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

March 2016

TABLE OF CONTENTS

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
LOD	Limit of Disturbance
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate
PA	Pennsylvania
PEM	Palustrine Emergent
PFO	Palustrine Forested
Project	Southeast Region, Pennsylvania Pipeline Project
PSS	Palustrine Scrub Shrub
ROW	Right-of-Way
SF	Square Feet
SPLP	Sunoco Pipeline, LP
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 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 report is an addendum to the original Aquatic Resources Report prepared for Chester County, Pennsylvania (PA) and dated August 2015. The two 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, existing environment information in regards to aquatic resources so that proper avoidance and minimization measures can be implemented. This report does not reference a detailed project description or 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: 2014 Update of Wetland Ratings (Lichvar, 2014). Plant classifications are as follows:

Obligate (OBL) - essentially always found in wetlands; estimated probability >99%

Facultative Wetland (FACW) - usually found in wetlands; estimated probability 67%-99%

Facultative (FAC) - equally likely to occur in wetlands and non-wetlands;
estimated probability 34%-66%

Facultative Upland (FACU) - sometimes occurs in wetlands; estimated probability 1%-33%

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

The field investigations for modifications to the proposed pipeline Project were performed during numerous field visits from November 2013 through March 2016. The 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 1-5; USGS, 2009)
- Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey (Figures 2-1 to 2-5; NRCS, 2014)
- USFWS National Wetland Inventory (NWI) Mapping (Figures 3-1 to 3-5; 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 flagging was limited to the bounds of the investigated study area and wetlands are shown as closed or partially closed systems on the detail map (Figures 4-1 to 4-13).

Data concerning soils, hydrology, and vegetation were collected and recorded on USACE Wetland Determination Data Forms at wetlands and upland point locations associated with wetlands, which are provided in Appendix A. Photographs depicting wetland topography and vegetation are included in Appendix B. Stream data sheets detailing stream characteristics are provided in Appendix C. Appendix D contains photographs of streams located within the study area. Appendix E provides a list of hydric soils known to occur within Chester County. Resumes of project personnel are included in Appendix F.

3.0 RESULTS

The field investigations identified four areas within Chester County, PA, located within the Southeast Region of the proposed Pennsylvania Pipeline Project Addendum Study Area that met the wetland criteria outlined in the *1987 Manual*, as amended by the *Corps Regional Supplement*. Five streams were identified within the Project study area. A narrative summary of field data collected for these systems is presented below. The detail maps provided as Figures 4-1 to 4-13 illustrate the wetland and stream locations in relation to the 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 soil list for Chester County, PA is included in Appendix E. The NRCS soil survey maps are included as Figures 2-1 to 2-5. Confirmation of the soil mapping units was not performed during this site evaluation.

See Figures 3-1 to 3-5 for NWI wetlands that fall within the Addendum Study Area.

Based on field evidence and best professional judgment, it was determined that four wetlands are present within the addendum study area. The areas demonstrated the presence of all three wetland parameters required by the *1987 Manual* and the *Corps Regional Supplement*. The vegetative community was dominated by hydrophytic plant species, the soils exhibited hydric characteristics, and the areas contained wetland hydrology indicators.

USACE wetland determination data forms that detail the existing vegetation, soil characteristics, and hydrology were prepared for each wetland and its associated upland point (Appendix A).

Wetland B19 PFO 3

Wetland B19 PFO 3 (W-B19 PFO 3) is a 21,578-square foot (SF) PFO wetland (Figure 4-3). Indicators of wetland hydrology include surface water, a high water table, saturation within the upper 12 inches of the soil profile, oxidized rhizospheres on living roots, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), pin oak (*Quercus palustris*), American beech (*Fagus grandifolia*), Northern spicebush (*Lindera benzoin*), Japanese stilt grass (*Microstegium vimineum*), sensitive fern (*Onoclea sensibilis*), and skunk cabbage (*Symplocarpus foetidus*). The soil between 0 and 3 inches exhibits a low-chroma matrix (10YR 3/1) with a silt loam texture. The soil between 3 and 12 inches

exhibits a low-chroma matrix (10YR 3/2) with a clay loam texture that contains redoximorphic features (7.5YR 5/4).

Wetland KP1 PEM

Wetland KP1 PEM (W-KP1 PEM) is a 2,134-SF PEM wetland (Figure 4-3). Indicators of wetland hydrology include oxidized rhizospheres on living roots, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of Japanese stilt grass (*Microstegium vimineum*) and sensitive fern (*Onoclea sensibilis*). The soil between 0 and 12 inches exhibits a low-chroma matrix (2.5Y 5/2) with a clay loam texture that contains redoximorphic features (7.5YR 5/6).

Wetland KP1 PFO

Wetland KP1 PFO (W-KP1 PFO) is a 24,571-SF PFO wetland (Figure 4-3). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, water-stained leaves, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of red maple (*Acer rubrum*), Northern spicebush (*Lindera benzoin*), American beech (*Fagus grandifolia*), Japanese stilt grass (*Microstegium vimineum*), sensitive fern (*Onoclea sensibilis*), and skunk cabbage (*Symplocarpus foetidus*). The soil between 0 and 4 inches exhibits a low-chroma matrix (10YR 3/1) with a silt loam texture. The soil between 4 and 15 inches exhibits a low-chroma matrix (10YR 3/2) with a clay loam texture that contains redoximorphic features (7.5YR 5/4).

Wetland C40

Wetland C40 (W-C40) is a 10,969-SF PEM wetland (Figure 4-4). Indicators of wetland hydrology include a high water table, saturation within the upper 12 inches of the soil profile, drainage patterns, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of sensitive fern (*Onoclea sensibilis*) and arrowleaf tearthumb (*Persicaria sagittata*). The soil between 0 and 4 inches exhibits a low-chroma matrix (2.5Y 2.5/1) with a mucky texture. The soil between 4 and 8 inches exhibits a low-chroma matrix (10YR 4/2) with a silt loam texture. The soil between 8 and 12 inches exhibits a low-chroma matrix (2.5Y 4/2) with a gravelly sandy loam texture that contains redoximorphic features (10YR 5/4).

Wetland C43

Wetland C43 (W-C43) is a previously identified 193,538-SF wetland with PEM and PFO habitat types that was extended into the Addendum Study Area (Figure 4-6). No new data was collected for this wetland extension.

3.2 STREAM IDENTIFICATION AND EVALUATION

Based on field evidence and best professional judgment, it was determined that five streams were identified within the addendum study area. Data sheets that detail the bank and channel characteristics, substrate composition, aquatic habitat, and hydrology were prepared for each of the streams (Appendix C).

Stream C73

Stream C73 (S-C73) is Black Horse Creek, a perennial tributary to Marsh Creek (Figure 4-4). The stream bank is approximately 20 feet in width. The bank height is 4 feet. The stream bed contains a boulder, cobble, gravel, sand, and silt substrate. At the time of the field investigation, the stream exhibited an average water depth of 1 foot.

Stream C74

Stream C74 (S-C74) is an ephemeral unnamed tributary (UNT) to Black Horse Creek (Figure 4-4). The stream bank is approximately 4 feet in width. The bank height is 1 foot. The stream bed contains a boulder, cobble, gravel, and sand substrate. The stream exhibited no flow at the time of the field investigations.

Stream C93

Stream C93 (S-C93) is a previously identified stream that was extended into the Addendum Study Area (Figure 4-5). No new data was collected for this stream.

Stream H32

Stream H32 (S-H32) is an intermittent UNT to East Branch Chester Creek (Figure 4-10). The stream bank is approximately 7 feet in width. The bank height is 1 foot. The stream bed contains a cobble, gravel, sand, silt, and clay substrate. At the time of the field investigation the stream exhibited an average water depth of 4 inches.

Stream Q61

Stream Q61 (S-Q61) is an ephemeral UNT to East Branch Chester Creek (Figure 4-11). The stream bank is approximately 3 feet in width. The bank height is 1 foot. The stream bed contains a cobble, gravel, sand, and organic substrate. The stream exhibited no flow at the time of the field investigation.

3.2 STREAMS WITH FLOODWAY IMPACTS OUTSIDE THE STUDY AREA

Streams with floodway impacts that extend within the Project limit of disturbance (LOD), but are outside of the study area, are described on Table 2 and shown on Figures 4-1 to 4-13. There are five streams within Chester County with floodways that extend into the Project LOD.

4.0 CONCLUSIONS

During the field investigations in Chester County, PA, located within the Southeast Region of the proposed Pennsylvania Pipeline Project, four 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 *Corps 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).

Five streams were identified within the Addendum Study Area.

There are five streams within Chester County with floodways that extend into the Project LOD.

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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.

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TABLES

Table 1
Wetland and Stream Summary
Pennsylvania Pipeline Project

Water Resource	Dominant Plant Community/Flow Regime	Bank Full Width (ft.)	Water Depth	Channel Depth	Wetland Size (Square Feet)	Wetland Size (Acres)	Associated Water Resource
Wetland							
W-B19 PFO (3)	PFO	-	-	-	21,578	0.49	S-B18
W-KP1 PEM	PEM	-	-	-	2,134	0.005	N/A
W-KP1 PFO	PFO	-	-	-	24,571	0.56	N/A
W-C40	PEM	-	-	-	10968	0.3	S-C73, S-C74
Streams							
S-C73	Perennial	20.0	1.0'	4.0'	-	-	W-C40, S-C74
S-C74	Ephemeral	4.0	0.0"	1.0'	-	-	W-C40, S-C73
S-H32	Intermittent	7.0	4.0"	1.0'	-	-	W-H36, S-C31
S-Q61	Ephemeral	3.0	0.0"	1.0'	-	-	N/A

* = See Data Sheet for Channel Depth - Right and Left Bank Measurements Differ.
' = Feet
" = Inches

Table 2
Streams with Floodway Impacts
Outside the Study Area
Pennsylvania Pipeline Project

Stream ID	Flow Regime	Bank Full Width (ft.)	Water Depth (in.)	Channel Depth (ft.)
S-B20	Intermittent	2.5	2	0.75
S-CC23	Perennial	6.0	4.0	0.50
S-C65	Perennial	3.0	1.0	1.00
S-AM2	Perennial	8.0	8.0	1.00
S-C95	Perennial	5.0	3.0	0.75

FIGURES

Start of Line
PADEP Southeast Region
Chester County
Lat: 40° 9' 20.914" N
Lon: 75° 50' 34.386" W

STATE GAME LANDS NO 43

WARWICK

EAST NANTMEAL

WEST NANTMEAL

Elverson

Springfield Cem

Warwick Cem

Morningside Cem

Ebenezer Ch Cem

Conestoga

Central Sch

Loag

Trailer Park

Isabella

Goodwill Ch

Hause Sch

East Nantmeal Ch

Brandywine Facility

Thomas

French Creek

Marsh Creek

South Branch

TURNPIKE

TOLL

PLANK ROAD

PENNSYLVANIA

BORO

BDY

4WD

TRAIL

BM

Pit

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary

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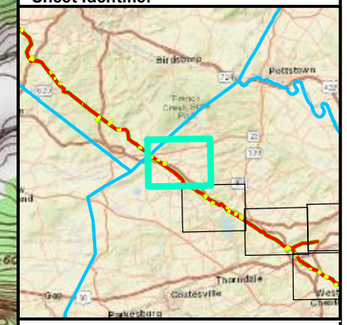

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USGS PROJECT LOCATION MAP
FIGURE 1-1
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

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, Elverson, Pottstown, Washingtown

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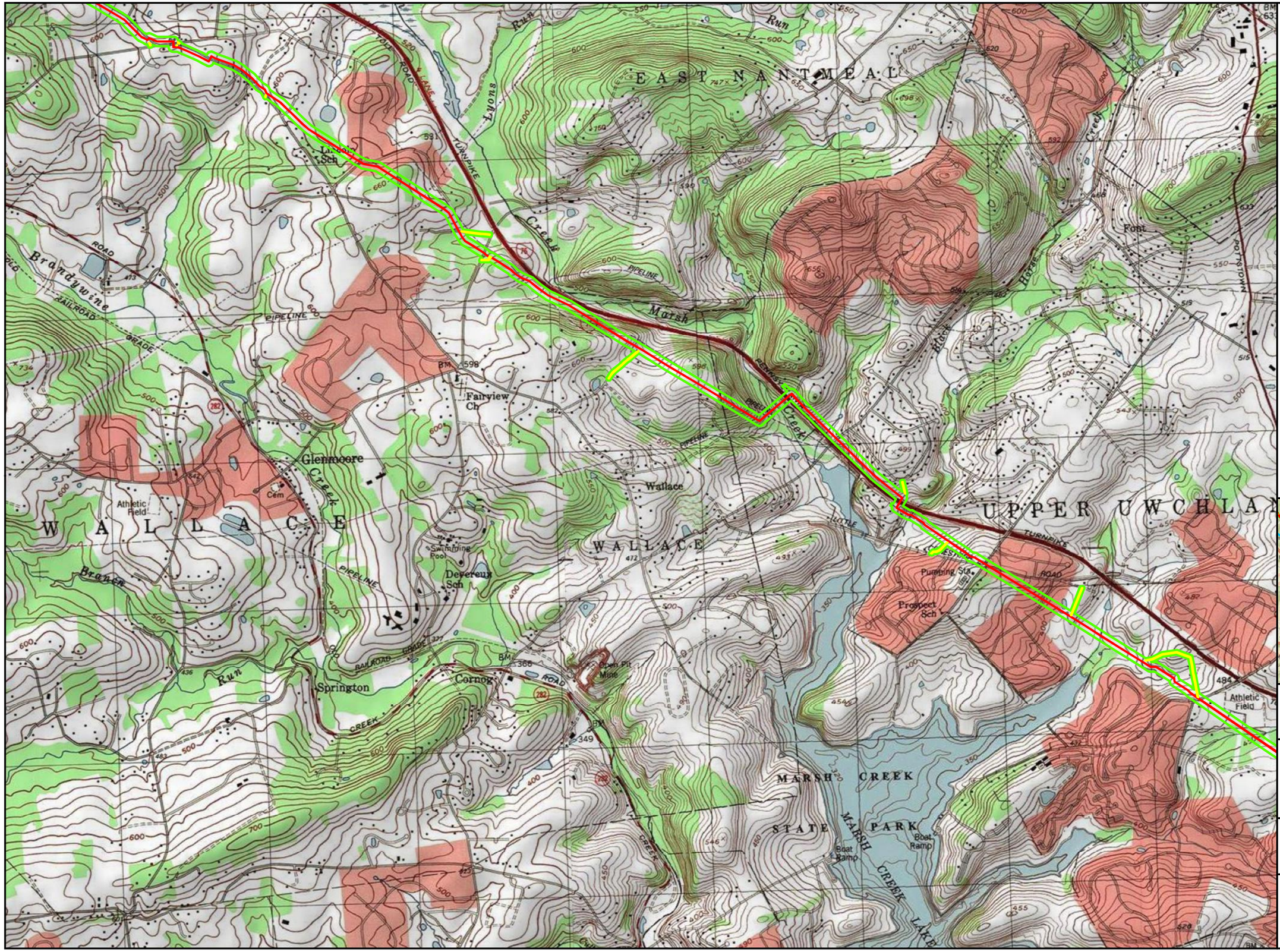
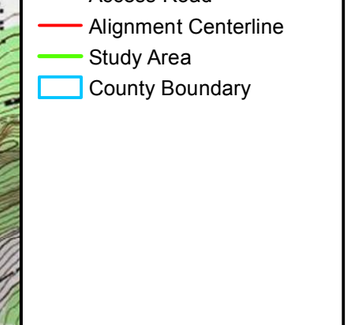


Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary

Sheet Identifier



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Meters
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USGS PROJECT LOCATION MAP
FIGURE 1-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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2) Quadrangles being displayed are Downingtown, Washington

