

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



Prepared By:

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For

Sunoco Pipeline, LP

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Sinking Spring, PA



March 2016

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ACRONYMS

1987 Manual	Corps of Engineers Wetland Delineation Manual
Corps Regional Supplement	Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region
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	Southcentral 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 Berks 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 Berks 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 1-3; USGS, 2009)
- Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey (Figures 2-1 to 2-3; NRCS, 2014)
- USFWS National Wetland Inventory (NWI) Mapping (Figures 3-1 to 3-3; USFWS, 2009)

The delineation consisted of the establishment of the wetland/upland margin with flagging hung at intervals that accurately depicted the outline of the boundary. The individual flags were then located using a Global Positioning System (GPS) receiver and later added to the Project area mapping. Wetland 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 4-7).

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 Berks County. Resumes of project personnel are included in Appendix F.

3.0 RESULTS

The field investigations identified two areas within Berks County, PA, located within the Southcentral 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*. Additionally, five streams were identified within the evaluated study area. A narrative summary of field data collected for these systems is presented below. The detail maps provided as Figures 4-1 to 4-7 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 Berks County, PA is included in Appendix E. The NRCS soil survey maps are included as Figures 2-1 to 2-3. Confirmation of the soil mapping units was not performed during this site evaluation.

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

Based on field evidence and best professional judgment, it was determined that two wetlands are present within the study area. These 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 area 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 AM2

Wetland AM2 (W-AM2) is a 3,778-square foot (SF) PEM wetland (Figure 4-5). 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 Japanese stilt grass (*Microstegium vimineum*) and reed canary grass (*Phalaris arundinacea*). The soil between 0 and 3 inches exhibits a low-chroma matrix (10YR 4/2) with a silt loam texture. The soil between 3 and 12 inches exhibits a low-chroma matrix (10YR 4/1) with a silt loam texture that contains redoximorphic features (5YR 4/4).

Wetland C6 PEM

Wetland C6 PEM (W-C6 PEM) represents, the greater than 54,359-SF PEM extension of, wetland W-C6 (Figure 4-5). 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 Northern catalpa (*Catalpa speciosa*), red maple (*Acer rubrum*), rambler rose (*Rosa multiflora*), black willow (*Salix nigra*), uptight sedge (*Carex stricta*), narrow leaf cattail (*Typha angustifolia*), and Japanese stilt grass (*Microstegium vimineum*). The soil between 0 and 4 inches exhibits a low-chroma matrix (2.5Y 2/1) with a muck texture. The soil between 4 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a silt loam texture.

3.2 STREAM IDENTIFICATION AND EVALUATION

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

Stream A64

Stream A64 (S-A64) is an intermittent unnamed tributary (UNT) to East Branch Conestoga River (Figure 4-7). The stream bank is approximately 2.5 feet in width. The bank height is 6 inches. The stream bed contains a sand, silt, and clay substrate. At the time of the field investigation the stream exhibited an average water depth of 2 inches. This stream was previously identified but not included in the previous report.

Stream BB34

S-BB34 is a previously identified stream that was extended into the Addendum Study Area (Figure 4-4). No new data was collected for this stream extension.

Stream C11

S-C11 is a previously identified stream that was extended into the Addendum Study Area (Figure 4-5). No new data was collected for this stream extension.

Stream C8

S-C8 is a previously identified stream that was extended into the Addendum Study Area (Figure 4-5). No new data was collected for this stream extension.

Stream C9

S-C9 is a previously identified stream that was extended into the Addendum Study Area (Figure 4-5). No new data was collected for this stream extension.

3.3 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 4-7. There are 3 streams within Berks County with floodways that extend into the Project LOD.

4.0 CONCLUSIONS

During the field investigations in Berks County, PA, located within the Southcentral Region of the proposed Pennsylvania Pipeline Project, one area was identified within the Addendum Study Area which exhibited all three criteria necessary to be classified as a jurisdictional wetland in accordance with the *1987 Manual* and the *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).

One stream that was previously identified, but not included in the previous report, is located within the evaluated study area.

REFERENCES

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

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Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. The National Wetland Plant List: 2014 Update of Wetland Ratings. Phytoneuron 2014-41: 1-42.

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

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

TABLE

Table 1
Wetland and Stream Summary
Pennsylvania Pipeline Project
Page 1 of 1

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-AM2	PEM	-	-	-	3778	0.09	S-C11
W-C6	PEM	-	-	-	54359	1.25	
Stream							
S-A64	Intermittent	2.5'	2.0"	6.0"	-	-	W-A37, S-A61, S-A63, S-A58

" = Inches

' = Feet

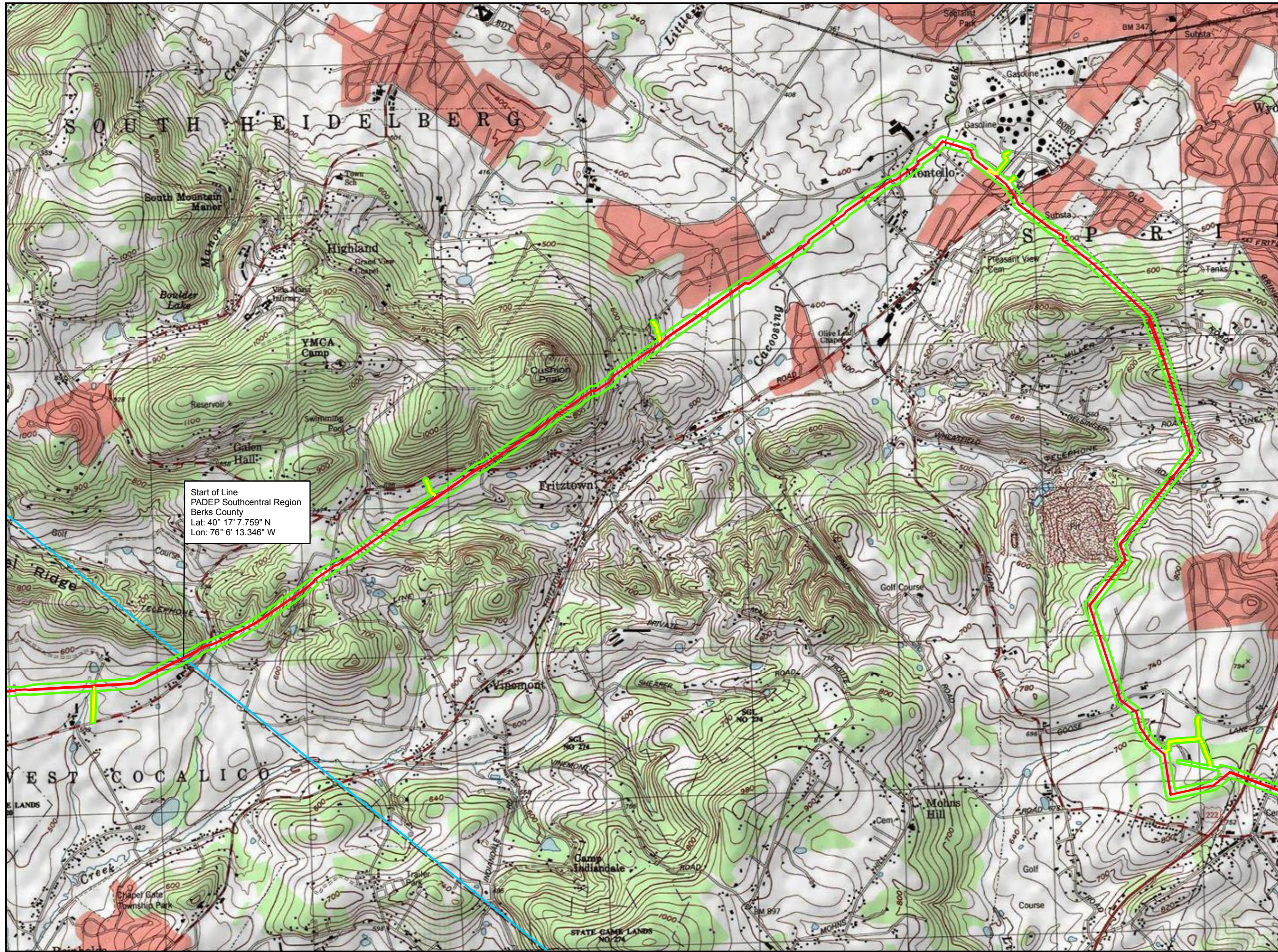
* = See Data Sheet for Channel Depth

Table 2
Streams with Floodway Impacts
Outside the Study Area
Pennsylvania Pipeline Project
Page 1 of 1

