May 2010 - August 2010

Fisheries Technician, Cook Inlet Aquaculture Association, Kenai, AK, May 2009 – August 2009

SCIENTIFIC/TECHNICAL PUBLICATIONS

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

MEMBERSHIPS

- N/A

AWARDS

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

TETRA TECH

Cody R. Stoliker

ENVIRONMENTAL SCIENTIST I

EXPERIENCE SUMMARY

Cody R. Stoliker has approximately 1 year of professional experience in wetland delineation, permitting, and stream assessments and classification in Pennsylvania, New York, Ohio, and West Virginia. With 4 years of fisheries and wildlife management experience, specializing in large game conservation, Mr. Stoliker has technician experience working with bear, elk, moose, deer, and wolves in Wyoming, as well as biologist work with whitetail deer, red stag, feral hogs, and the endangered American Burying Beetle in Oklahoma along pipeline routes where he produced habitat assessments, post monitoring impact statements and performed population control. Mr. Stoliker is assisting Tetra Tech field leads and other environmental scientists to assess and delineate streams and wetlands along natural gas pipeline routes, access roads, right-of-ways, and well pad sites. Cody R. Stoliker's educational background is in Wildlife Management with a minor focus in wetland assessment/delineation and fisheries.

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RELEVANT EXPERIENCE

Environmental Scientist I; Sunoco Logistics; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects Pennsylvania. Responsible for performing and assisting with wetland delineations and stream assessments for the proposed Pennsylvania Pipeline Project. Other responsibilities included report preparation and wetland functional assessments.

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

Environmental Scientist I; MarkWest Ohio Gathering Company, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Ohio. Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in eastern Ohio. Specific tasks included field survey, report preparation, and completion of Ohio EPA specific wetland and stream assessments.

EDUCATION

Bachelor of Technology, Wildlife Management, 2013, State University of New York at Cobleskill

AREA OF EXPERTISE

Large Game Wildlife Management & Conservation, Wetland Assessment

REGISTRATIONS/ AFFILIATIONS

Ducks Unlimited 2012- Present

Rocky Mountain Elk Foundation 2013 – Present

National Wild Turkey Federation 2013 - Present

TRAINING/CERTIFICATIONS

Certified Wetland Assessment Delineator, NY, 2010

NYS Certified Class A Interior Firefighter

OFFICE

Tetra Tech OGA
Pittsburgh, PA

YEARS OF EXPERIENCE

1

YEARS WITH TETRA TECH

1

SCIENTIFIC/TECHNICAL PUBLICATIONS

N/A

CHRONOLOGICAL HISTORY

Environmental Scientist I, Tetra Tech, 2014-2015, Pittsburgh, PA

Wildlife Biologist/Ranch Manager, Oklahoma Trophy Ranch, 2013-2014, Allen, OK

Wildlife Management Technician, Rolling Thunder & Rim Ranches, Spring-Fall 2013, Bondurant, WY

Assistant Herdsman, Bison Island, 2012-2013, Sharon Springs, NY

Avian Survey Technician, NYS Dept. of Environmental Conservation, Winter 2011, Albany NY

TETRA TECH

Kevin Pulver
Wetland/Environmental Scientist II

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

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.

EMPLOYEMENT HISTORY

- 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

- N/A

MEMBERSHIPS

- Society of Wetland Scientists