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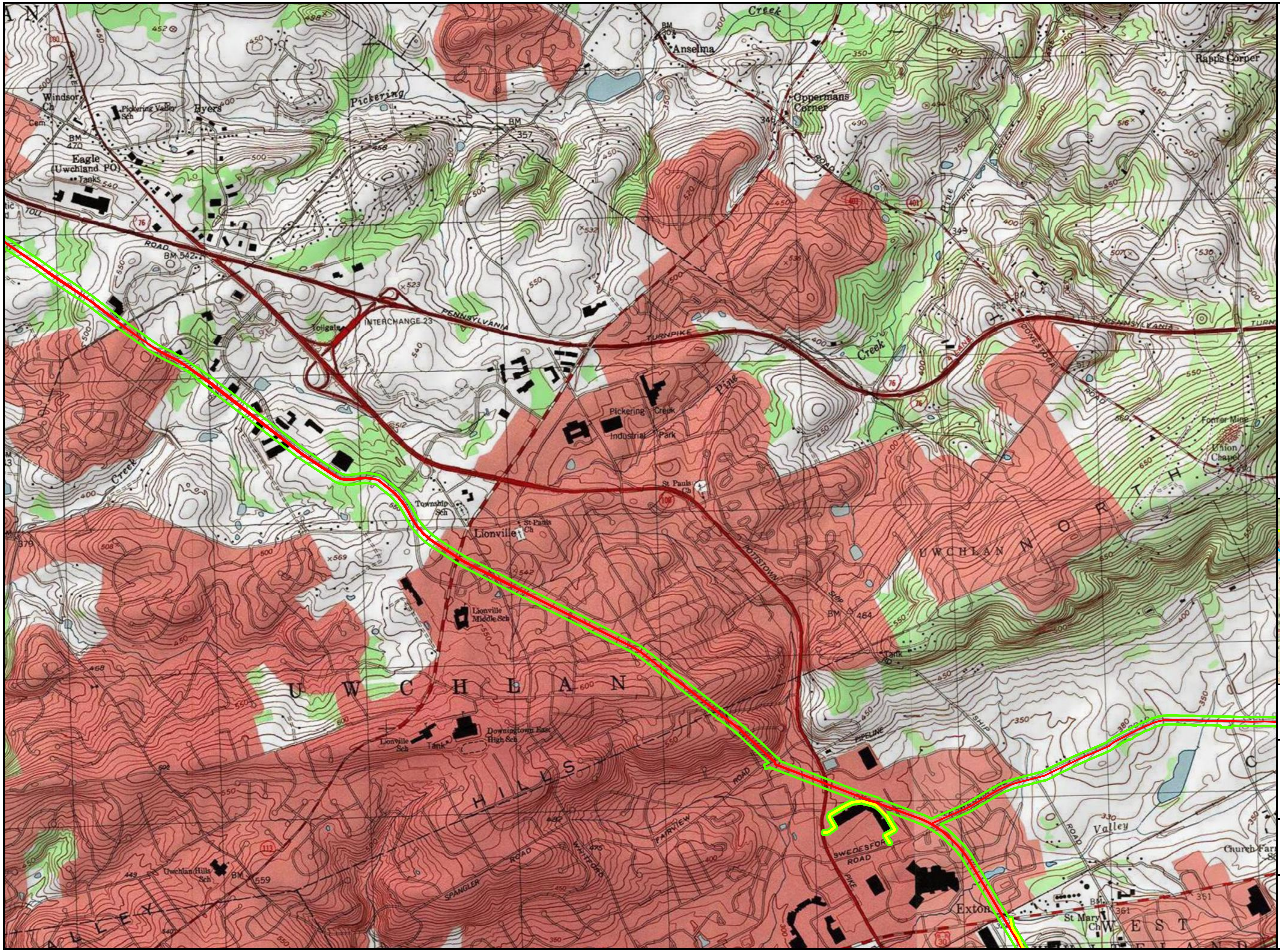

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- Alignment Centerline
- Study Area
- County Boundary

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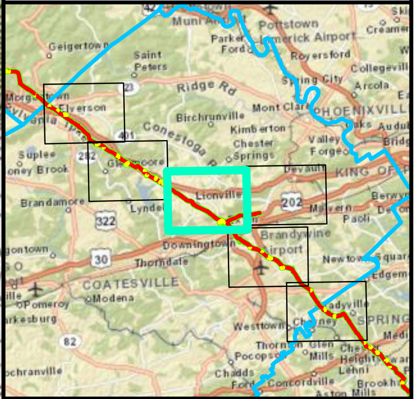

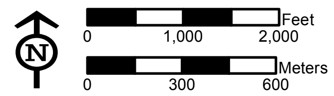

USGS PROJECT LOCATION MAP
FIGURE 1-3
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

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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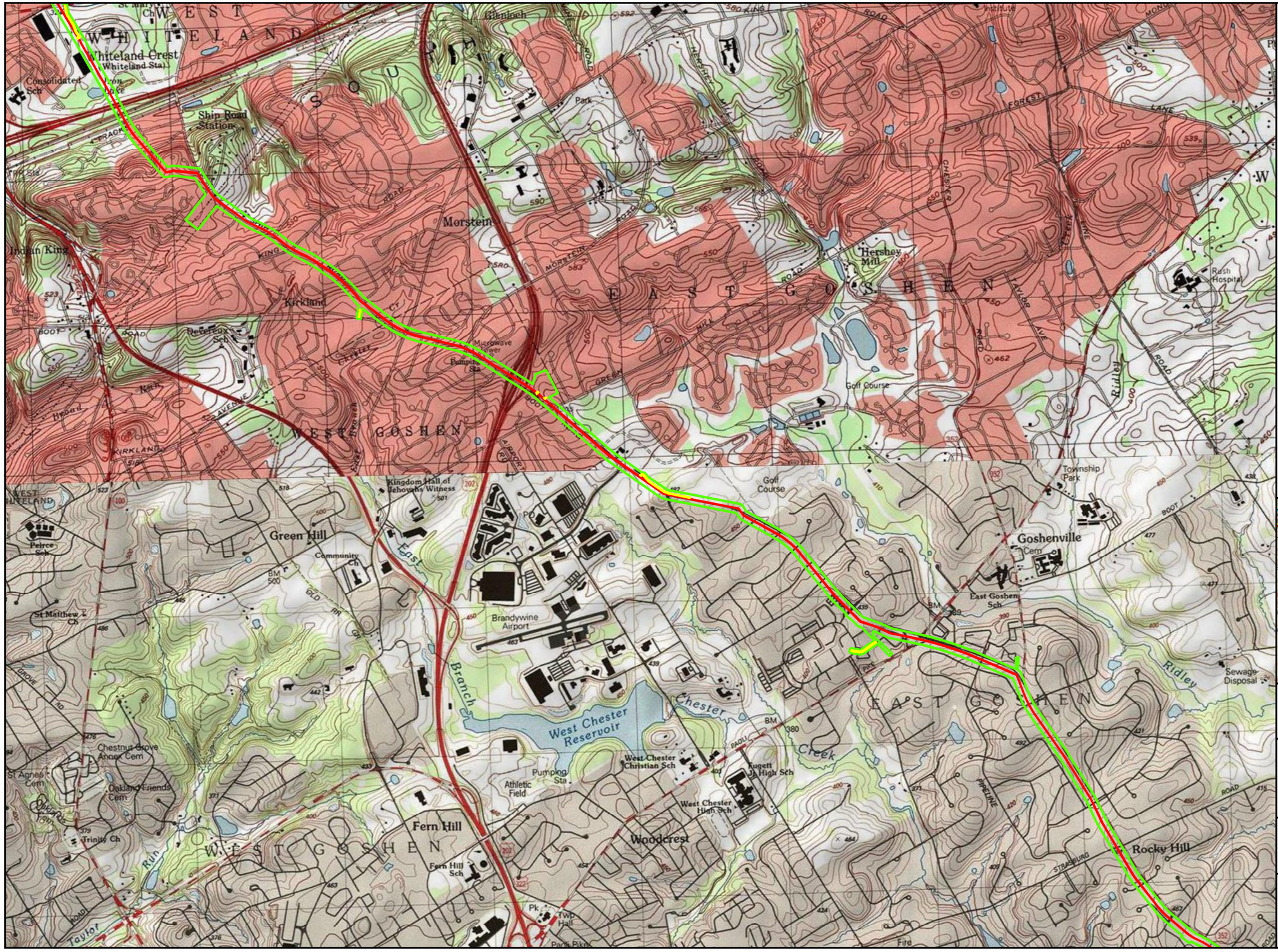
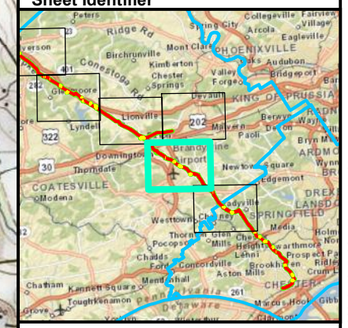


Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary

Sheet Identifier



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USGS PROJECT LOCATION MAP
FIGURE 1-4
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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2) Quadrangles being displayed are Malvern, West Chester

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End of Line
PADEP Southeast Region
Chester County
Lat: 39° 57' 1.162" N
Lon: 75° 30' 38.44" W

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary

Sheet Identifier

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0 300 600

USGS PROJECT LOCATION MAP
FIGURE 1-5
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

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2) Quadrangles being displayed are Media, West Chester

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Start of Line
PADEP Southeast Region
Chester County
Lat: 40° 9' 20.914" N
Lon: 75° 50' 34.386" W

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NRCS Soils and Codes

Sheet Identifier

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NRCS SOILS MAP
FIGURE 2-1
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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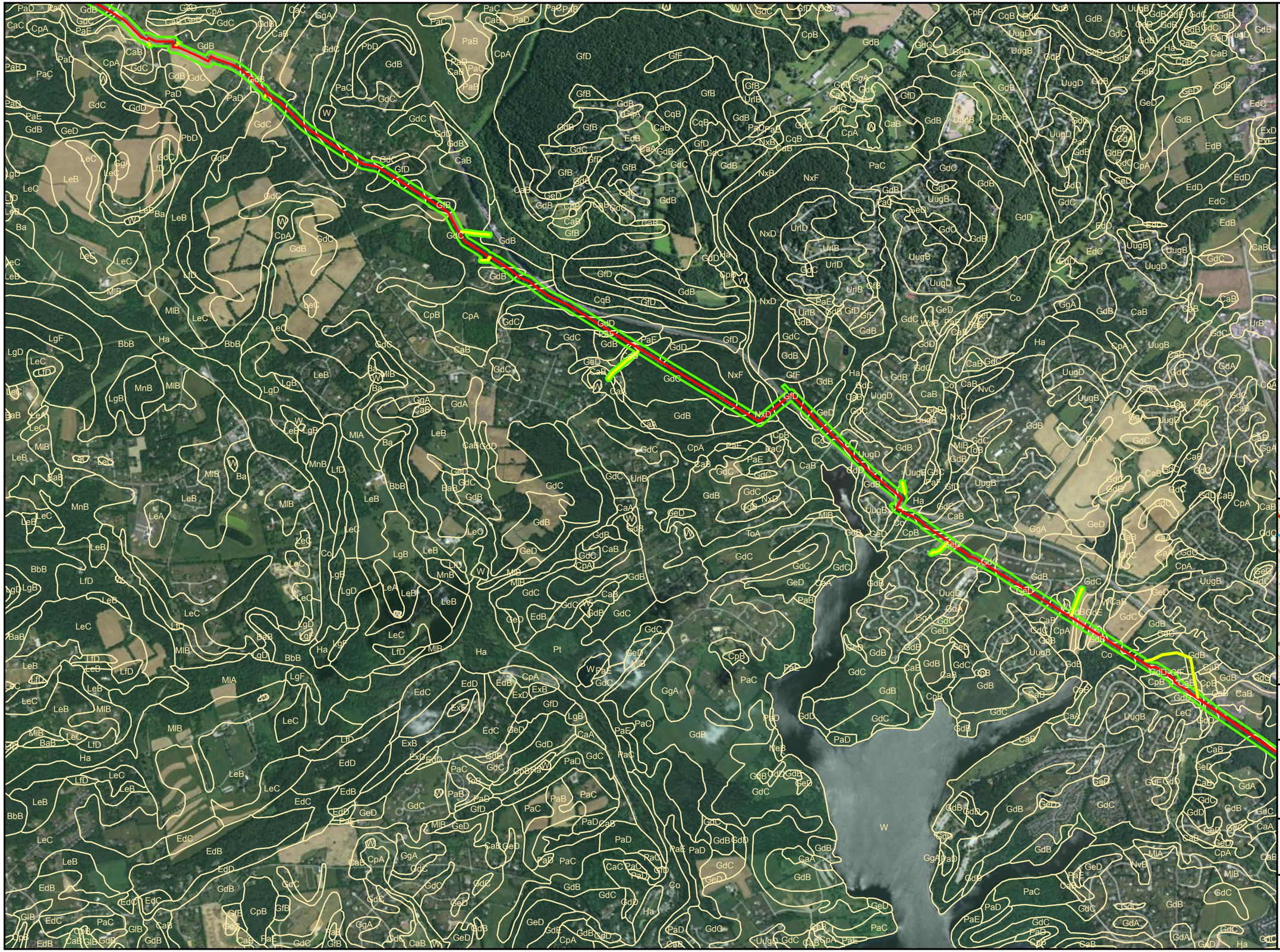

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- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NRCS Soils and Codes

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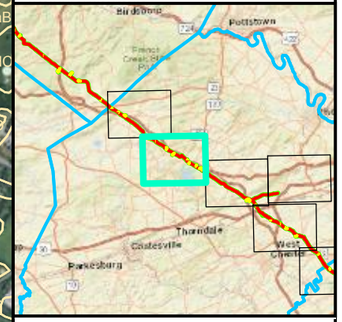

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NRCS SOILS MAP
FIGURE 2-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

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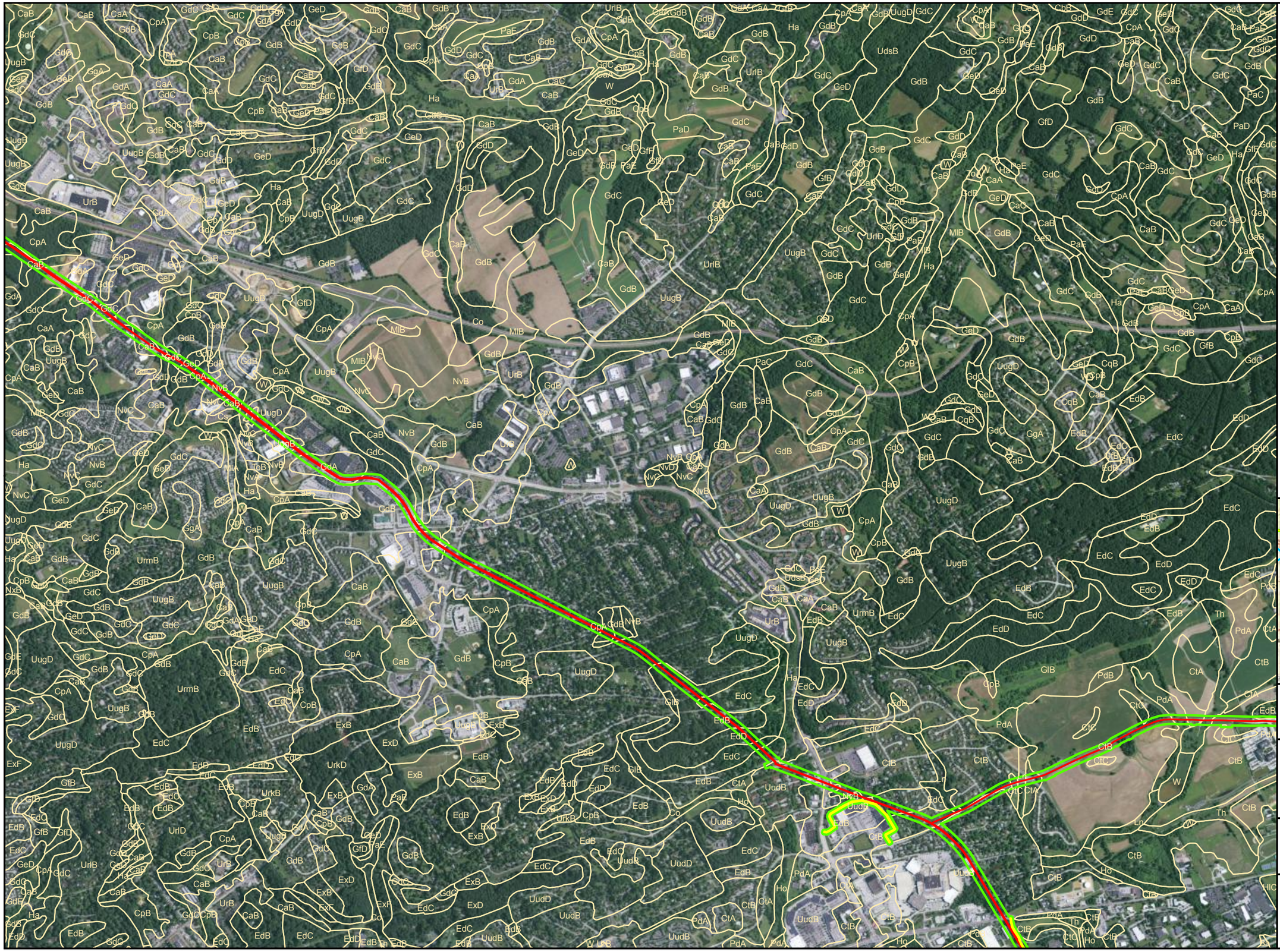
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NRCS SOILS MAP
FIGURE 2-3
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA
TETRA TECH
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NRCS SOILS MAP
FIGURE 2-4
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