Stream ID	Flow Regime	Bank Full Width (ft.)	Water Depth (in.)	Channel Depth (ft.)
S-C4	Ephemeral	3	0.5	1.00
S-C13	Ephemeral	2.0	2.0	1.00
S-H26	Intermittent	3.0	3.0	0.33

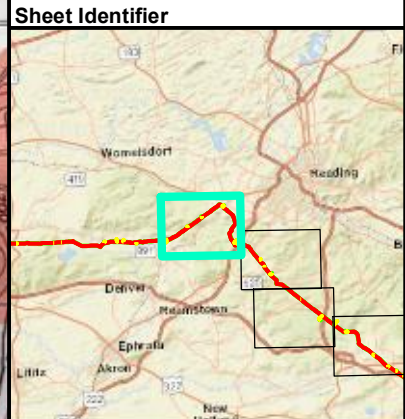
* = Channel depth average

FIGURES



Start of Line
 PADEP Southcentral Region
 Berks County
 Lat: 40° 17' 7.759" N
 Lon: 76° 6' 13.346" W

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

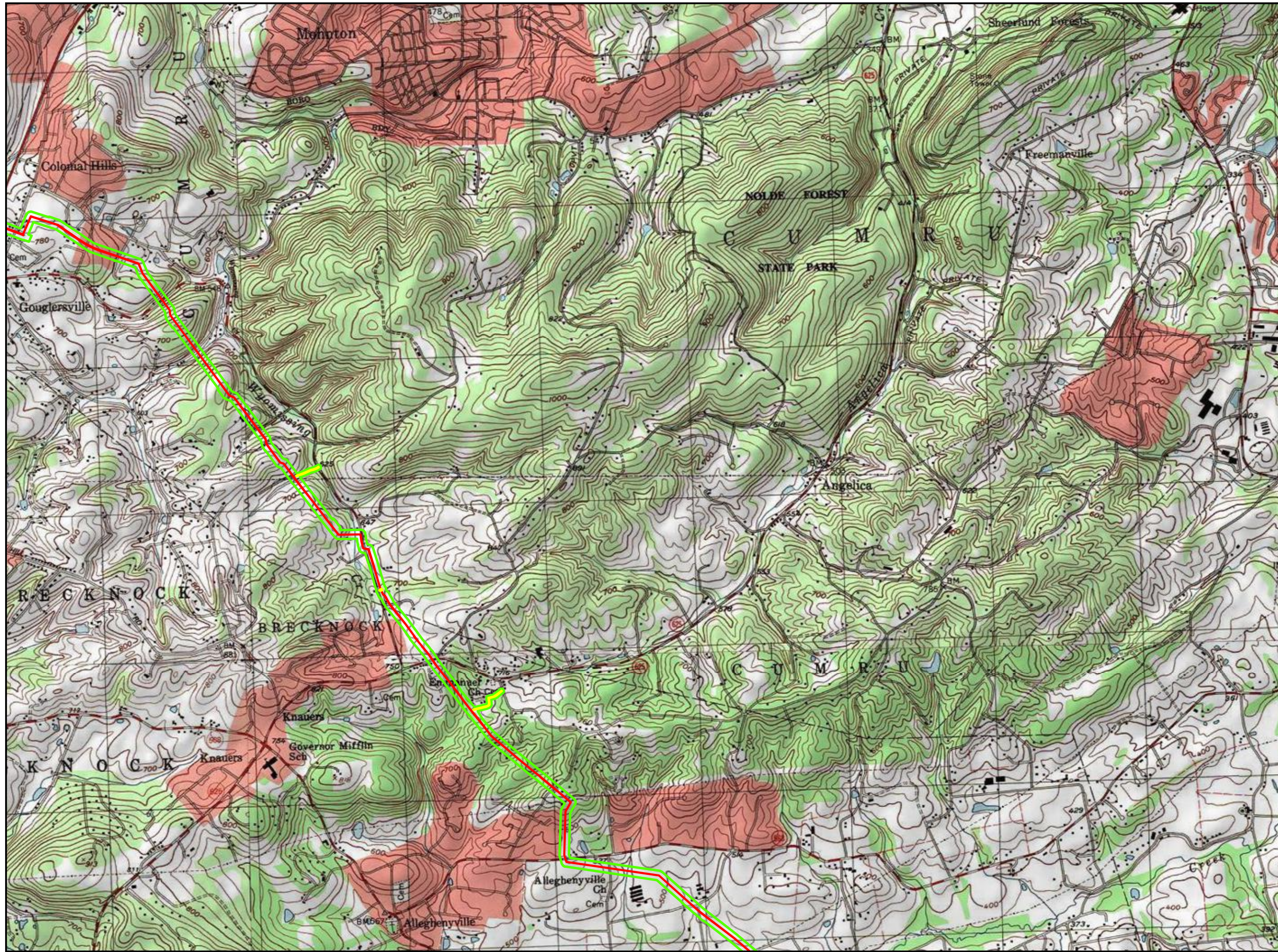


**USGS PROJECT LOCATION MAP
 FIGURE 1-1
 PENNSYLVANIA PIPELINE PROJECT
 FEBRUARY 25, 2016 ALIGNMENT
 SUNOCO LOGISTICS, L.P.
 BERKS COUNTY, PA**



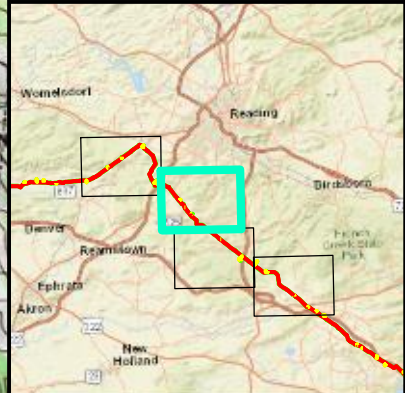
Notes:
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
 2) Quadrangles being displayed are Reading, Sinking Spring

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

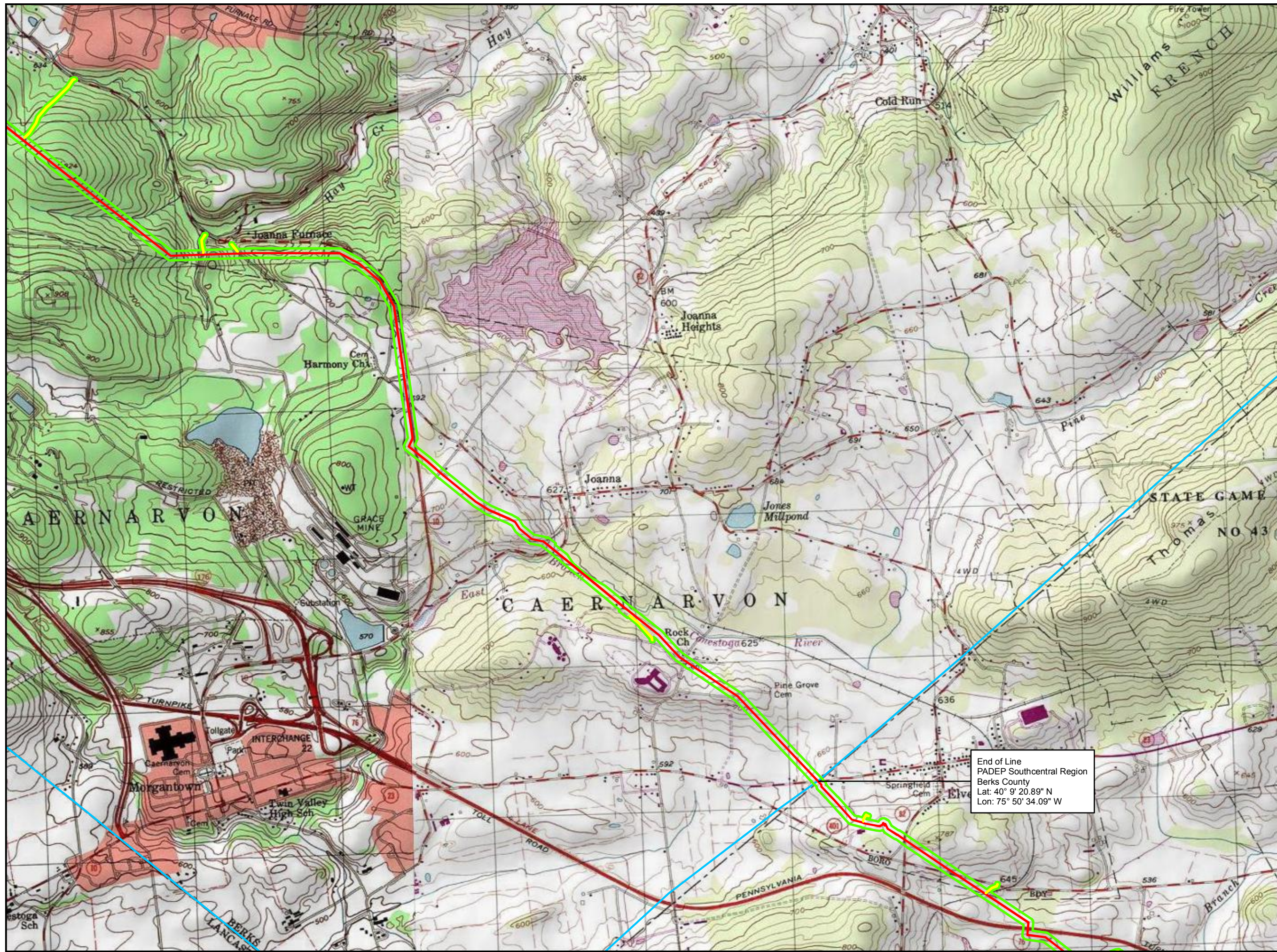
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**USGS PROJECT LOCATION MAP
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PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA**

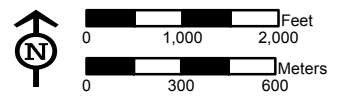
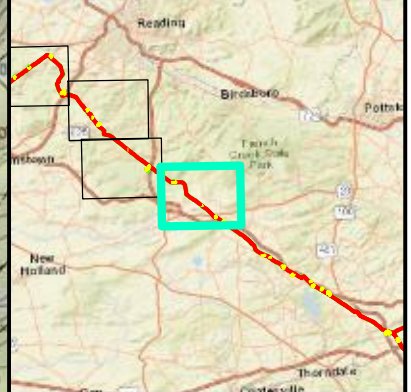


Notes:
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
 2) Quadrangles being displayed are Morgantown, Reading, Sinking Spring, Terre Hill



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

Sheet Identifier



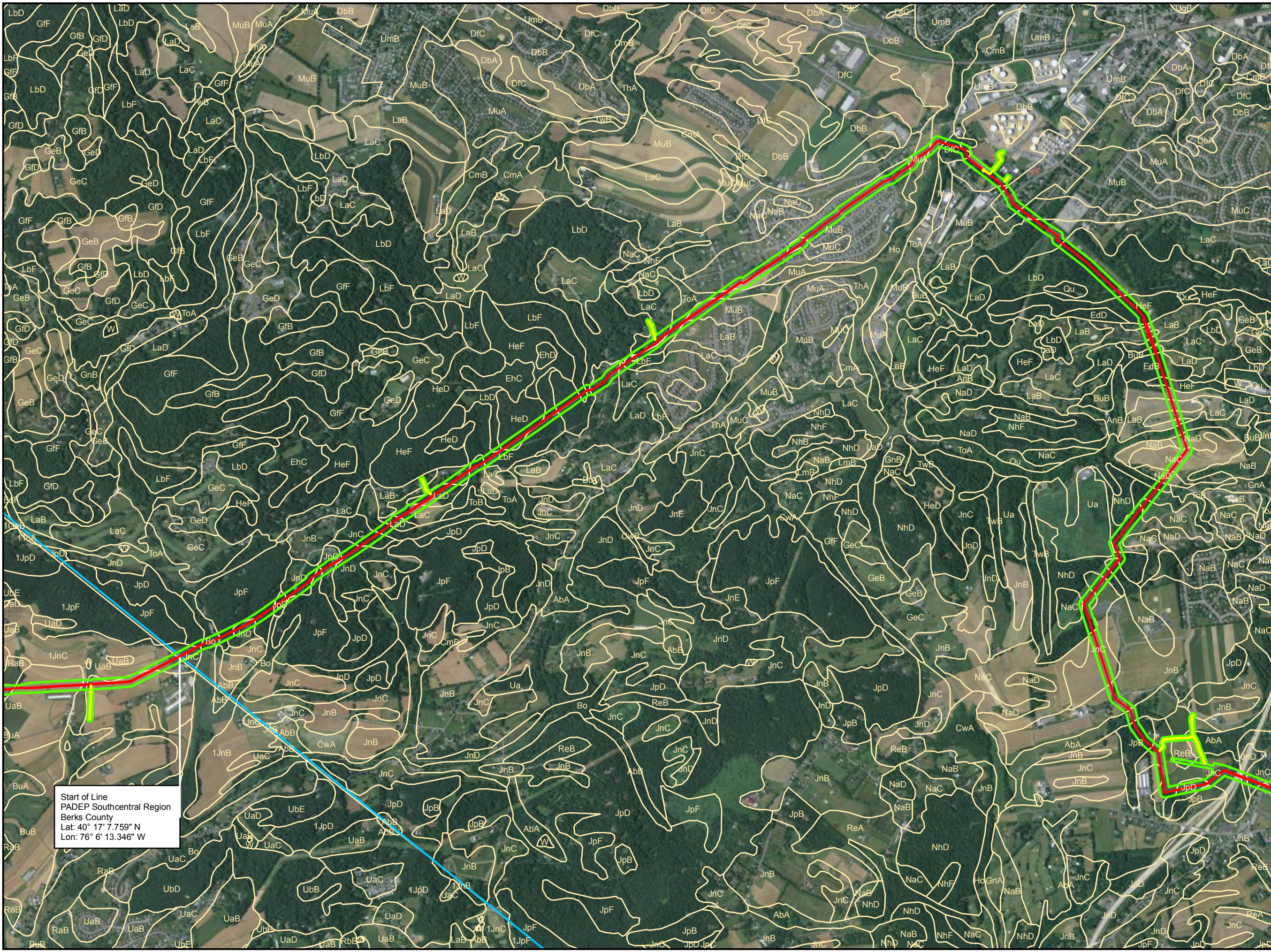
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 Berks County
 Lat: 40° 9' 20.89" N
 Lon: 75° 50' 34.09" W

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



Notes:
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
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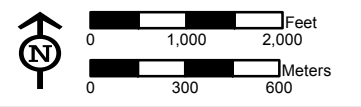
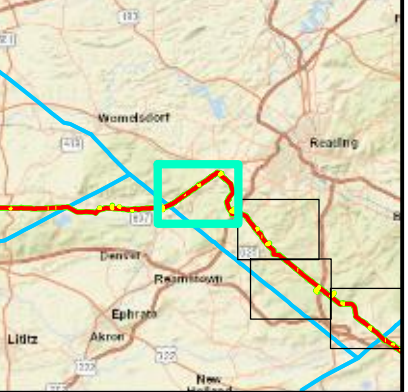
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- Legend**
- Access Road
 - Alignment Centerline
 - Study Area
 - County Boundary
 - NRCS Soils and Codes

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Berks County
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Lon: 76° 6' 13.346" W