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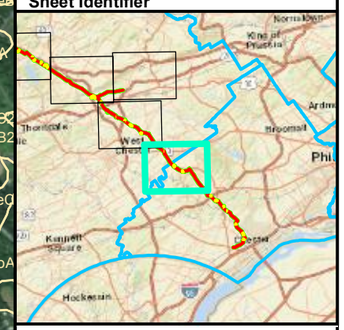
End of Line
PADEP Southeast Region
Chester County
Lat: 39° 57' 1.162" N
Lon: 75° 30' 38.44" W

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NRCS Soils and Codes

Sheet Identifier



N

0 1,000 2,000 Feet

0 300 600 Meters

NRCS SOILS MAP
FIGURE 2-5
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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

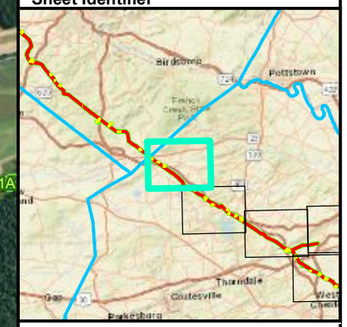
P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SIEVE\PENNPIPELINE_SOUTHEAST_SOILS_CHESTERCO.MXD 03/14/16 SP

Start of Line
PADEP Southeast Region
Chester County
Lat: 40° 9' 20.914" N
Lon: 75° 50' 34.386" W

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NWI Wetlands and Codes

Sheet Identifier



N

0 1,000 2,000 Feet

0 300 600 Meters

NWI WETLANDS MAP
FIGURE 3-1
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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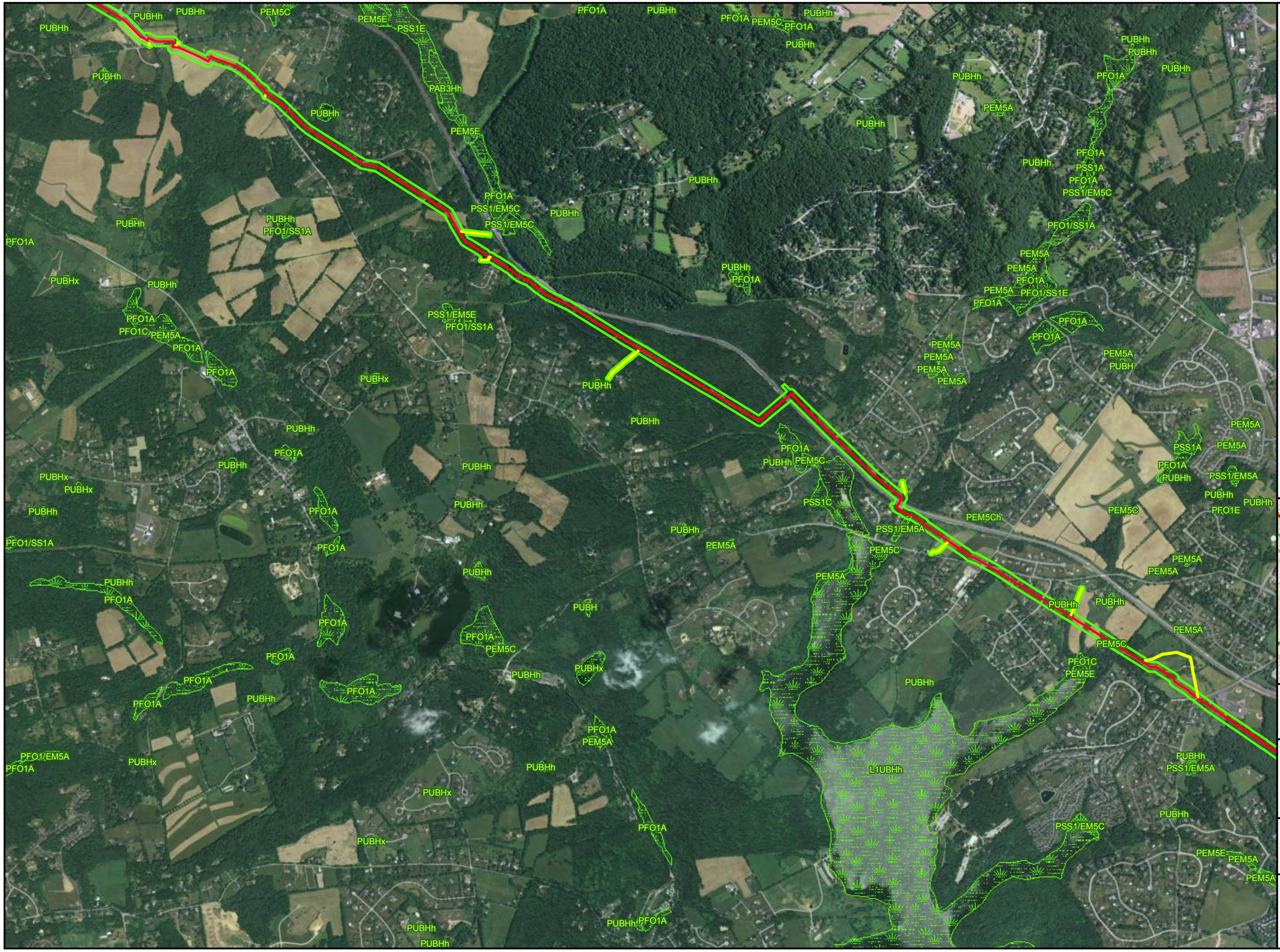
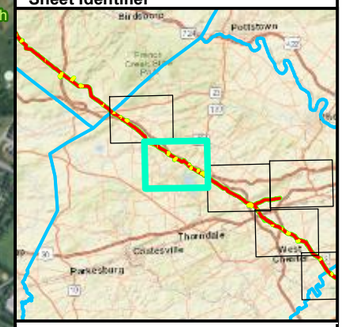


Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NWI Wetlands and Codes

Sheet Identifier



N

Feet
0 1,000 2,000

Meters
0 300 600

NWI WETLANDS MAP
FIGURE 3-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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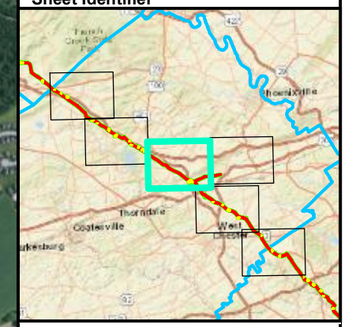
Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NWI Wetlands and Codes

Sheet Identifier



N

Feet
0 1,000 2,000

Meters
0 300 600

NWI WETLANDS MAP
FIGURE 3-3
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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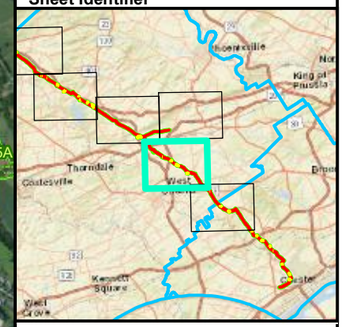
Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NWI Wetlands and Codes

Sheet Identifier



N

0 1,000 2,000 Feet

0 300 600 Meters

NWI WETLANDS MAP
FIGURE 3-4
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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End of Line
PADEP Southeast Region
Chester County
Lat: 39° 57' 1.162" N
Lon: 75° 30' 38.44" W

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- NWI Wetlands and Codes

Sheet Identifier

N

0 1,000 2,000 Feet

0 300 600 Meters

NWI WETLANDS MAP
FIGURE 3-5
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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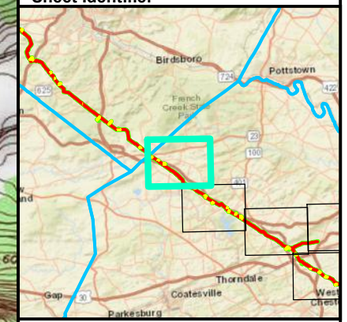
Start of Line
PADEP Southeast Region
Chester County
Lat: 40° 9' 20.914" N
Lon: 75° 50' 34.386" W

Page 1

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- Index

Sheet Identifier



N

0 1,000 2,000 Feet

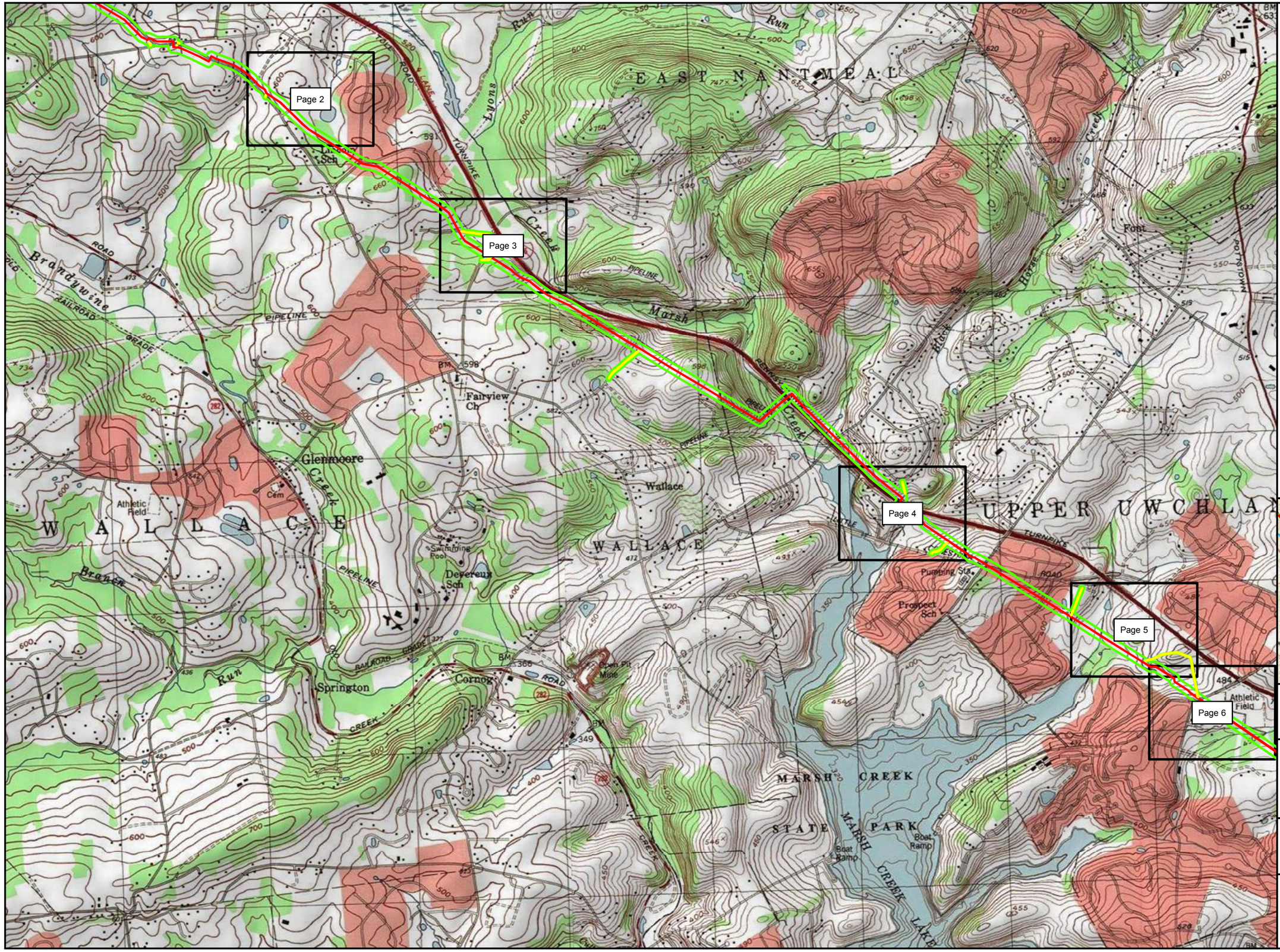
0 300 600 Meters

USGS PROJECT LOCATION MAP
FIGURE 4-INDEX-1
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 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, Elverson, Pottstown, Washingtown

PGH P:\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SE\PENNPIPELINE_CHESTERCO_INDEX.MXD 03/22/16 JN


Page 2
Page 3
Page 4
Page 5
Page 6
EAST NANTMEAL
UPPER UWCHLAN
WALLACE
MARSH CREEK STATE PARK
Glenmoore
Springton
Cornog
Wallace
Fairview Ch
Devereux Sch
Prospect Sch
Pumping Sta
Open Pit Mine
Athletic Field
Swimming Pool
Boat Ramp
Cem
Lyons
Four Lane
Turnpike
Pipeline
Railroad Grade
Road
Creek
Run
Marsh
Branch
Black Horse
Font
Pottstown
Legend
Access Road
Alignment Centerline
Study Area
County Boundary
Index
Sheet Identifier
Birdsboro
Pottstown
Thorndale
Coatesville
West Chester
Parkesburg
Feet
0
1,000
2,000
Meters
0
300
600
USGS PROJECT LOCATION MAP
FIGURE 4-INDEX-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 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, Washingtown
PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEP\PENNPIPELINE_CHESTERCO_INDEX.MXD 03/22/16 JN

Page 6

Page 7

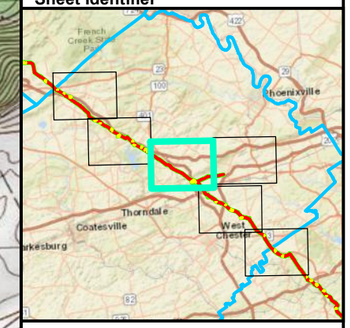
Page 8

Page 9

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- Index

Sheet Identifier



0 1,000 2,000 Feet

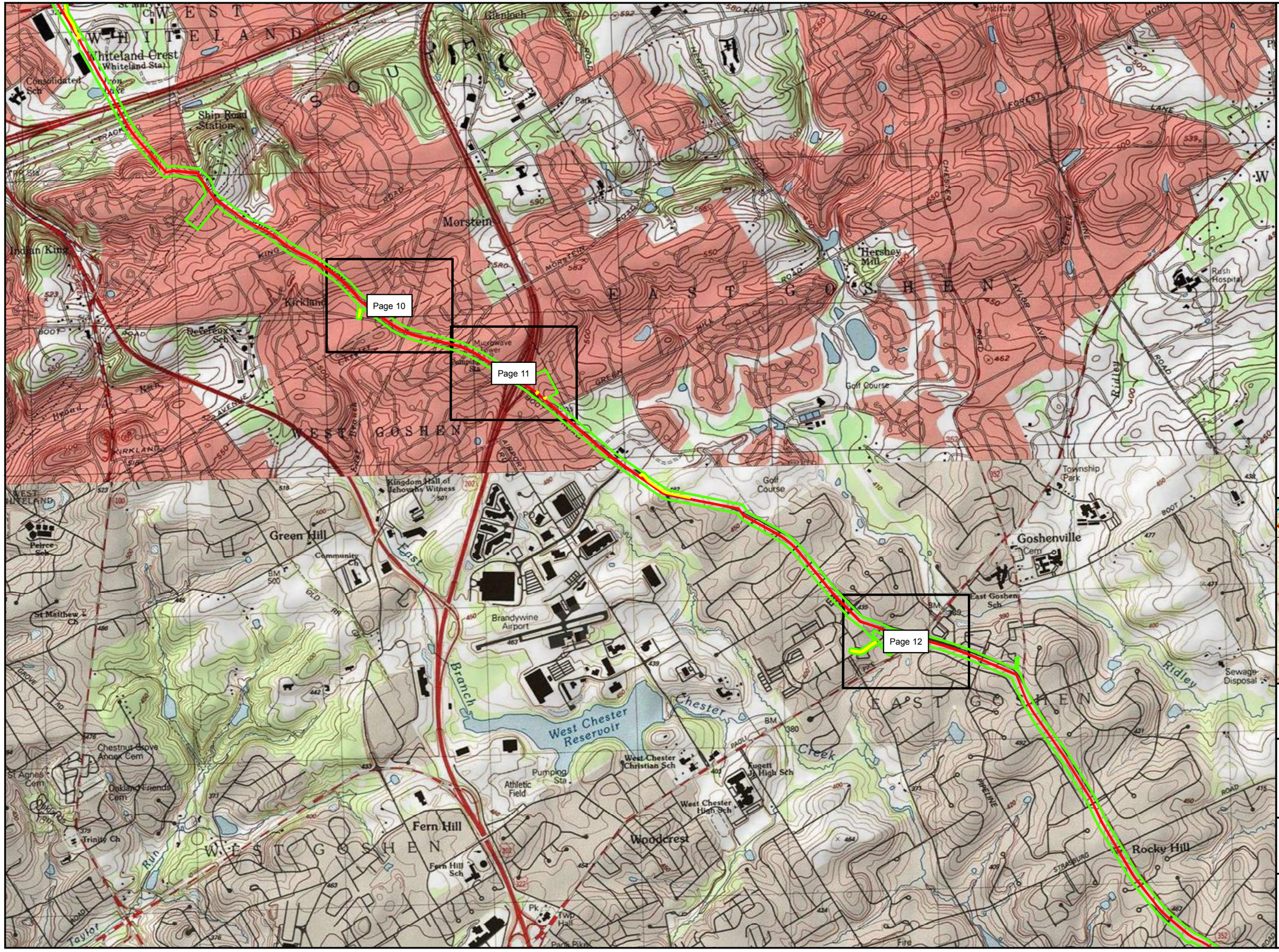
0 300 600 Meters

USGS PROJECT LOCATION MAP
FIGURE 4-INDEX-3
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 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

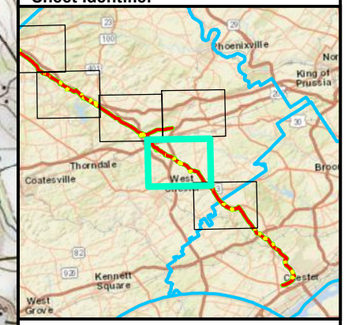
PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEP\PENNPIPELINE_CHESTERCO_INDEX.MXD 03/22/16 JN



Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- Index

Sheet Identifier



N

Feet
0 1,000 2,000

Meters
0 300 600

USGS PROJECT LOCATION MAP
FIGURE 4-INDEX-4
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 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

P:\PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SE\PENNPIPELINE_CHESTERCO_INDEX.MXD 03/22/16 JN

Page 13

End of Line
PADEP Southeast Region
Chester County
Lat: 39° 57' 1.162" N
Lon: 75° 30' 38.44" W

Legend

- Access Road
- Alignment Centerline
- Study Area
- County Boundary
- Index

Sheet Identifier

Feet
0 1,000 2,000

Meters
0 300 600

USGS PROJECT LOCATION MAP
FIGURE 4-INDEX-5
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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2) Quadrangles being displayed are Media, West Chester

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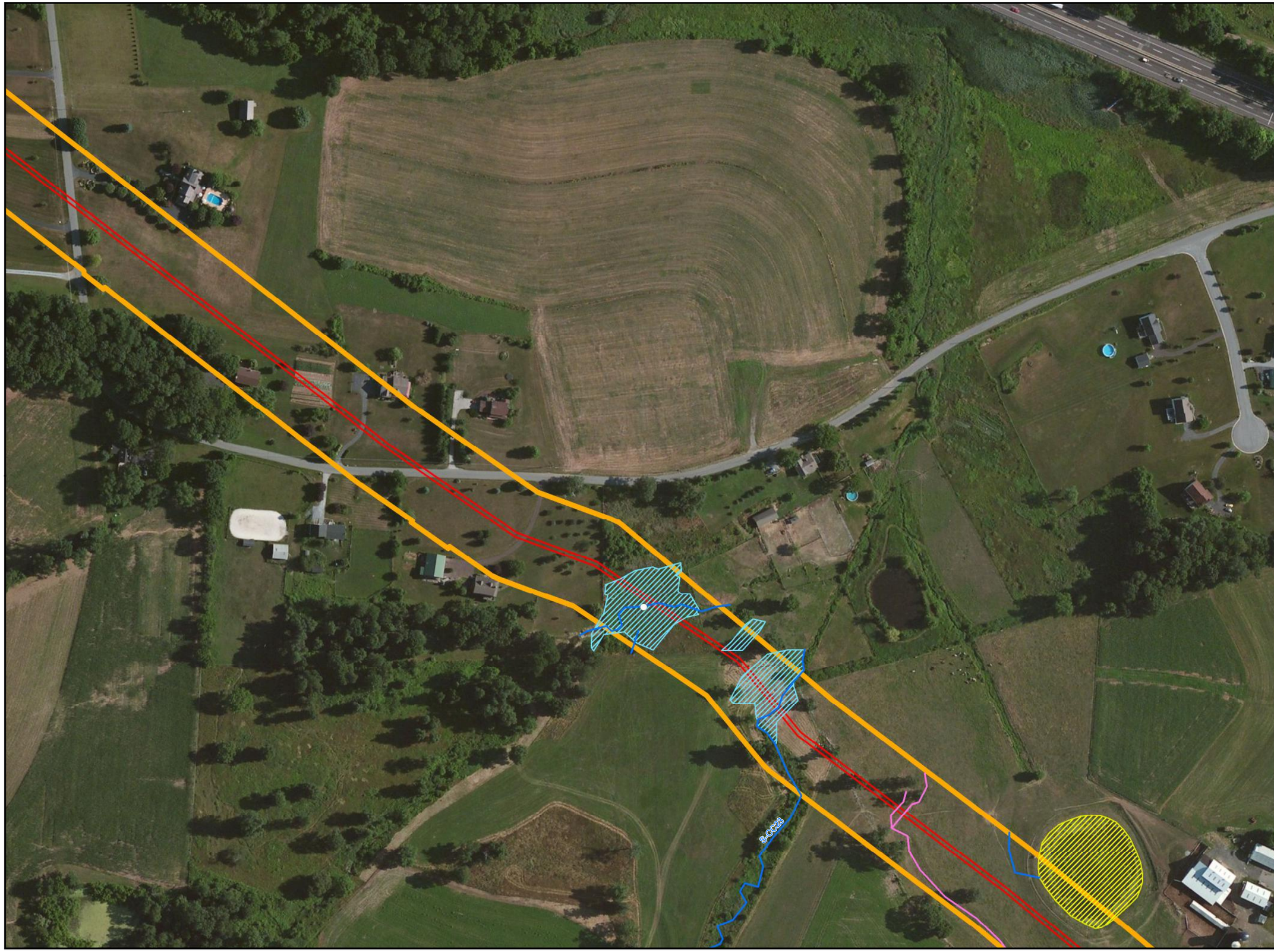


Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

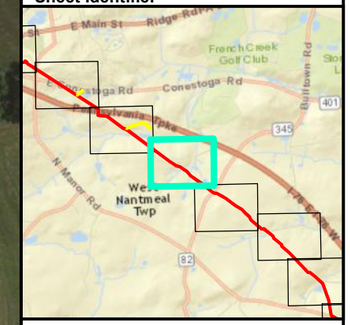
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-1
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SET\PENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN

Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

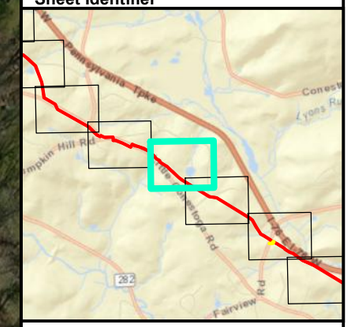
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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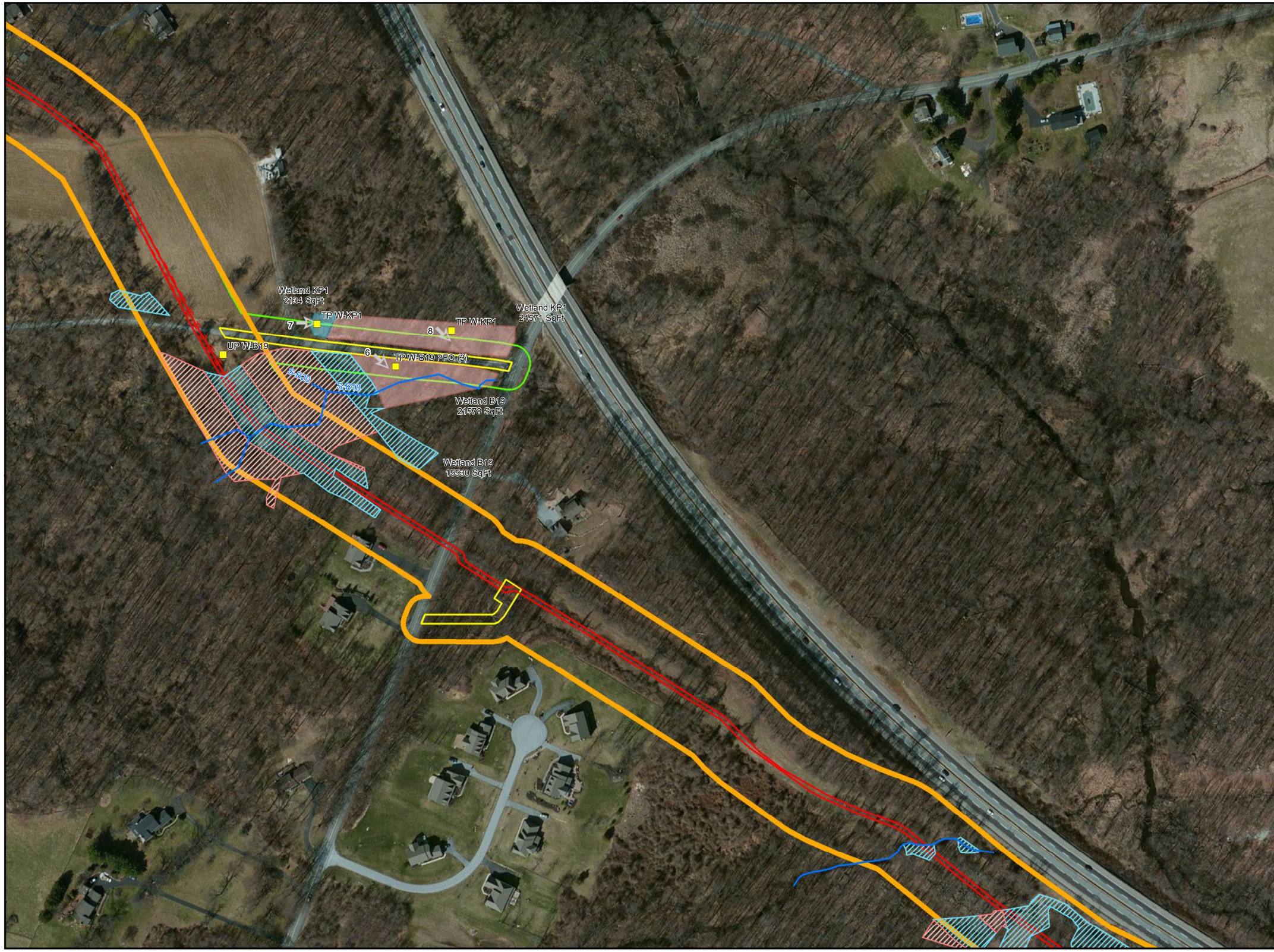


Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

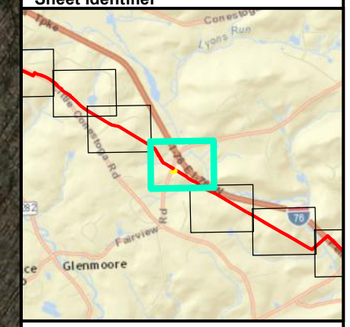
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-3
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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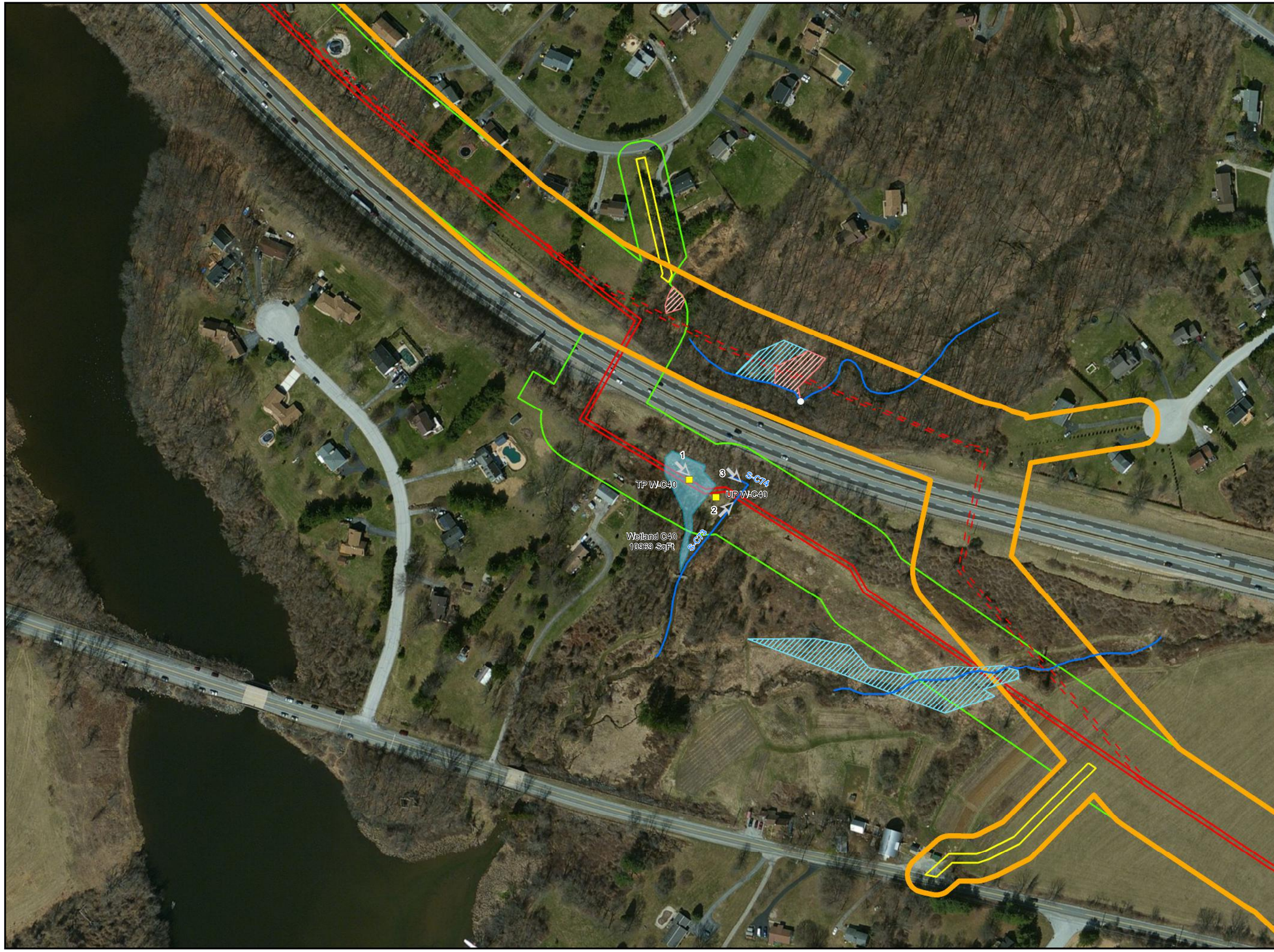


Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

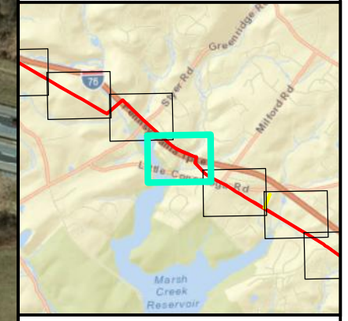
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