Sheet Identifier

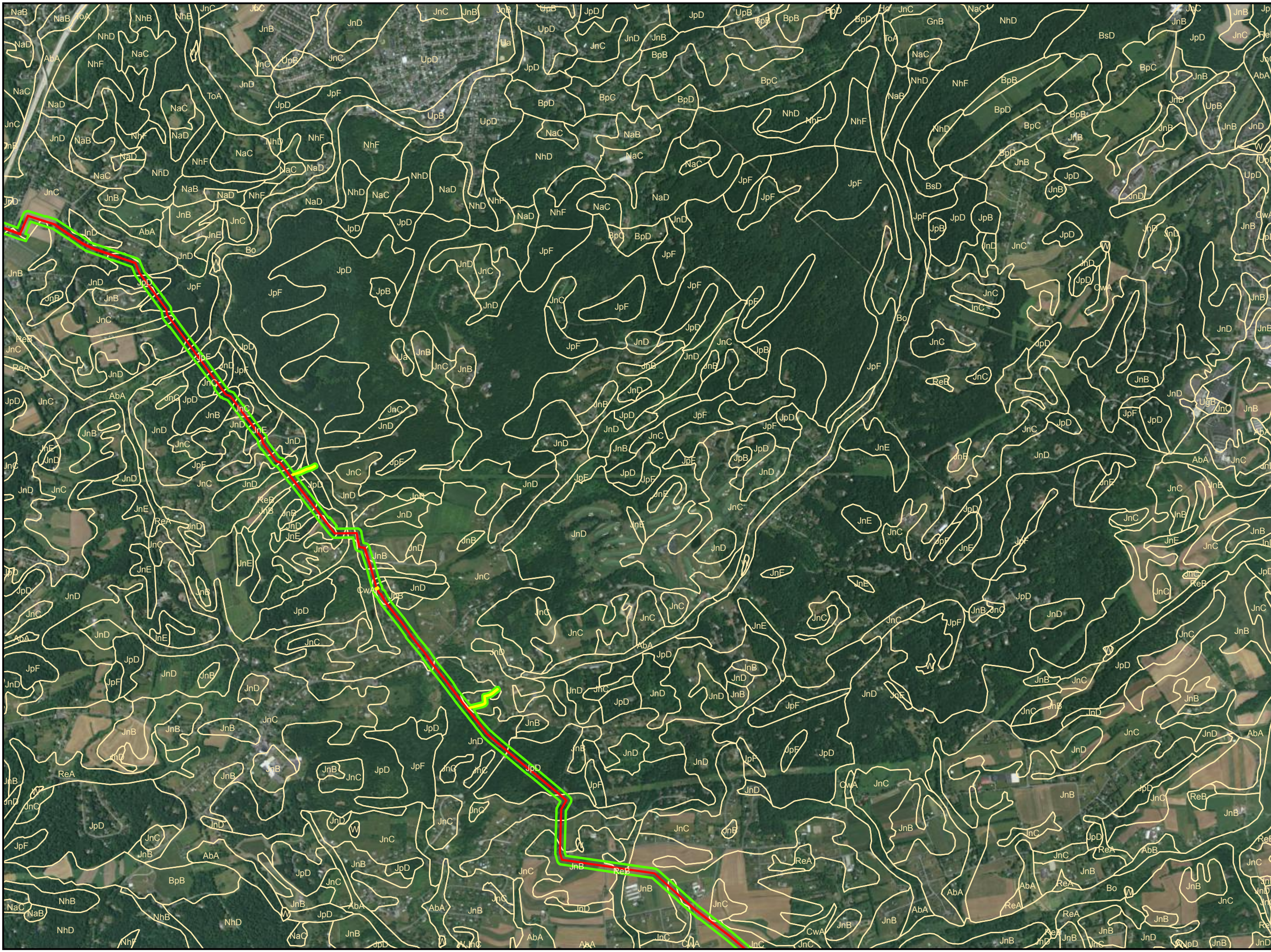


**NRCS SOILS MAP
FIGURE 2-1
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA**



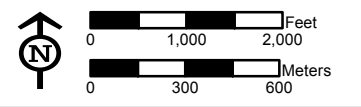
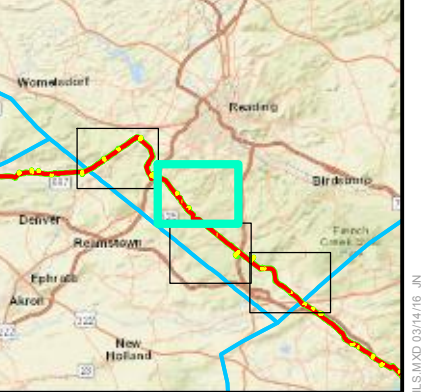
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- Legend**
- Access Road
 - Alignment Centerline
 - Study Area
 - County Boundary
 - NRCS Soils and Codes

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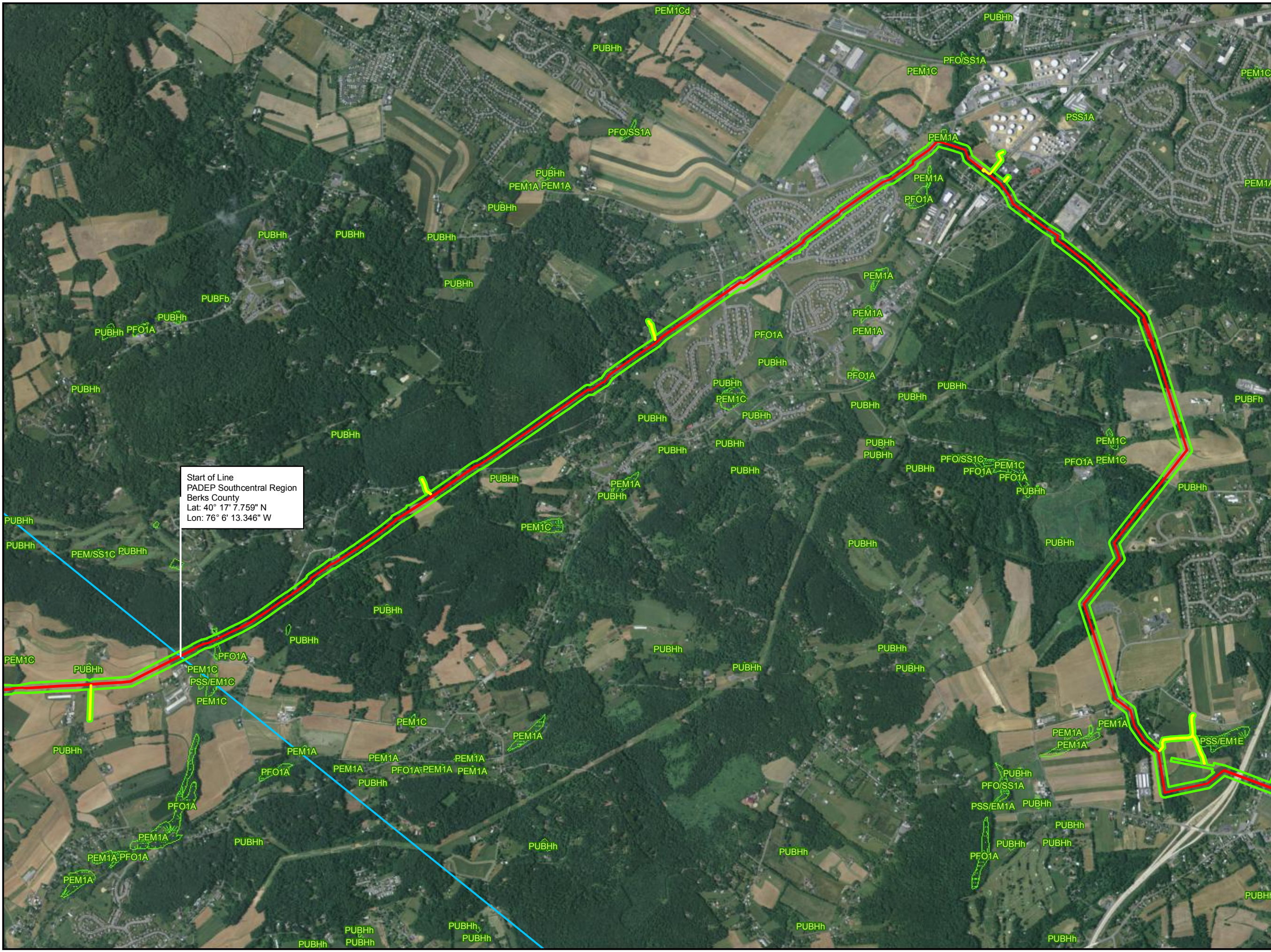