Feet
0 100 200

Meters
0 30.45 60.9

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-4
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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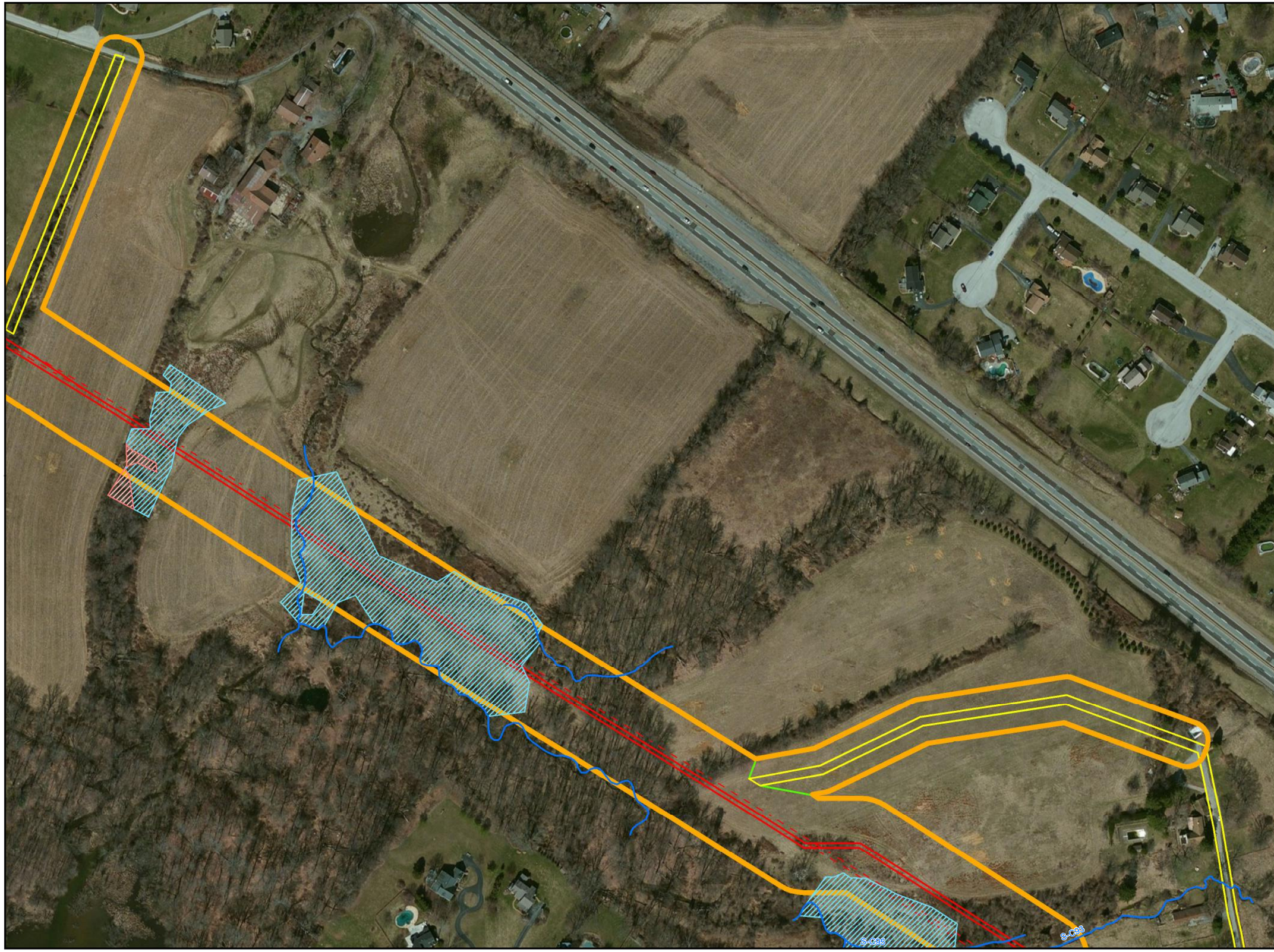


Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

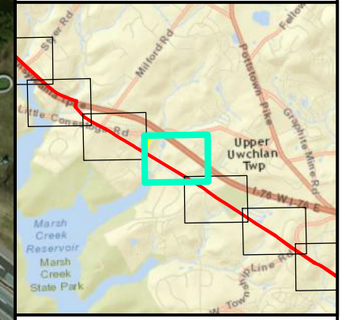
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-5
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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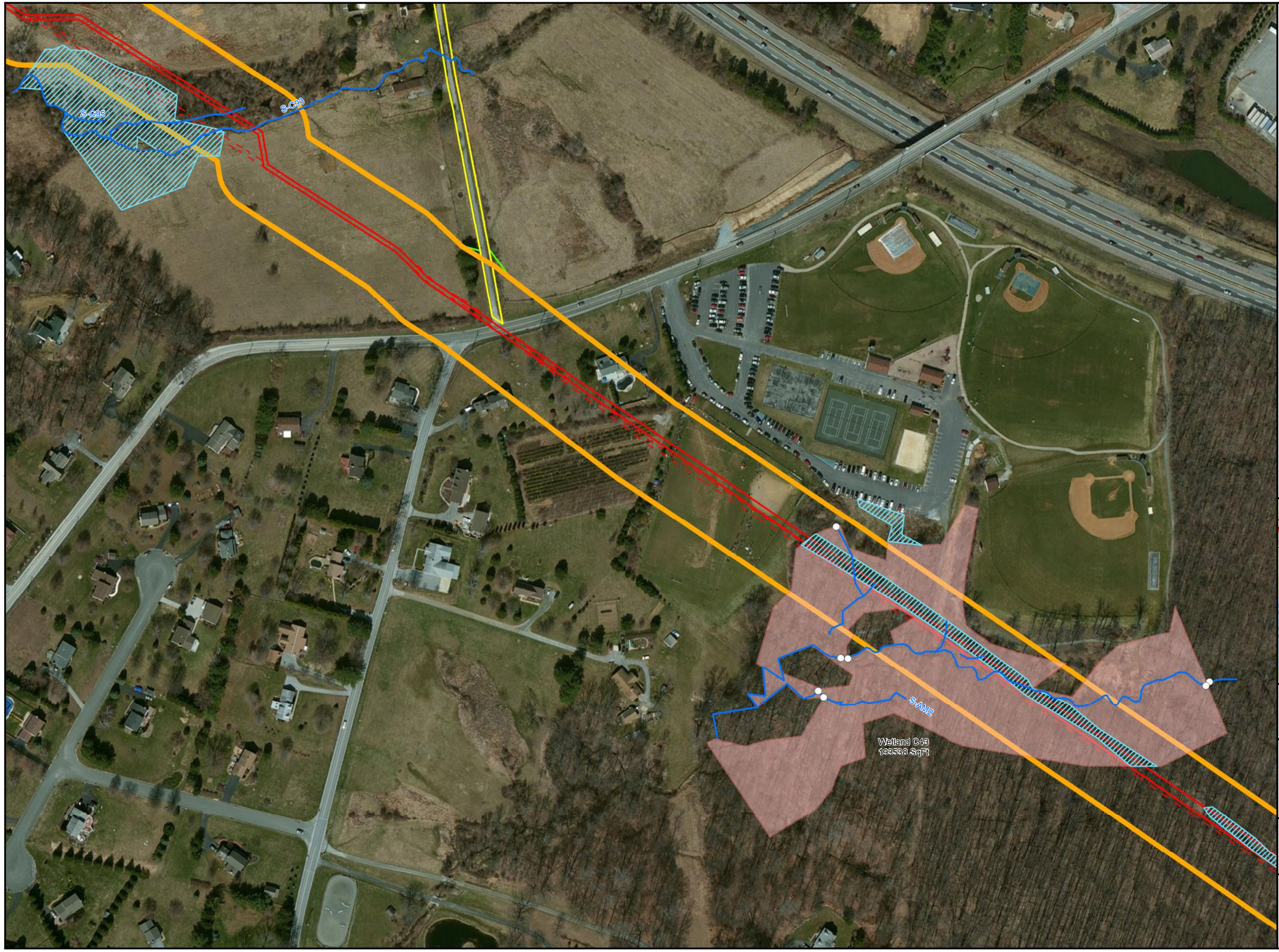
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEEPENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN



Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

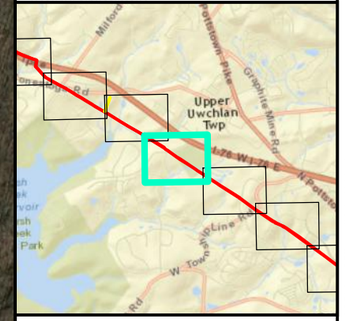
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-6
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

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Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

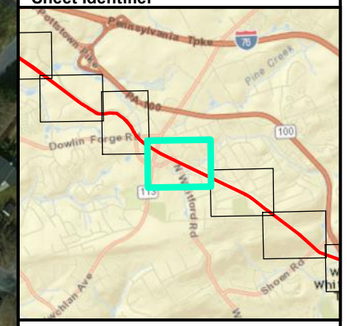
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-7
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS S\EPENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN

Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

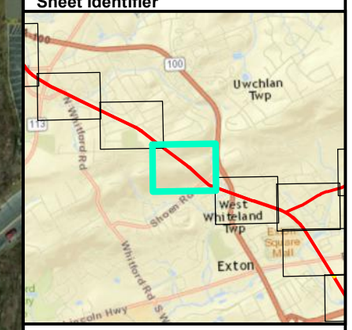
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

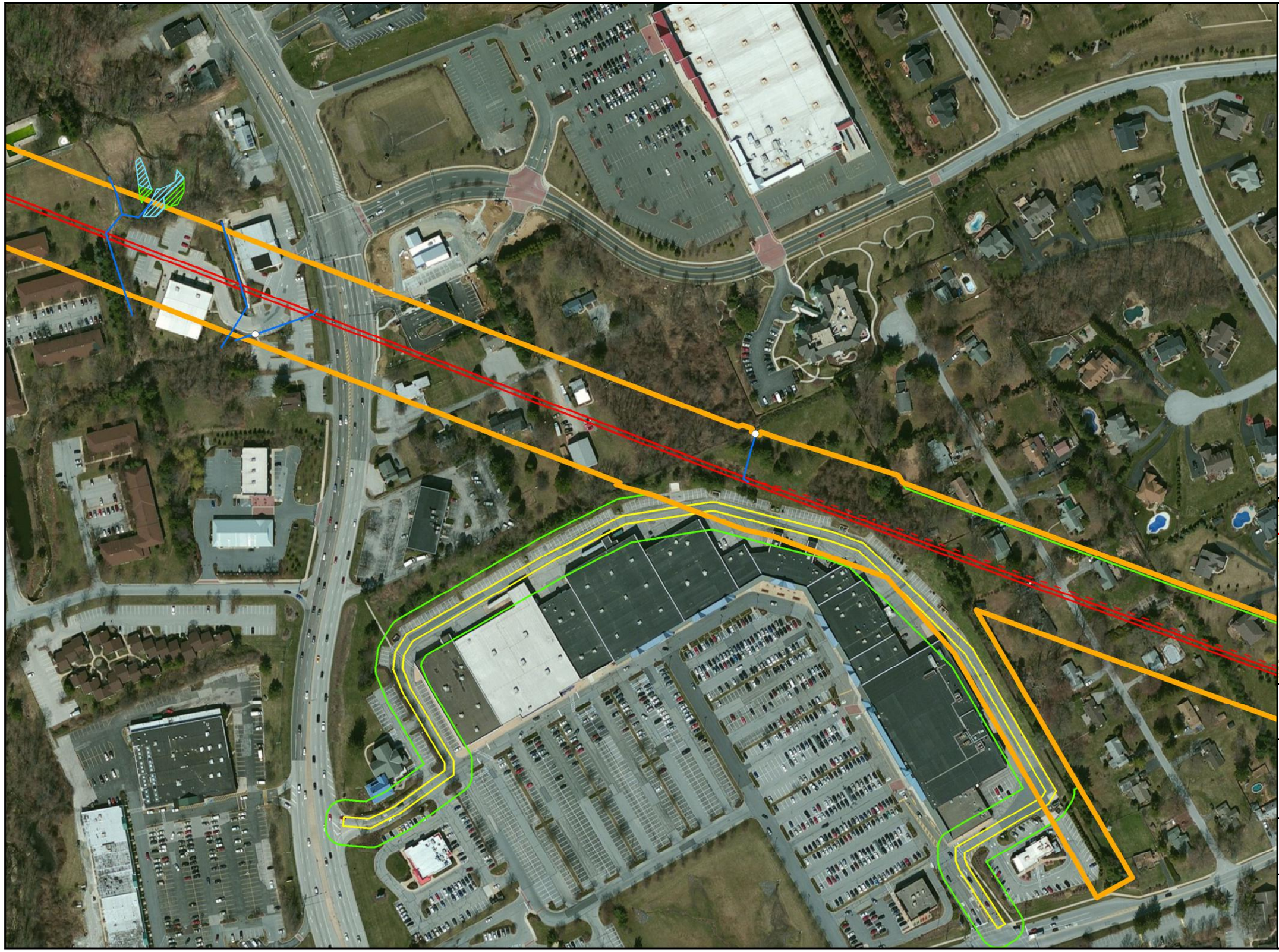
0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-8
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEEPENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN



Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

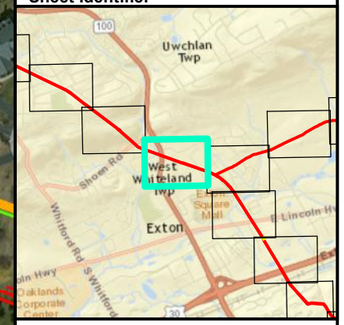
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

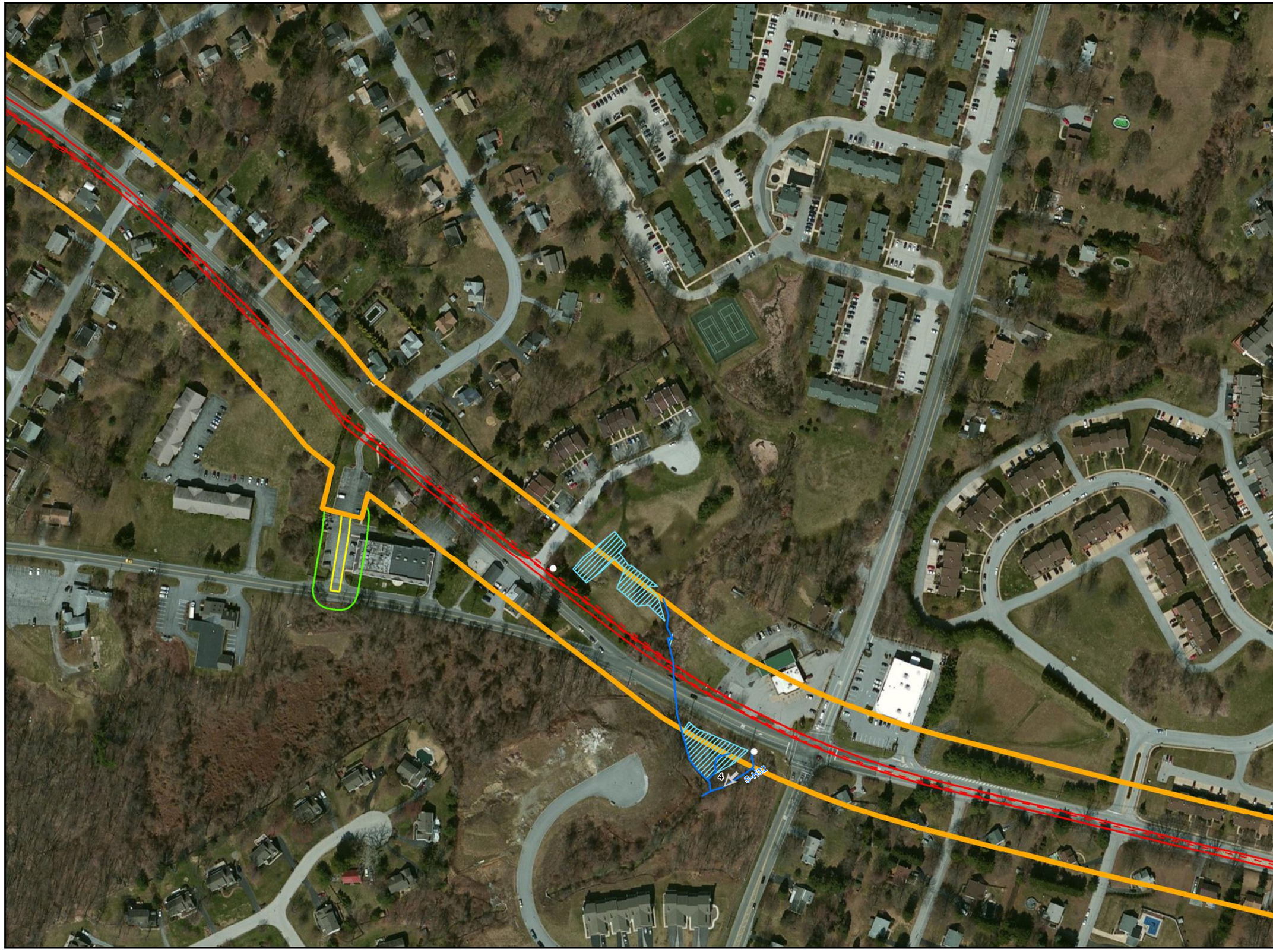
0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-9
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEEPENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN



Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

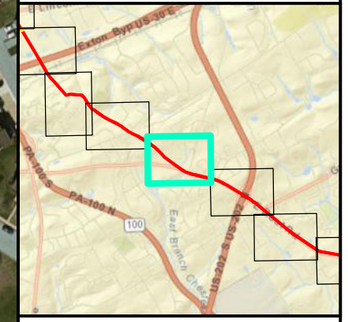
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-10
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

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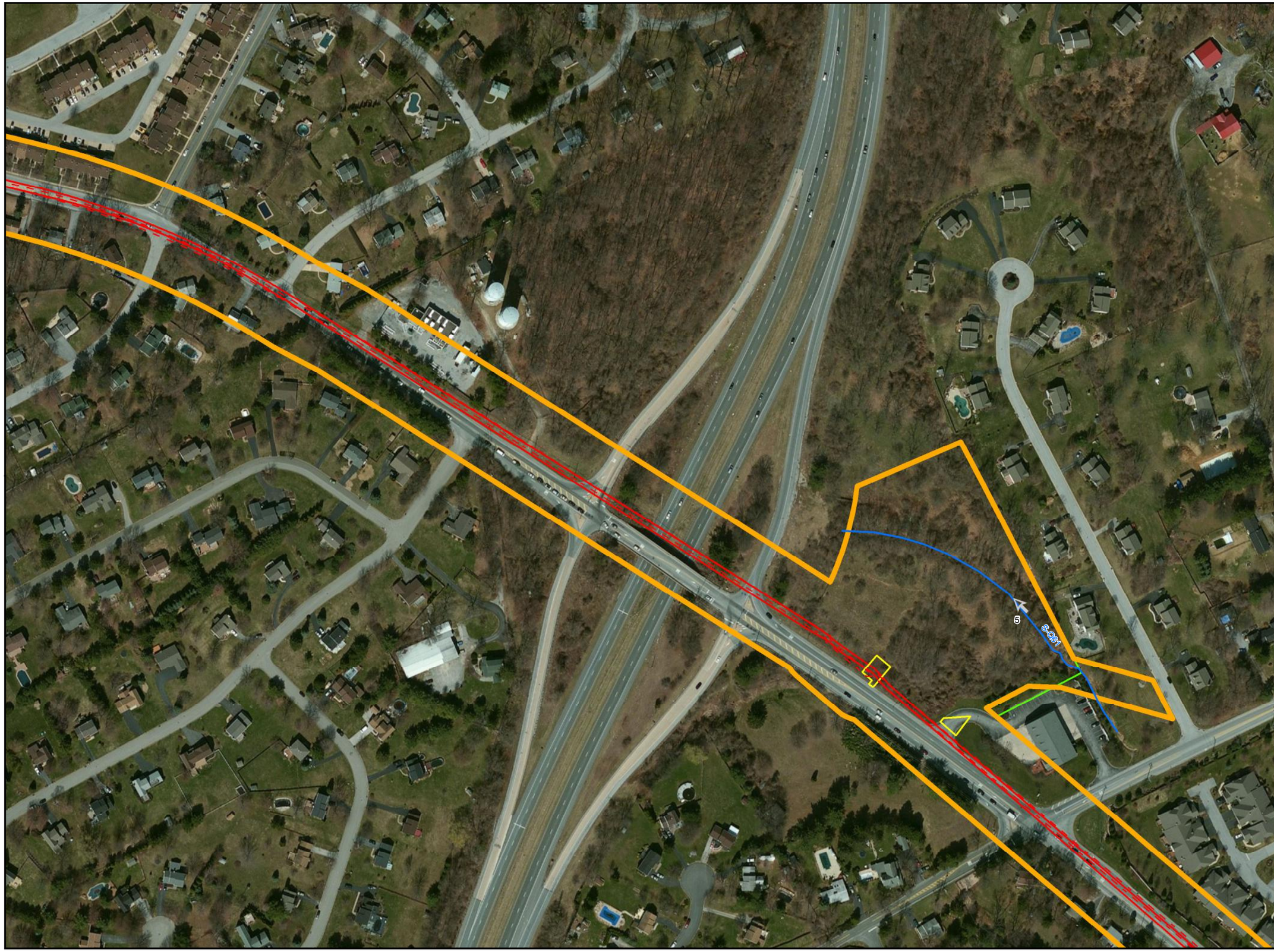
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEEPENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN



Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

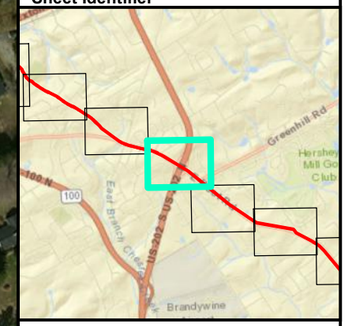
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-11
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SET\PENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN

Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

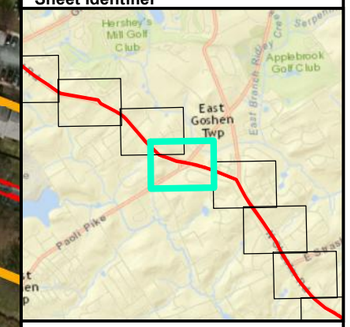
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-12
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
1) Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).
2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SEEPENNPIPELINE_CHESTERCO_ADDENDUMDETAIL.MXD 03/24/16 JN

Legend

- Culvert
- Sample Location
- Photo Location
- Drainage Feature
- Stream

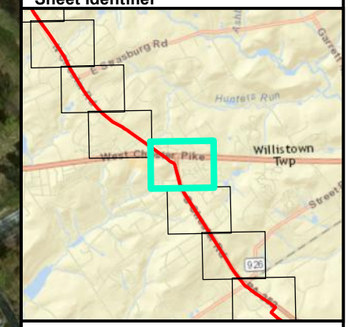
Wetland

- PEM
- PFO
- PSS
- PuB

New Wetland

- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/19/15)
- Alignment Centerline (8/19/15)
- Study Area (8/19/15)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-13
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
CHESTER COUNTY, PA

TETRA TECH

Notes:
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2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

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APPENDIX A
WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 03/08/2016

Applicant/Owner: Sunoco State: PA Sampling Point: W-B19 PFO 3

Investigator(s): J. McGuirk, K. Pulver Section, Township, Range: NA

Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): concave Slope (%): 0-3

Subregion (LRR or MLRA): LRRS Lat: 40.103282° Long: -75.756278° Datum: NAD 83

Soil Map Unit Name: Gladstone Gravelly loam, 8 to 15 percent slopes NWI classification: None

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

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

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks:
Cowardin Code: PFO
HGM: Riverine
WT: RPWWD

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes ✔	No _____	Depth (inches): 1
Water Table Present?	Yes ✔	No _____	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✔ **No** _____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-B19 PFO 3

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	60	✔	FAC
2. Quercus palustris	20	✔	FACW
3.			
4.			
5.			
6.			
7.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 16		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	30	✔	FAC
2. Fagus grandifolia	10	✔	FACU
3. Lindera benzoin	10	✔	FAC
4.			
5.			
6.			
7.			
8.			
9.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		
Herb Stratum (Plot size: 5')			
1. Microstegium vimineum	30	✔	FAC
2. Onoclea sensibilis	20	✔	FACW
3. Symplocarpus foetidus	17	✔	OBL
4. Scirpus atrovirens	10		OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	77 = Total Cover		
50% of total cover: 38.5	20% of total cover: 15.4		
Woody Vine Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

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

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✔ **No** ___

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

SOIL

Sampling Point: W-B19 PFO 3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100					SIL	
3-12	10YR 3/2	85	7.5YR 5/4	15	C	M/PL	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✔ **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 03/08/2016

Applicant/Owner: Sunoco State: PA Sampling Point: W-KP1 PEM

Investigator(s): J. McGuirk, K. Pulver Section, Township, Range: NA

Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): concave Slope (%): 0-3

Subregion (LRR or MLRA): LRRN Lat: 40.103545 Long: -75.756857 Datum: NAD 83

Soil Map Unit Name: Gladstone gravelly loam, 8 to 15 percent slopes NWI classification: None

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

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

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks:
Cowardin Code: PEM
HGM: Riverine
WT: RPWWD

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✔	Depth (inches): _____

Wetland Hydrology Present? **Yes** ✔ **No** _____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-KP1 PEM

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Herb Stratum (Plot size: 5')			
1. Microstegium vimineum	70	✔	FAC
2. Onoclea sensibilis	30	✔	FACW
3. Scirpus atrovirens	10		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	110 = Total Cover		
50% of total cover: 55	20% of total cover: 22		
Woody Vine Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

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

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✔ **No** ___

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

SOIL

Sampling Point: W-KP1 PEM

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 5/2	90	7.5YR 5/6	10	C	M/PL	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 03/08/2016

Applicant/Owner: J. McGuirk, K. Pulver State: PA Sampling Point: W-KP1 PFO

Investigator(s): Sunoco Logistics Section, Township, Range: NA

Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): Concave Slope (%): 0-3

Subregion (LRR or MLRA): LRRN Lat: 40.103488 Long: -75.75579 Datum: NAD 83

Soil Map Unit Name: Gladstone grevelly loam 3 to 8 percent slopes NWI classification: None

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

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

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks:
Cowardin Code: PFO
HGM: Riverine
WT: RPWWD

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes ✔	No _____	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes ✔	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✔ **No** _____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-KP1 PFO

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	60	✔	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	60 = Total Cover		
50% of total cover: 30	20% of total cover: 12		
Sapling/Shrub Stratum (Plot size: 15')			
1. Acer rubrum	20	✔	FAC
2. Lindera benzion	20	✔	FACW
3. Fagus grandifolia	15	✔	FACU
4.			
5.			
6.			
7.			
8.			
9.			
	55 = Total Cover		
50% of total cover: 27.5	20% of total cover: 11		
Herb Stratum (Plot size: 5')			
1. Microstegium vimineum	30	✔	FAC
2. Onoclea sensibilis	20	✔	FACW
3. Symplocarpus foetidus	20	✔	OBL
4. Carex stricta	10		OBL
5. Rubus allegheniensis	10		FACU
6. Phragmites autralis	10		FACW
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 86 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

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

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✔ **No** ___

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

SOIL

Sampling Point: W-KP1 PFO

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/1	100					SIL	
4-15	10YR 3/2	85	7.5YR 5/4	15	C	M/PL	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 01/02/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-B19/KP1 UPL

Investigator(s): Andrew Grech, Jason McGuirk, Deanna Quinn Section, Township, Range: Wallace

Landform (hillslope, terrace, etc.): foot-slope Local relief (concave, convex, none): linear Slope (%): 2-6%

Subregion (LRR or MLRA): LRRS Lat: 40.061211 Long: -75.452740 Datum: NAD 83

Soil Map Unit Name: Gladstone gravelly loam, 8 to 15 percent slopes NWI classification: None

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

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

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks:
Upland

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✔	Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✔

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-B19/KP1 UPL

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Herb Stratum (Plot size: 5')			
1. Microstegium vimineum	40	✔	FAC
2. Dichanthelium clandestinum	30	✔	FAC
3. Rosa multiflora	10		FACU
4. Rubus sp.	10		ND
5. Solidago sp.	10		ND
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

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

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ✔ **No** ___

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

ND- Not Determined

SOIL Sampling Point: W-B19/KP1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8"	10YR 3/3	100					SiL	Disturbed
8-12"	7.5YR 4/6	100					SiL	Disturbed

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✔

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 03/12/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-C40

Investigator(s): J. McGuirk & D. Quinn Section, Township, Range: Upper Uwchlan

Landform (hillslope, terrace, etc.): Valley Bottom Local relief (concave, convex, none): Concave Slope (%): 1-3

Subregion (LRR or MLRA): LRRS Lat: 40.085611 Long: -75.722738 Datum: NAD 83

Soil Map Unit Name: Codorus silt loam, Cokesbury silt loam, 3 to 8 percent slopes NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ____

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

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks:
Cowardin Code: PEM
HGM: Depressional
WT: RPWWD

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes ____	No ✔	Depth (inches): ____
Water Table Present?	Yes ✔	No ____	Depth (inches): 0"
Saturation Present? (includes capillary fringe)	Yes ✔	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✔ No ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-C40

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Herb Stratum (Plot size: 5')			
1. Onoclea sensibilis	30	✔	FACW
2. Persicaria sagittata	30	✔	OBL
3. Typha latifolia	20		OBL
4. Symplocarpus foetidus	20		OBL
5. Impatiens sp.	10		FACW
6.			
7.			
8.			
9.			
10.			
11.			
	110 = Total Cover		
50% of total cover: 55	20% of total cover: 22		
Woody Vine Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✔ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

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

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✔ No ___

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

Both Impatiens sp. have wetland indicator status's of FACW.

SOIL Sampling Point: W-C40

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4"	2.5Y 2.5/1	100					Muck	
4-8"	10YR 4/2	100					SiL	
8-12"	2.5Y 4/2	93	10YR 5/4	7	C	M	GRSL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Chester Sampling Date: 03/12/2014

Applicant/Owner: Sunoco State: PA Sampling Point: W-C40 UPL

Investigator(s): J. McGuirk & D. Quinn Section, Township, Range: Upper Uwchlan

Landform (hillslope, terrace, etc.): Valley Bottom Local relief (concave, convex, none): Convex Slope (%): 1-3

Subregion (LRR or MLRA): LRRS Lat: 40.08556 Long: -75.722511 Datum: NAD 83

Soil Map Unit Name: Cokesbury silt loam, 3 to 8 percent slopes NWI classification: None

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

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

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

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

Remarks:
UPLAND

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

Surface Water Present?	Yes _____	No ✔	Depth (inches): _____
Water Table Present?	Yes _____	No ✔	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✔	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-C40 UPL

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size: 15')			
1. Rosa multiflora	20	✔	FACU
2. Elaeagnus umbellata	10	✔	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		
Herb Stratum (Plot size: 5')			
1. Phleum pratense	25	✔	FACU
2. Dactylis glomerata	25	✔	FACU
3. Andropogon virginicus	15	✔	FACU
4. Poa sp.*	15	✔	ND
5. Allium cernuum	10		FACU
6. Microstegium vimineum	10		FAC
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 5* (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

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

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✔

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

ND - Not determined

*Not identified to species, not included in dominance test

SOIL

Sampling Point: W-C40 UPL

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8"	10YR 4/4	100					SiL	Refusal, coarse fragments.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

APPENDIX B
WETLAND PHOTOGRAPHS

Photograph Number:	1	**Feature Name:**	W-C40	**Date:**	03/12/2014
Direction:	SE	**Plant Community:**	PEM	**Remarks:**	N/A

Photograph Number:	6	**Feature Name:**	W-B19 PFO (3)	**Date:**	03/8/2016
Direction:	SE	**Plant Community:**	PFO	**Remarks:**	N/A

Photograph Number:	7	**Feature Name:**	W-KP1 PEM	**Date:**	03/8/2016
Direction:	E	**Plant Community:**	PEM	**Remarks:**	N/A

Photograph Number:	8	**Feature Name:**	W-KP 1 PFO	**Date:**	03/8/2016
Direction:	SE	**Plant Community:**	PFO	**Remarks:**	N/A

APPENDIX C
STREAM DATA SHEETS

Tetra Tech Stream Data Sheet

Surveyors: J. McGuirk & D. Quinn Date: 03/12/2014 Resource ID Number: S-C73
Project: PPP State: PA County: Chester
Photo Number (s): _____ Canopy Cover: 60 % Location: 40.085217, -75.722747

Flow Direction: W **Bank Width:** 20 Feet **Water Width:** 18 Feet
High Water Depth: 4 Feet **Water Depth:** 1.00 Feet **Turbidity:** moderate
Flow Stage: Moderate
Flow Regime: [✔] Perennial [ ] Intermittent [ ] Ephemeral [ ] Flowing Ditch [ ] Dry/Stagnant Ditch

Sinuosity:
[ ] Low
[✔] Medium
[ ] High

Features:
[✔] Riffles [ ] Sand/Mud Bar [✔] Run/Glide
[✔] Pools [✔] Gravel Bar [ ] Braided
[ ] Rapids [ ] Aquatic Vegetation [ ] Other _____

Substrate:
[ ] Bedrock ___%
[✔] Boulder 40 %
[✔] Cobble/Gravel 35 %
[✔] Sand 15 %
[✔] Silt/Clay 10 %
[ ] Organic ___%

Bank Substrate:
Height: Left 4' Right 4'

	Left	Right
Bedrock	[ ]	[ ]
Boulder	[✔]	[✔]
Gravel	[✔]	[✔]
Sand	[✔]	[✔]
Silt/Clay	[ ]	[ ]
Organic	[ ]	[ ]

Floodplain Width:

	Left	Right
<10 feet	[ ]	[ ]
<25 feet	[✔]	[✔]
<50 feet	[ ]	[ ]
<100 feet	[ ]	[ ]
>100 feet	[ ]	[ ]

Dominant Vegetation:
[ ] Forested
Species: _____
[ ] Shrub
Species: _____
[✔] Herbaceous
Species: Onoclea sensibilis, Persicaria sagittata, Typha latifolia, Symplocarpus foetidus

Wildlife Observed/Notes:

Sketch:
See Attached Figure.