**NRCS SOILS MAP
FIGURE 2-2
PENNSYLVANIA PIPELINE PROJECT
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SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA**



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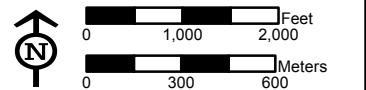
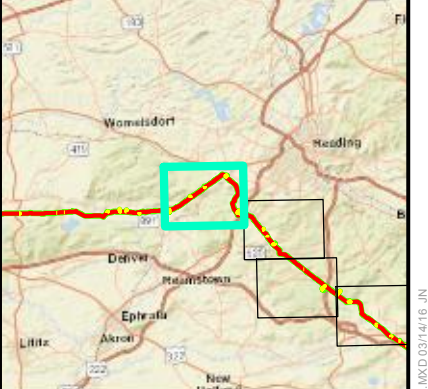
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 PADEP Southcentral Region
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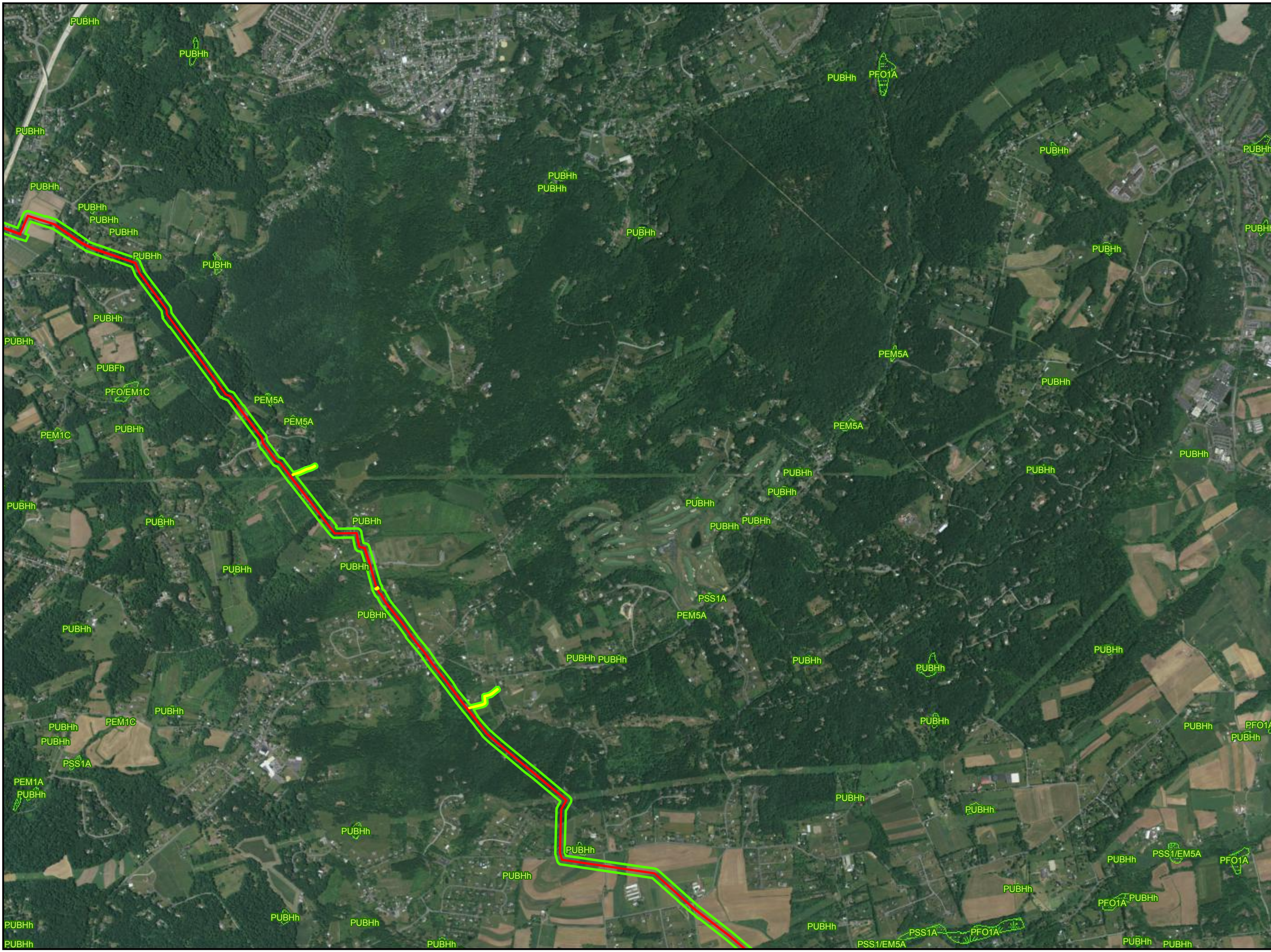


**NWI WETLANDS MAP
 FIGURE 3-1
 PENNSYLVANIA PIPELINE PROJECT
 FEBRUARY 25, 2016 ALIGNMENT
 SUNOCO LOGISTICS, L.P.
 BERKS COUNTY, PA**



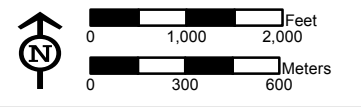
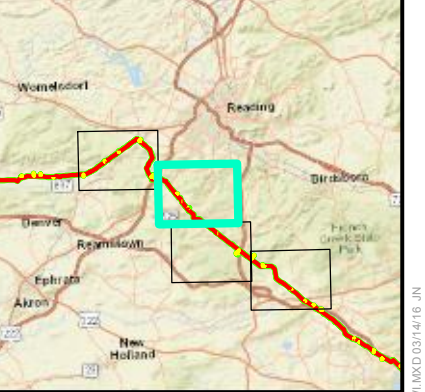
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- Legend**
- Access Road
 - Alignment Centerline
 - Study Area
 - County Boundary
 - NWI Wetlands and Codes