Tetra Tech Stream Data Sheet

Surveyors: J. McGuirk & D. Quinn Date: 03/12/2014 Resource ID Number: S-C74
Project: PPP State: PA County: Chester
Photo Number (s): _____ Canopy Cover: 80 % Location: 40.085669, -75.722344

Flow Direction: SE **Bank Width:** 4 Feet **Water Width:** 0 Feet
High Water Depth: 0 Inches **Water Depth:** 0.00 Inches **Turbidity:** n/a
Flow Stage: No Flow

Flow Regime: [ ] Perennial [ ] Intermittent [✔] Ephemeral [ ] Flowing Ditch [ ] Dry/Stagnant Ditch

Sinuosity:
[✔] Low
[ ] Medium
[ ] High

Features:
[✔] Riffles [ ] Sand/Mud Bar [✔] Run/Glide
[✔] Pools [ ] Gravel Bar [ ] Braided
[ ] Rapids [ ] Aquatic Vegetation [ ] Other _____

Substrate:
[ ] Bedrock ___%
[✔] Boulder 15 %
[✔] Cobble/Gravel 25 %
[✔] Sand 60 %
[ ] Silt/Clay ___%
[ ] Organic ___%

Bank Substrate:
Height: Left 1' Right 1'

	Left	Right
[ ]	Bedrock	[ ]
[ ]	Boulder	[ ]
[ ]	Gravel	[ ]
[✔]	Sand	[✔]
[ ]	Silt/Clay	[ ]
[✔]	Organic	[✔]

Floodplain Width:

Left		Right
[✔]	<10 feet	[✔]
[ ]	<25 feet	[ ]
[ ]	<50 feet	[ ]
[ ]	<100 feet	[ ]
[ ]	>100 feet	[ ]

Dominant Vegetation:
[ ] Forested
Species: _____
[✔] Shrub
Species: Lonicera tatarica
[ ] Herbaceous
Species: _____

Wildlife Observed/Notes:

Sketch:
See Attached Figure.

Tetra Tech Stream Data Sheet

Surveyors: AJ Grech, Amanda Stott Date: 03/25/2014 Resource ID Number: S-H32
Project: PPP State: PA County: Chester
Photo Number (s): _____ Canopy Cover: 40 % Location: 40.008478, -75.591662

Flow Direction: SW **Bank Width:** 7 Feet **Water Width:** 6 Feet
High Water Depth: 8 Inches **Water Depth:** 4.00 Inches **Turbidity:** Moderate
Flow Stage: Medium

Flow Regime: [ ] Perennial [✔] Intermittent [ ] Ephemeral [ ] Flowing Ditch [ ] Dry/Stagnant Ditch

Sinuosity:
[✔] Low
[ ] Medium
[ ] High

Features:
[✔] Riffles [ ] Sand/Mud Bar [✔] Run/Glide
[ ] Pools [✔] Gravel Bar [ ] Braided
[ ] Rapids [ ] Aquatic Vegetation [ ] Other _____

Substrate:
[ ] Bedrock ___%
[ ] Boulder ___%
[✔] Cobble/Gravel 20 %
[✔] Sand 60 %
[✔] Silt/Clay 20 %
[ ] Organic ___%

Bank Substrate:
Height: Left 1' Right 1'

	Left	Right
Bedrock	[ ]	[ ]
Boulder	[ ]	[ ]
Gravel	[ ]	[ ]
Sand	[✔]	[✔]
Silt/Clay	[✔]	[✔]
Organic	[✔]	[✔]

Floodplain Width:

	Left	Right
<10 feet	[✔]	[✔]
<25 feet	[ ]	[ ]
<50 feet	[ ]	[ ]
<100 feet	[ ]	[ ]
>100 feet	[ ]	[ ]

Dominant Vegetation:
[✔] Forested
Species: Platanus occidentalis
[✔] Shrub
Species: American Honeysuckle, Lonicera canadensis
[ ] Herbaceous
Species: _____

Wildlife Observed/Notes:

Sketch:
See Attached Figure.

Tetra Tech Stream Data Sheet

Surveyors: J. McGuirk & C.Stoliker Date: 06/13/2015 Resource ID Number: S-Q61
Project: PPP State: PA County: Chester
Photo Number (s): _____ Canopy Cover: 0 % Location: 40.004703, -75.579004

Flow Direction: SE **Bank Width:** 3 Feet **Water Width:** 0 Feet
High Water Depth: 12 Inches **Water Depth:** 0.00 Inches **Turbidity:** n/a
Flow Stage: n/a
Flow Regime: [ ] Perennial [ ] Intermittent [✔] Ephemeral [ ] Flowing Ditch [ ] Dry/Stagnant Ditch

Sinuosity:
[ ] Low
[✔] Medium
[ ] High

Features:
[✔] Riffles [ ] Sand/Mud Bar [✔] Run/Glide
[✔] Pools [ ] Gravel Bar [ ] Braided
[ ] Rapids [ ] Aquatic Vegetation [ ] Other _____

Substrate:
[ ] Bedrock ___%
[ ] Boulder ___%
[✔] Cobble/Gravel 40 %
[✔] Sand 20 %
[ ] Silt/Clay ___%
[✔] Organic 40 %

Bank Substrate:
Height: Left 1' Right 1'

	Left	Right
Bedrock	[ ]	[ ]
Boulder	[ ]	[ ]
Gravel	[✔]	[✔]
Sand	[✔]	[✔]
Silt/Clay	[ ]	[ ]
Organic	[✔]	[✔]

Floodplain Width:

Left		Right
[✔]	<10 feet	[✔]
[ ]	<25 feet	[ ]
[ ]	<50 feet	[ ]
[ ]	<100 feet	[ ]
[ ]	>100 feet	[ ]

Dominant Vegetation:
[ ] Forested
Species: _____
[ ] Shrub
Species: _____
[✔] Herbaceous
Species: _____

Wildlife Observed/Notes:

Sketch:
See Attached Figure.

APPENDIX D
STREAM PHOTOGRAPHS

Photograph Number:	2	**Feature Name:**	S-C73	**Date:**	03/12/2014
Direction:	NE, Upstream	**Flow Regime:**	Perennial	**Remarks:**	Black Horse Creek

Photograph Number:	3	**Feature Name:**	S-C74	**Date:**	03/12/2014
Direction:	SE, Upstream	**Flow Regime:**	Ephemeral	**Remarks:**	N/A

Photograph Number:	4	**Feature Name:**	S-H32	**Date:**	03/25/2014
Direction:	SW, Downstream	**Flow Regime:**	Intermittent	**Remarks:**	N/A

Photograph Number:	5	**Feature Name:**	S-Q61	**Date:**	06/13/2015
Direction:	NW, Upstream	**Flow Regime:**	Ephemeral	**Remarks:**	N/A

APPENDIX E
HYDRIC SOILS LIST

Hydric Soils List
Chester County, Pennsylvania

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

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

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

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

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

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

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

APPENDIX F
RESUMES

Preston R Smith
DEPARTMENT MANAGER/BIOLOGIST/ECOLOGIST
PITTSBURGH, PA

EDUCATION: B.S. Biology (Environmental Science); University of Pittsburgh; Dec. 2000
M.S. Biological Sciences; Wright State University; March 2010

EXPERIENCE SUMMARY:

Mr. Preston Smith is a Biologist with 13+ total years of professional experience. Mr. Smith currently manages the Wetlands and Ecological Services Department for the Appalachian Basin Oil and Gas Services Group. His current responsibilities include project management, staff management, workload delegation including scheduling personnel for field work and report writing, QA/QC of work products and deliverables, and proposal/budget preparation. Mr. Smith has been involved in wetland delineations, habitat studies, plant surveys, permitting, and related report generation for commercial Oil and Gas clients in Pennsylvania, Ohio, and West Virginia for natural gas pipelines, water lines, well pads, impoundments, and water withdrawal locations. Since starting at Tetra Tech, Mr. Smith has also been involved in NEPA Categorical Exclusion, Environmental Assessment, and Environmental Impact Statement projects in several capacities serving as Project Manager, Deputy Project Manager, Water Resources Specialist, and Ecologist for various clients including the US Coast Guard, Department of Energy, Federal Energy Regulatory Commission, Nuclear Regulatory Commission, and Tennessee Department of Transportation.

TRAINING: OSHA 1910.120 40-Hour HAZWOPER Training; June 22, 2007
OSHA 1910.120(e)(4) 8-Hour HAZWOPER Supervisory; October 17, 2008
OSHA 1910.120 8-Hour HAZWOPER Refresher; November 1, 2013
ACOE-based 40-hour Wetland Delineation Certification; June 26, 2009

RELEVANT PROJECT EXPERIENCE:

Manager, Wetlands and Ecological Services Department; Various Midstream and Exploration and Production Oil and Gas Clients, Ohio, Pennsylvania, and West Virginia, 2011-present. As the Wetlands and Ecological Services Department Manager, Mr. Smith has managed Wetland Delineation and Stream Identification field activities and report generation for 250+ miles of pipeline, 40+ well pads, 20+ water withdrawal locations**;**

Natural Resources Lead; Confidential Client; Ohio, West Virginia, and Pennsylvania, 2013-present. As the Natural Resources Lead, Mr. Smith is responsible for scheduling and managing Wetland and Stream surveys and Rare, Threatened, and Endangered Species Surveys for an approximately 350-mile Non-FERC, Natural Gas Liquid Pipeline. He is also responsible for Agency coordination.

Task Manager/Biologist; Confidential Client, Washington, Allegheny, and Westmoreland County, PA, 2013. As a Task Manager/Biologist, Mr. Smith scheduled field crews and participated in Rare, Threatened and Endangered Plant surveys for large natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

Task Manager/Biologist; Confidential Client, Beaver and Butler County, PA, 2013-present. As a Task Manager/Biologist, Mr. Smith scheduled field crews and participated in Rare, Threatened and Endangered Plant surveys for a large natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

Natural Resource Permit Manager; Confidential Client; West Virginia; 2013-present. As the Natural Resource Permitting Manager, Mr. Smith prepared Preconstruction Notifications for U.S. Army Corps of Engineers Nationwide Permit 12 for several natural gas and water pipeline projects. He also prepared a Stream Activity Application Reports for submittal to the WV Department of Natural Resources (WV DNR) Office of Lands and Streams as part of these projects. Mr. Smith coordinated with US Fish and Wildlife Service and WV DNR Natural Heritage Program to evaluate the potential for threatened and endangered species within the project areas.

Natural Resource Permit Manager; Multiple Clients; Ohio; 2012-present. As the Natural Resource Permitting Manager, Mr. Smith prepared Preconstruction Notifications for U.S. Army Corps of Engineers Nationwide Permit 12 for several natural gas pipeline projects. Mr. Smith coordinated with US Fish and Wildlife Service and the Ohio Department of Natural Resources Division of Wildlife to evaluate the potential for threatened and endangered species within the project areas.

Project Manager; Stream Restoration Plan; Confidential Client; Eastern Ohio; 2013. As a Project Manager, Mr. Smith managed and contributed to Stream Restoration and Mitigation Plan for an Ohio EPA Director's Authorization to open cut a Class III Cold-water habitat stream. The Stream Restoration and Mitigation Plan was approved by Ohio EPA and led to the successful approval of the Director's Authorization.

Task Manager; Confidential Client; Fayette County, PA, September 2012. As a Task Manager/Biologist, Mr. Smith scheduled field crews for a Rare, Threatened and Endangered Plant survey for a natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

Task Manager; Confidential Client; Armstrong County, PA, July 2012. As a Task Manager/Biologist, Mr. Smith scheduled field crews for a Rare, Threatened and Endangered Plant survey for a natural gas pipeline project. A final report was also prepared under Mr. Smith's direction and approval was received form the PA DCNR.

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

Biologist/Wetland Delineator/; Confidential Clients; Western PA/Northern West Virginia/Eastern Ohio; 2009-present. As a Biologist/Wetland Delineator, Mr. Smith has conducted and assisted with wetland investigations based on the 1987 US Army Corps of Engineers Wetland Delineation Manual and Regional Supplements. The investigations involved

identifying wetland vegetation, soils, and hydrology along linear pipelines, water withdrawal sites, and well pad sites and preparing Wetland Reports for Marcellus/Utica Shale-related activities.

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

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

Project Manager; Environmental Assessment for the New Station Lake Charles; U.S. Coast Guard; Lake Charles, LA. 2010-2011. As a project manager, Mr. Smith managed all aspects of the EA and Finding of No Significant Impact for construction and operation of a new USCG facility in Lake Charles, LA from kickoff to completion. His duties included client management, budget monitoring, workload delegation, agency coordination, contributing to various sections of the document, site visit to characterize habitat, and publishing and submittal of all documents.

Deputy Project Manager; Environmental Impact Statement for a Coal Gasification Plant; U.S. Department of Energy; Beaumont, TX. 2009-2010. As a Deputy Project Manager, Mr. Smith assisted the Project Manager with client relations, attended the Public Scoping Meeting, coordinated and attended meetings with federal and local agencies, drafted and attended project meetings, and authored several ecological sections of a pre-Draft Environmental Impact Statement for the DoE for the TX Energy Industrial Gasification Plant. Mr. Smith also coordinated and participated in Biological surveys including fish and benthic sampling on the Neches River and a site habitat characterization in for the project, which is currently on hold.

NEPA Project Manager; Categorical Exclusion for the Memphis Medical Center Streetscape; City of Memphis; Memphis, TN. 2011-present. As a NEPA project manager, Mr. Smith is managing all aspects of the CE for street improvements along a 2.81-mile segment of Elvis Presley Boulevard. His duties include client management, budget monitoring, workload delegation, agency coordination, contributing to the document, and publishing and submittal of all documents.

NEPA Analyst/Environmental Scientist; FERC-regulated Environmental Assessment for an Interstate Natural Gas Pipeline; West Virginia and Pennsylvania; 2010-present. As a NEPA analyst, Mr. Smith drafted the Aquatic Resource section of a FERC-regulated EA for a commercial Oil and Gas client for Marcellus Shale-related activities.

NEPA Analyst/Ecologist; NEPA Environmental Report in support of a DOE Federal Loan Guarantee Program for Clean Coal Technology for a Coal Gasification Plant; Beaumont, TX; Eastman Chemical; 2008-2009. As a NEPA Specialist, Mr. Smith authored several ecological sections of an Environmental Report in support of an Environmental Impact Statement for the DoE for the TX Energy Industrial Gasification Plant.

Biologist/Field Operations Leader; TX Energy Environmental Report; Eastman Chemical; Beaumont, TX; 2008. As the Field Operations Leader, Mr. Smith coordinated and participated in Biological surveys including fish and benthic sampling on the Neches River and a site habitat characterization in Beaumont, TX.

Deputy Project Manager/NEPA Analyst/Ecologist; Environmental Assessment for a Dredge Boat Basin at the U.S. Coast Guard Station, Marblehead, OH; 2007. As a Deputy Project Manager/NEPA Analyst/Ecologist, Mr. Smith contributed to the planning and development of an environmental assessment and Finding of No Significant Impact/Record of Decision for a proposed blasting/dredging operation for the U.S. Coast Guard. He authored the geology, topography, soils, seismic zone considerations and coastal zone considerations; water resources and drainage; hazardous materials and hazardous waste; aquatic environment; threatened and endangered species; and the wild and scenic rivers sections of the environmental assessment in addition to assisting with overall document research and development.

Aquatic Ecologist; South Texas Project Combined Construction and Operating License Application Environmental Report; Bechtel; Texas; 2007. As an Aquatic Ecologist, Mr. Smith prepared the aquatic ecology sections for site alternatives to building and operating two Advanced Boiling Water Reactors (ABWR) units on the South Texas Project (STP) site. He evaluated the aquatic environmental impacts associated with developing new nuclear capacity at each of three alternative sites. Part of the evaluation included the impacts of water usage and disposal for electricity generation. Additionally, the impacts to threatened and endangered species were considered.

Aquatic Ecologist; Beaver Valley Nuclear Power Station License Renewal Environmental Review Program; FirstEnergy Nuclear Operating Company; Pennsylvania; 2007. As an Aquatic Ecologist, Mr. Smith prepared part of the aquatic impacts section of an environmental report for the Davis-Besse Nuclear Power Station license renewal. The focus of the section was assessing the impacts of impingement/entrainment on fish species and comparing the data to permissible rates.