Sheet Identifier

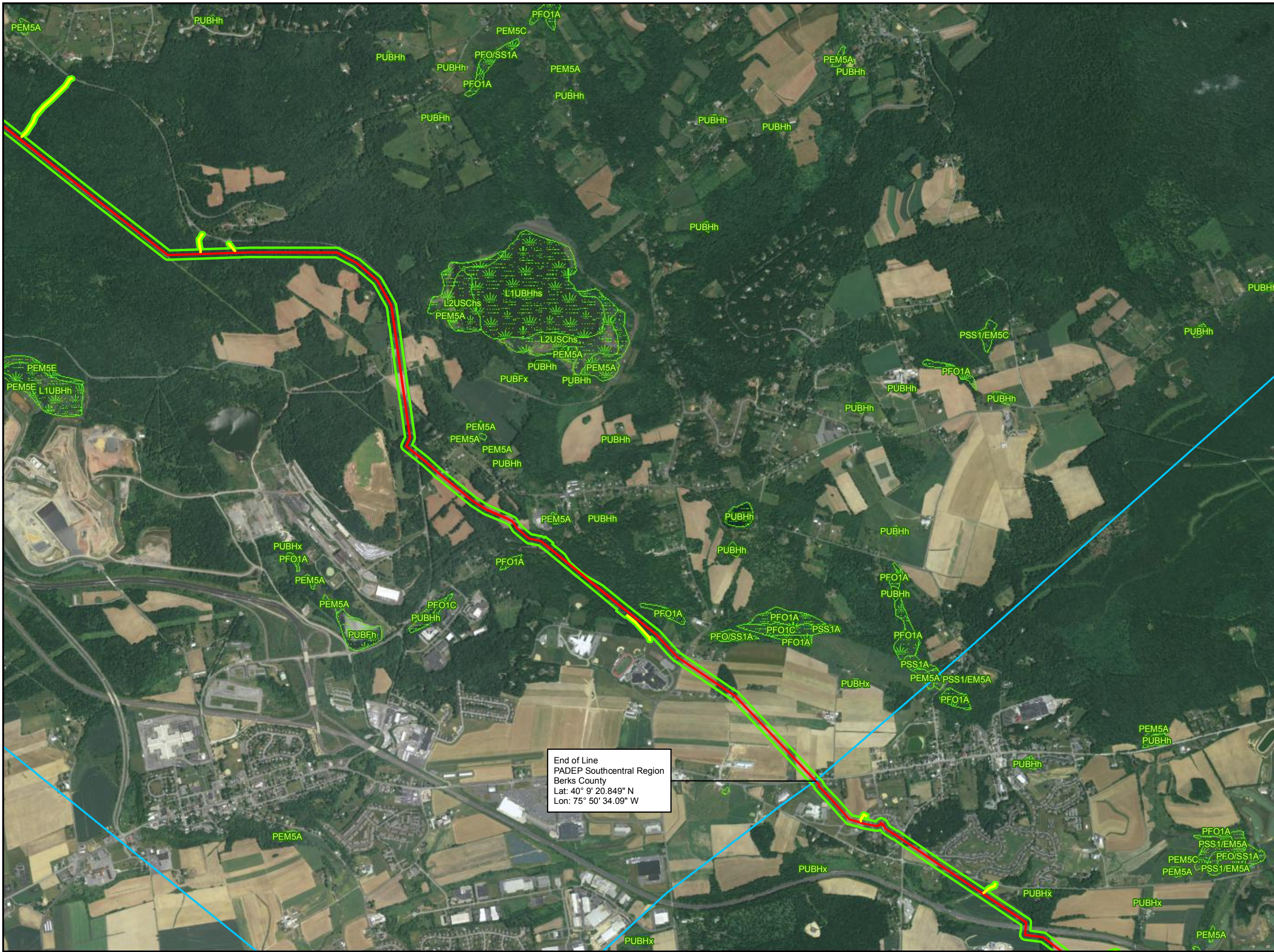


**NWI WETLANDS MAP
FIGURE 3-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA**



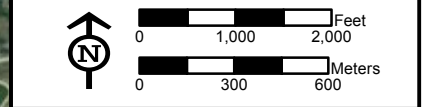
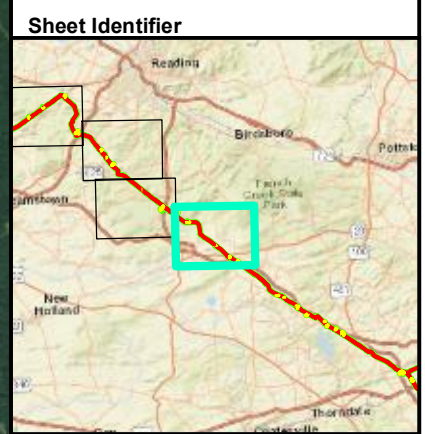
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End of Line
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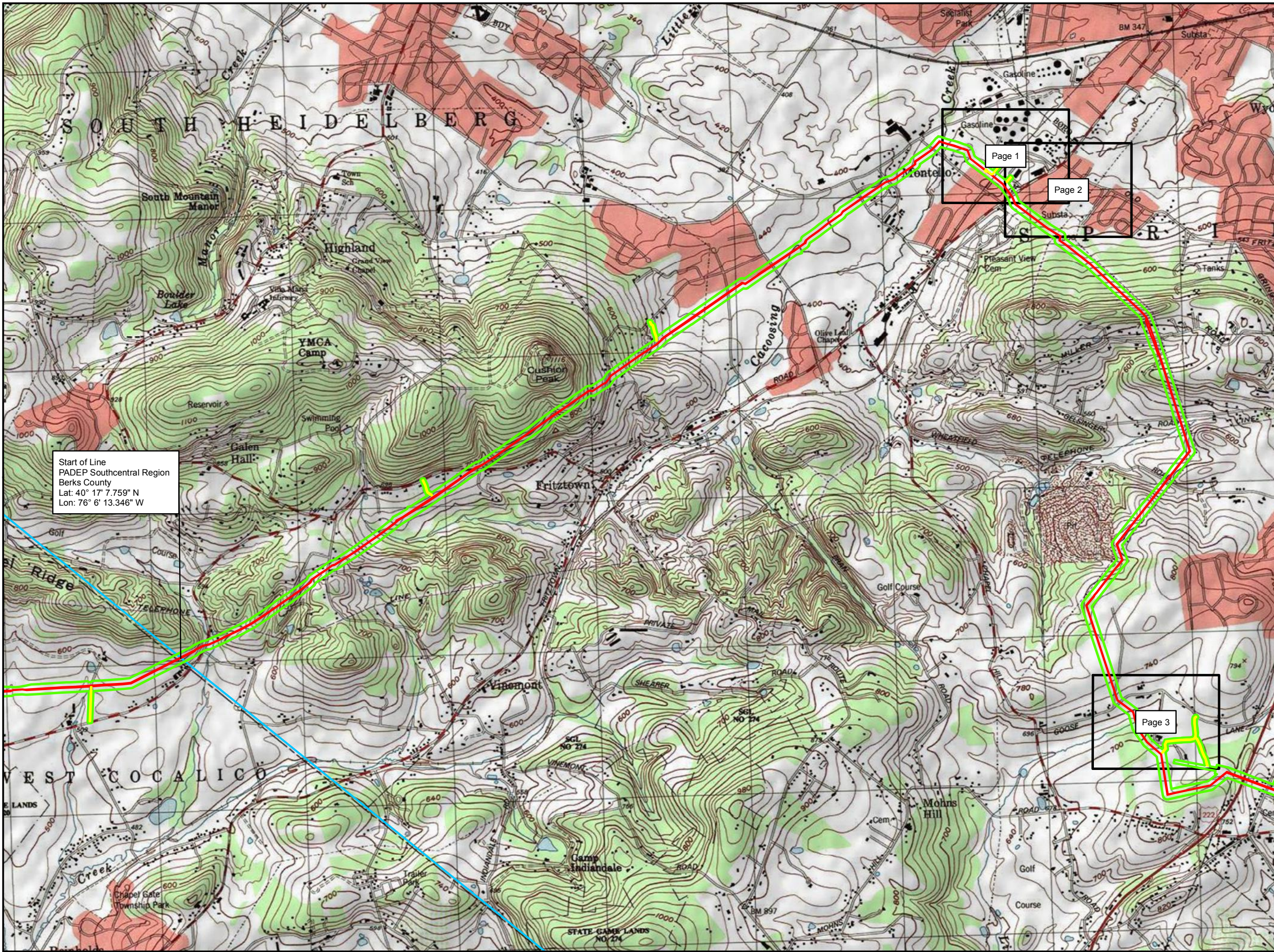


**NWI WETLANDS MAP
 FIGURE 3-3
 PENNSYLVANIA PIPELINE PROJECT
 FEBRUARY 25, 2016 ALIGNMENT
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 BERKS COUNTY, PA**



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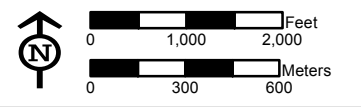
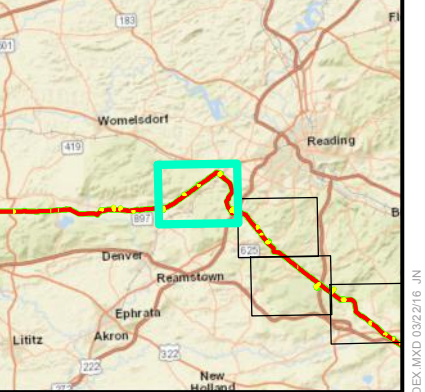
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 - Study Area
 - County Boundary
 - Map Book Index

Page 1

Page 2

Page 3

Sheet Identifier

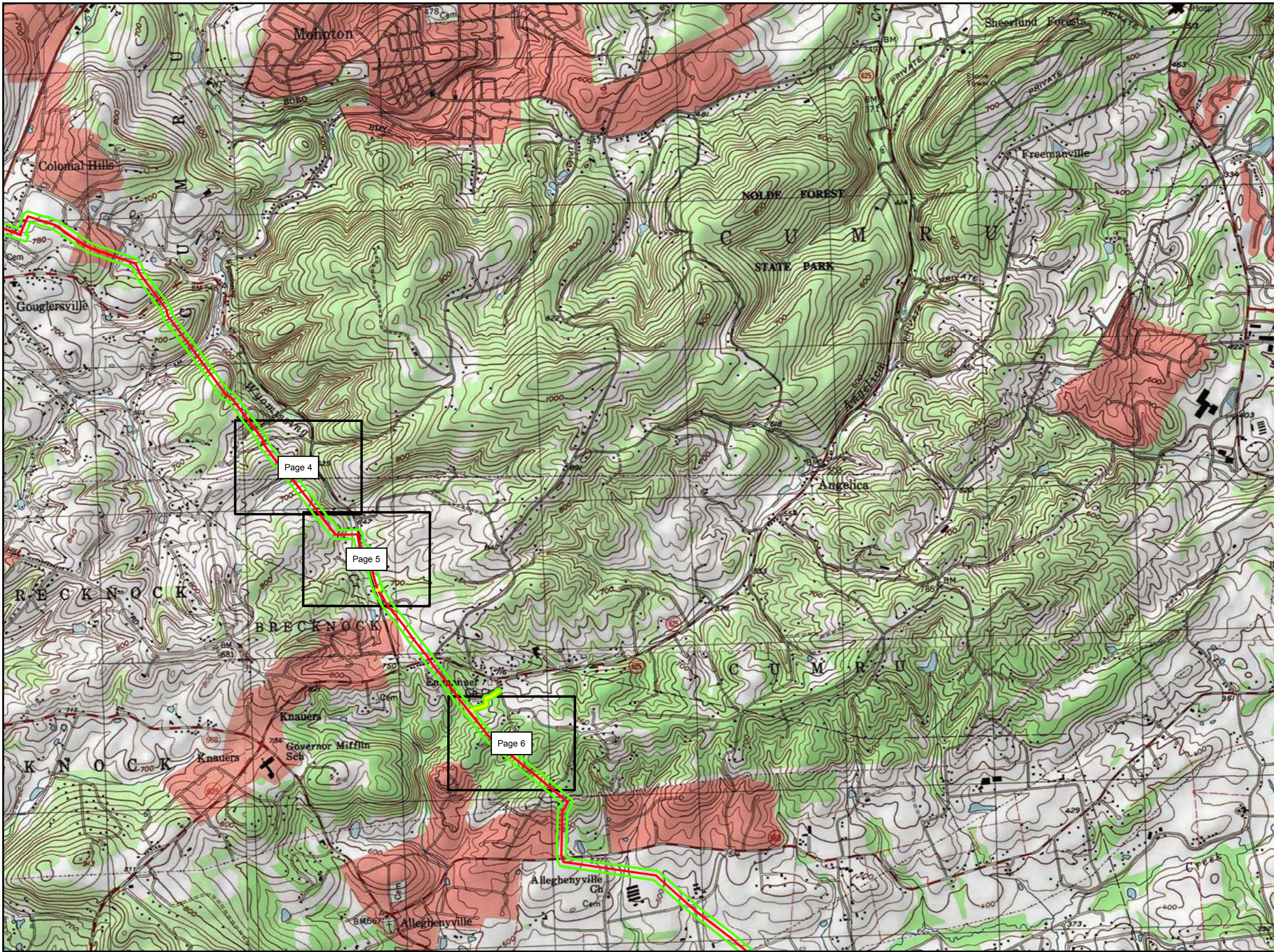


INDEX MAP
FIGURE 4-INDEX-1
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA



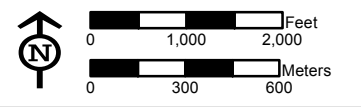
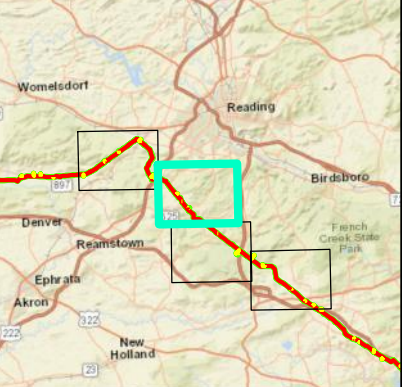
Notes:
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
 2) Quadrangles being displayed are Reading, Sinking Spring

PGH_P\GIS\SUNOCOMARINER_EAST_2\MOX\PPP_WETLANDS_SG-2\PENNSYLVANIA_PIPELINE_BERKSCO_INDEX_MXD 03/22/16_JN



- Legend**
- Access Road
 - Alignment Centerline
 - Study Area
 - County Boundary
 - Map Book Index

Sheet Identifier

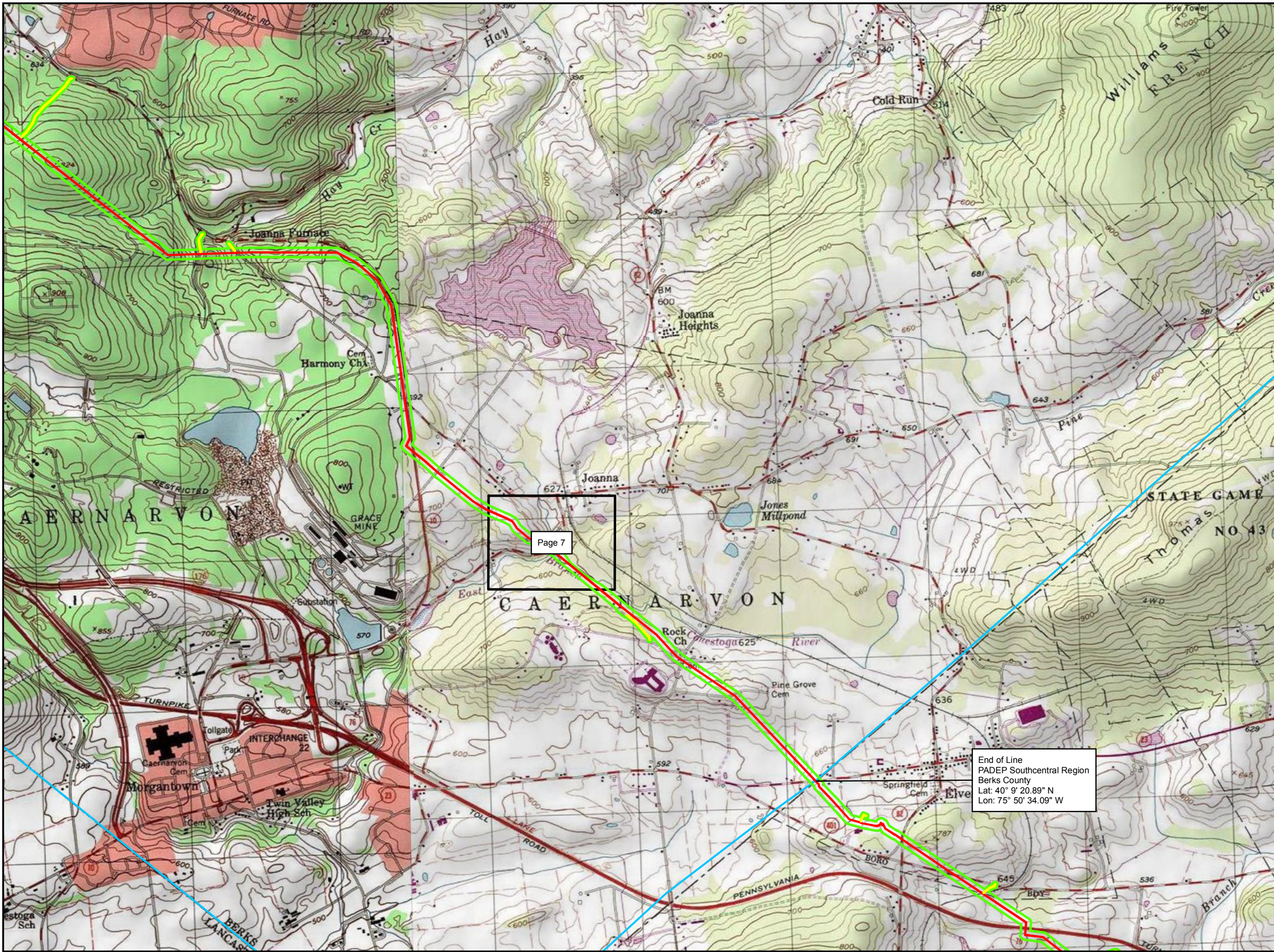


INDEX MAP
FIGURE 4-INDEX-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA



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

PGH_P\GIS\SUNOCOMARINER_EAST_2\MO\PPP_WETLANDS_SC-2\PENNPipeline_BERKSCO_INDEX.MXD 03/22/16 JN

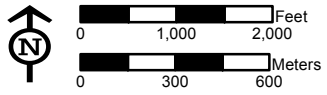
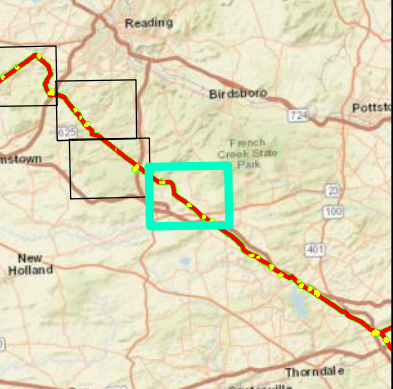