Benthic Ecologist; U.S. Navy, NSF Dahlgren, VA; 2008-present. As a benthic ecologist, Mr. Smith prepared response to comments, attended meetings, and prepared a work plan for field studies, and a benthic report in support of benthic monitoring program at NSF Dahlgren.

Ecologist; Endangered Species Review; Munitions Response Program; MCB Quantico; 2007-2008. As an Ecologist, Mr. Smith prepared the endangered species section of the Munitions Response Program at the Marine Corps Base Quantico. He gathered information on species occurring at the base and determined the Federal and State status of those species and identified locations where those species are likely to occur.

Project Manager; Wetland Delineation for the New Station Lake Charles; U.S. Coast Guard; Lake Charles, LA. 2011-2012. As a project manager, Mr. Smith is currently managing all aspects of the Wetland Delineation for a proposed site of a new USCG facility in Lake Charles, LA. His duties

included client management, budget monitoring, workload delegation, and review of the jurisdictional determination.

CHRONOLOGICAL WORK HISTORY:

Wetlands and Ecological Services Department Manager, Tetra Tech NUS, Inc.; Pittsburgh, PA; November 2011-present.

Biologist/Ecological Risk Assessor; Tetra Tech NUS, Inc.; Pittsburgh, PA; January 2007-November 2011.

Research Assistant/Lab Manager; Wright State University; Dayton, OH; September 2003-December 2006.
Managed an aquatic toxicology laboratory. Responsibilities included maintaining laboratory cultures and supplies, managing grant related research projects (see descriptions above), supervising undergraduate students, writing technical reports, conducting literature reviews, and maintaining laboratory and field equipment.

Research Assistant; Indiana University of Pennsylvania; Indiana, PA; September 2002-August 2003.
Provided support in maintaining laboratory insect cultures and supplies. Conducted small mammal surveys; endangered reptile surveys (Eastern Massasauga Rattlesnake); collected and identified amphibians and reptiles in Western Pennsylvania for the Pennsylvania Herpetological Atlas; identified benthic macroinvertebrates for Abandoned Mine Drainage projects.

TETRA TECH

Jason McGuirk
Wetland/Environmental Scientist IV

EXPERIENCE SUMMARY

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

RELEVANT EXPERIENCE

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

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

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

EDUCATION

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

REGISTRATIONS

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

AREA OF EXPERTISE

Wetland Delineation and Stream Identification, Fisheries, and Botanical Surveys

TRAINING/CERTIFICATIONS

Winter Vegetation ID, Rutgers University, 2012

Amtrak Contractor Certification, 2014

Certified Wetland Assessment Delineator, NY, 2009

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

6+

YEARS WITH TETRA TECH

2+

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

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

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

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

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

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

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

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

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

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

CHRONOLOGICAL HISTORY

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

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

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

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

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

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

SCIENTIFIC/TECHNICAL PUBLICATIONS

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

MEMBERSHIPS

- N/A

AWARDS

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

TETRA TECH

Deanna N.Quinn
Wetland/Environmental Scientist II

EXPERIENCE SUMMARY

Ms. Quinn has two years' experience as an environmental scientist/ wildlife biologist with a background in wildlife and fisheries resource management. Her education background includes studies in chemistry, biology, statistics, botany, terrestrial ecology, natural resource management, conservation ecology, environmental policy and regulatory compliance, wetland ecosystems, wetland assessment and delineation, geographic information systems and other environmental related fields. Deanna has performed numerous wildlife and vegetation surveys, stream assessments habitat assessments and related report generation. As an Environmental Scientist, Deanna has had the opportunity of working fulltime on wetland delineations under Environmental Wetland Specialists, primarily for Marcellus shale projects. She also has experience performing bat hibernaculum habitat surveys in Western Pennsylvania as well as Phase 1 Bog Turtle surveys in Pennsylvania.

RELEVANT EXPERIENCE

Environmental Scientist II, Sunoco Logistics, Ohio-Pennsylvania Pipeline Project, Spanning from Delaware County, PA through Harrison County, Ohio, November 2013 to present. Ms. Quinn conducted site investigations, wetland delineations, stream assessments, performed Ohio Rapid Assessment Method, PHWH HHEI & QHEI, Phase 1 Bog Turtle surveys, macroinvertebrate surveys, and wetland report preparation for proposed 300 mile natural gas pipeline reaching from the Delaware River in PA to Scio, OH.

Environmental Scientist I; Gulfport Energy; Various Natural Gas Well Pad Sites; Belmont County, Ohio; August 2013 to present. Ms. Quinn conducted site investigations, wetland delineations, stream assessments, performed Ohio Rapid Assessment Method, PHWH HHEI & QHEI, and wetland report preparation for proposed well pad locations in Belmont County, Ohio.

EDUCATION

BT Wildlife Management, 2011, SUNY Cobleskill

AAS Animal Sciences & Ecology, 2009, SUNY Delhi

REGISTRATIONS

NA

TRAINING/CERTIFICATIONS

Certified Wetland Assessment Delineator, 2010, NY

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

3

YEARS WITH TETRA TECH

1 year 10months

Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania; May 2013 to present. Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

CHRONOLOGICAL HISTORY

Environmental Analysis/Management: Environmental Scientist I-II, 2013-present, Pittsburgh, PA
Research: Husbandry Services Technician I, 2013, Pittsburgh, PA
Research Wildlife Biologist, 2010-2012, Cobleskill, NY
Research Avian Research Technician, 2011, Abaco, Bahamas
Research Predator Research Technician, 2010, Batavia, NY

SCIENTIFIC/TECHNICAL PUBLICATIONS

- N/A

MEMBERSHIPS

- The Wildlife Society, N/A

AWARDS

- N/A

ANDREW J. GRECH
WETLAND ENVIRONMENTAL SCIENTIST III
PITTSBURGH, PA

EDUCATION: **B.T. Wildlife Management, SUNY Cobleskill, 2011**

CERTIFICATIONS/ REGISTRATIONS: **Certified Wetland Assessment Delineator, NY, 2009**

TRAINING: **Sedges, Grasses, and Rushes ID, Rutgers University, 2012**
Wetland Hydrology, Rutgers University, 2012

EXPERIENCE SUMMARY:

Mr. Andrew Grech has five years of professional experience in wetland delineation, permitting, fisheries and wildlife, and stream assessments and classification in Pennsylvania, New York, and Ohio. Mr. Grech has conducted hundreds of wetland delineations, stream evaluations as well as conducted and produced habitat assessments, and post monitoring impact statements and assessments on over one hundred and fifty miles of proposed natural gas pipeline, and twenty proposed well pad sites. He has extensive knowledge in watercourse classification and assessment including the Rosgen method. Mr. Grech's educational background is in Wildlife Management with a minor focus in Fisheries & Aquaculture.

PROJECT EXPERIENCE:

Wetland & Watercourse Biologist; Chesapeake Energy; Bradford, Wyoming, & Susquehanna Counties, PA; March 2012 to March 2013. Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 40 miles of pipeline in Northeastern Pennsylvania.

Wetland & Watercourse Biologist; Chesapeake Energy; Carroll, Jefferson County, OH; June-November 2012. Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed ORAM and QHEI Assessments, and preparation of wetland report for 50 miles of pipeline in Eastern Ohio.

Wetland & Watercourse Biologist; Shell Oil; Mckean & Bradford Counties, PA; March 2012 to March 2013. Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 40 miles of pipeline in Northeast/central Pennsylvania.

Wetland & Watercourse Biologist; Chesapeake Energy; Bradford, Wyoming, & Susquehanna Counties, PA; November 2012 to March 2013. Responsible for conducting post construction habitat monitoring and assessment of constructed natural gas pipelines in Northeastern Pennsylvania.

Wetland & Watercourse Biologist; Southwest Energy; Wayne, Monroe, & Pike Counties, PA; November 2012 to March 2013. Responsible for conducting wetland delineations for proposed well pads. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 15 proposed well pads in Northeastern Pennsylvania.

Wetland & Watercourse Biologist; Markwest Energy; Allegheny, Butler, & Washington Counties, PA; August 2013 to October 2013. Responsible for conducting wetland delineations for proposed pipe line routes and reroutes. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland report for 20 miles of pipeline in Southwest Pennsylvania.

Wetland & Watercourse Biologist; REX Energy; Butler County, PA; September 2013. Responsible for conducting wetland delineations for proposed water withdrawal sites along Connoquenessing Creek and Glade Run. Performed PA Rapid Assessments, stream evaluation, and preparation of wetland reports for 2 water withdrawal sites in Southwest Pennsylvania.

Environmental Mgmt. Systems:

- Angler Surveys and Census for the Ice Fishery of Otsego Lake, NYDEC September - December 2007
- Pond surveys (water quality, fish identification, mapping) for Schoharie County residents January – May 2008
- Sonic and radio tracking, research crew member on 24 hour tracking samples. Otsego Lake N.Y. Through SUNY Cobleskill from September – December 2008
- Reptile and Amphibian trapping survey. SUNY Cobleskill from March – May 2009
- Wetland delineation, Field work in various wetlands thoughout the Cobleskill N.Y. area from September- December 2009
- Electrofishing Survey, Member of boat electro fishing crew; scapper, fish ID, Gill net retrieval, and fish measuring for night as well as day sampling of Otsego Lake N.Y. Through Biological Field Station from January – May 2010
- Waterfowl habitat survey, Activity budget survey, Nest Predation survey, various research projects around Cobleskill N.Y. September - December 2010.

Sampling:

Fisheries Technician; SUNY Cobleskill; Cobleskill, NY; September 2008. Responsible for preforming a fisheries survey and rescue for the N.Y. State power authority, on Gilboa reservoir. Sampled and collected fishes to be transported to mitigation location.

Fisheries Technician; SUNY Cobleskill; Cobleskill, NY; on and off from September 2007-December 2010. Responsible for collecting state fisheries data on several N.Y. state watersheds. Field sampling including haul seines, electro-shocking, gill nets, fyke nets, Responsible for the use of MS-222 for anesthetizing fishes during the study.

Wildlife Technician; SUNY Cobleskill; Cobleskill, NY; June 2010. Conducted local herpetology surveys on both salamander and frog habitats locally in and around Cobleskill area. Used amphibian traps to capture live specimens and recorded population densities and species diversity indexes for each location. Specifically focusing on human impacts, and habitat alterations and the population and diversity impacts associated with the disturbance.

Other:

New York State DEC; Trap-netted birds of prey, Richmondville, NY
SUNY Cobleskill; Electro-fishing/sonic tagging Walleye, Otsego Lake, NY
Otsego Lake Biological Field Station; Trap-netting/hydro-acoustic survey of Alewife, Otsego Lake, NY
SUNY Cobleskill; Electro-fished lake at night for a "mark and re-capture study," Otsego Lake, NY
New York State DEC; Bat count surveys, Howe Caverns, Cobleskill, NY
Peabody Wildlife Management Area; Trapping/radio-telemetry of Bob-white Quail, Drakesboro, KY
Colorado Parks and Wildlife Commission; Trapped and collared Columbian Sharp-tailed Grouse, W. CO
Colorado Parks and Wildlife Commission; Performed radio-telemetry and observation counts of Bighorn Sheep, W. CO

CHRONOLOGICAL WORK HISTORY:

Wetland Environmental Scientist III; Tetra Tech, Inc.; Pittsburgh, PA, August 2013- Present

Environmental technician/Range Manager, XH Angus Ranch; Saratoga, WY March 2013- August 2013

Wetland & Watercourse Biologist; Hanover Engineering & Associates; Towanda, PA, March 2012 - March 2013

Environmental Technician, Mount Agamenticus, York, ME, May 2011-March 2012

Seasonal Park Ranger, US Army Corps of Engineers, Thomaston, CT, May- September 2009 & 2010

PROFESSIONAL AFFILIATIONS:

American Wildlife Society

AMANDA M. STOTT
WILDLIFE AND WETLAND SCIENTIST/ENVIRONMENTAL SCIENTIST I
PITTSBURGH, PA

EDUCATION: B.T. Wildlife Management, SUNY Cobleskill, 2011
A.A.S General Studies, Liberal Arts and Sciences Herkimer C.C.C., 2009

CERTIFICATIONS/ REGISTRATIONS: Certified Wetland Assessment Delineator, NY, 2010

EXPERIENCE SUMMARY:

Ms. Amanda Stott has two years' experience as an environmental scientist/ wildlife biologist with a background in wildlife and fisheries resource management. Her education background includes studies in chemistry, biology, statistics, botany, terrestrial ecology, natural resource management, conservation ecology, environmental policy and regulatory compliance, wetland ecosystems, wetland assessment and delineation, geographic information systems and other environmental related fields. Amanda has performed numerous wildlife and vegetation surveys, stream assessments habitat assessments and related report generation. As an Environmental Scientist, Amanda has had the opportunity of working fulltime on wetland delineations under Environmental Wetland Specialists, primarily for Marcellus shale projects.

RELEVANT PROJECT EXPERIENCE:

Environmental Scientist I; MarkWest Liberty Midstream & Resources, LLC; Wetland Delineations for Miscellaneous Natural Gas Pipeline Projects; Pennsylvania; May 2013 to present. Responsible for performing and assisting with wetland delineations for various proposed natural gas pipeline projects in southwestern Pennsylvania. Specific tasks included field survey, report preparation, and wetland functional assessments.

Sampling:

Wildlife Technician; SUNY Cobleskill; Cobleskill, NY; June 2010. Conducted local herpetology surveys on both salamander and frog habitats locally in and around Cobleskill area. Used amphibian traps to capture live specimens and recorded population densities and species diversity indexes for each location. Specifically focusing on human impacts, and habitat alterations and the population and diversity impacts associated with the disturbance.

Wildlife Research Technician, University of Tennessee; Drakesboro, KY; August 2012. Conducted vegetation surveys to identify nesting habits of Northern Bob-White Quail. Using a plot-less sampling method and random point generations near known nesting sites. Focusing on generating suitable habit for nesting on reclaimed coal-mine area.

Wildlife Research Technician, Colorado Parks and Wildlife; Hayden, CO; August 2013.
Aid in annual report of flora growth by conducting vegetation surveys on private and public lands to regenerate sage-brush nesting areas for Sage Grouse populations. Use of line-point method and random point generations.

Environmental Mgmt. Systems:

- Pond surveys (water quality, fish identification, mapping) for Schoharie County residents January – May 2009
- Angler Surveys and Census for the Ice Fishery of Otsego Lake, NYDEC December-February 2010
- Wetland delineation, Field work in various wetlands throughout the Cobleskill N.Y. area from September- December 2010
- Waterfowl habitat survey, Activity budget survey, Nest Predation survey, various research projects around Cobleskill N.Y. September - December 2010.
- Population surveys of ruffed grouse, NYDEC, trapping and banding, various study areas around Cobleskill N.Y. December 2009-January 2010.

CHRONOLOGICAL WORK HISTORY:

Wetland/Environmental Scientist I; Tetra Tech, Inc.; Pittsburgh, PA, May 2013 – Present.

Wildlife Research Technician; Colorado Parks and Wildlife; Steamboat Springs, CO April-August 2013

Wildlife Survey Technician; Western Ecosystems Inc.; Lowville, NY; July 2012-January 2013

Wildlife Research Technician; University of Tennessee; Drakesboro, KY; July-October 2011

Animal Husbandry Technician; Stonewall Boarding and Game Preserve; Esperence, NY; June 2009-April 2011

PUBLICATIONS/ARTICLES:

Morin. M.M, Stott, A.M.; "Wildlife Management Report for: Native Meadows Preserve"; New Milford, Connecticut; October 2012

TETRA TECH

Kevin Pulver
Wetland/Environmental Scientist I

EXPERIENCE SUMMARY

Mr. Kevin Pulver has 1 year 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 I; 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 I; 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 I; 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 I; 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. 15-673 (2015)

TRAINING/CERTIFICATIONS

Certificate in Wetland Delineation from Wetland Training Institute (2013)

CPR / First Aid / AED (2015)

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

1

YEARS WITH TETRA TECH

1

CONTACT

Email: kevin.pulver@tetratech.com

Direct: 412.920.7024

Environmental Scientist I; 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.

EMPLOYEMENT HISTORY

- Wetland/Environmental Scientist I, Tetra Tech, Inc., November, 2014 – Present, Pittsburgh, PA
- AutoCAD Drafter, Land Services Group, November 2013-July 2014, Wellsboro, PA
- Cartographer, Intelligent Direct, Inc., May 2013 – November 2013, Wellsboro, PA
- Biological Scientist Intern, United States Geologic Survey - Northern Appalachian Research Laboratory, Summer 2012, Wellsboro, PA

SCIENTIFIC/TECHNICAL PUBLICATIONS

- N/A

MEMBERSHIPS

- Society of Wetland Scientists

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