- Legend**
- Access Road
 - Alignment Centerline
 - Study Area
 - County Boundary
 - Map Book Index

Page 7

End of Line
PADEP Southcentral Region
Berks County
Lat: 40° 9' 20.89" N
Lon: 75° 50' 34.09" W

Sheet Identifier

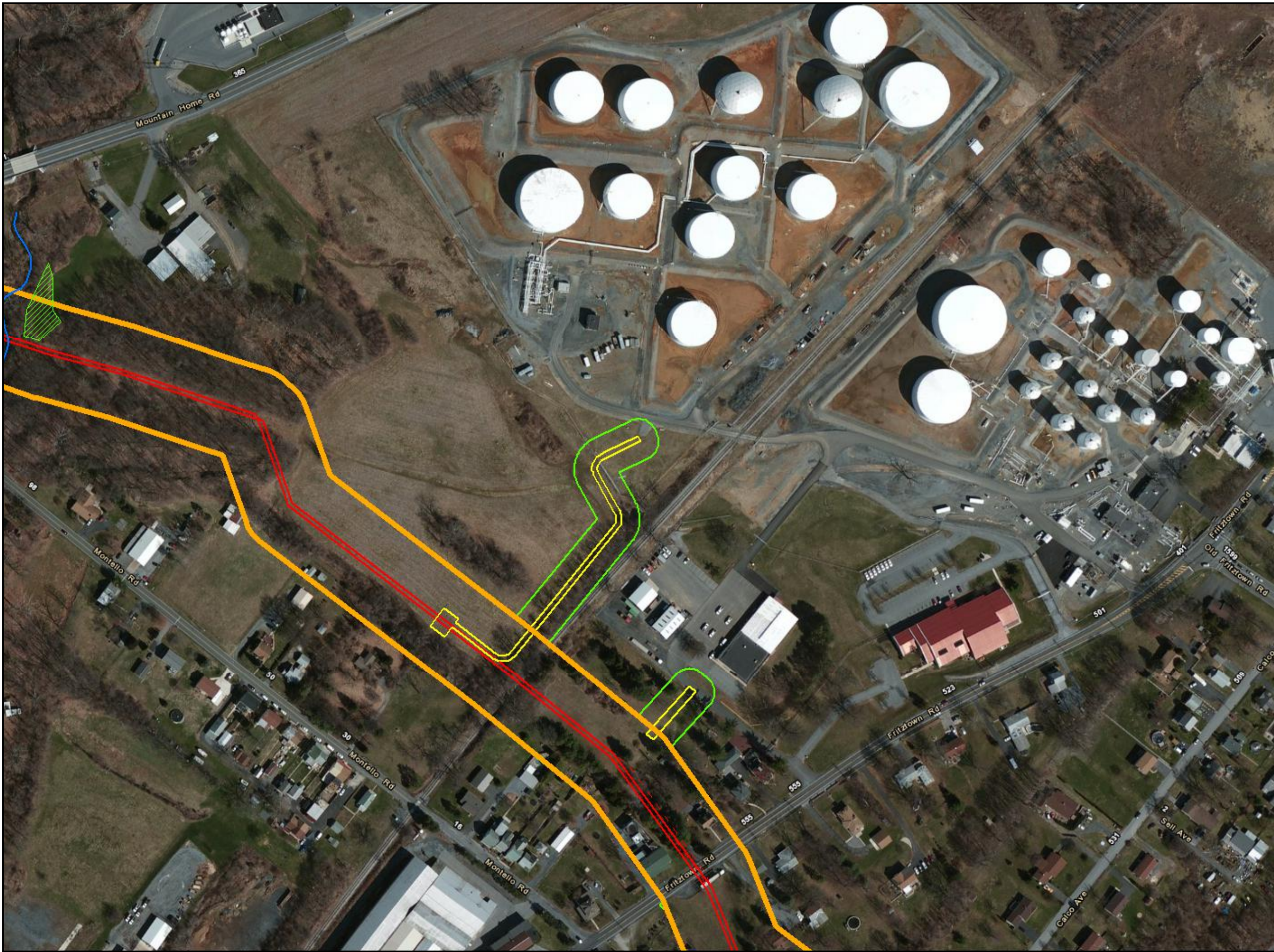


INDEX MAP
FIGURE 4-INDEX-3
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA



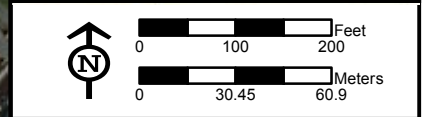
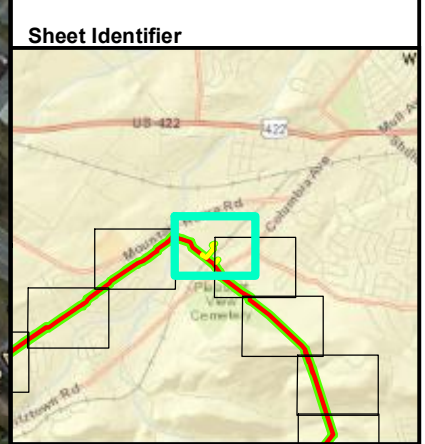
- Notes:**
- 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
 - 2) Quadrangles being displayed are Downingtown, Elverson, Pottstown, Washington

PGH_P\GIS\SUNOCO\MARINER_EAST_2\MO\PPP\WETLANDS_S2-PENNSYLVANIA_PIPELINE_BERKSCO_INDEX.MXD 03/22/16 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 (8/2/15)
- Alignment Centerline (8/2/15)
- Study Area (8/2/15)



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

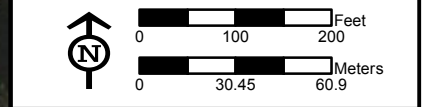
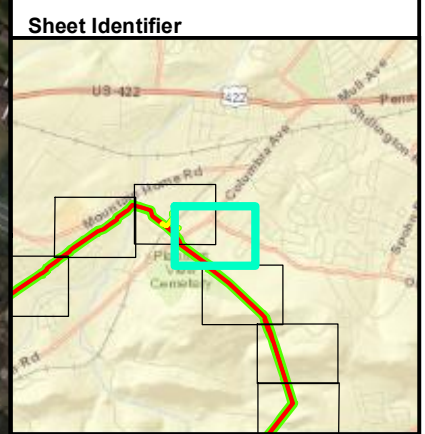


Notes:
 1) Aerial photograph provided by ESRI's ArcGIS Online WorldImagery map service (© 2011 ESRI and its data suppliers).
 2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH_P:\GIS\SUNOCO\MARINER_EAST_2\MXD\PPP_WETLANDS_SC-2\PENNSYLVANIA_PIPELINE_BERKS_CO_ADDENDUMDETAIL.MXD 03/22/16 JN



- Legend**
- Culvert
 - Sample Location
 - Photo Location
 - Drainage Feature
 - Stream
 - Wetland
 - ▨ PEM
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 - ▨ PSS
 - ▨ PuB
 - New Wetland
 - ▨ PEM
 - ▨ PFO
 - ▨ PSS
 - ▨ PuB
 - Access Road
 - Alignment Centerline
 - Study Area
 - Access Road (8/2/15)
 - Alignment Centerline (8/2/15)
 - Study Area (8/2/15)

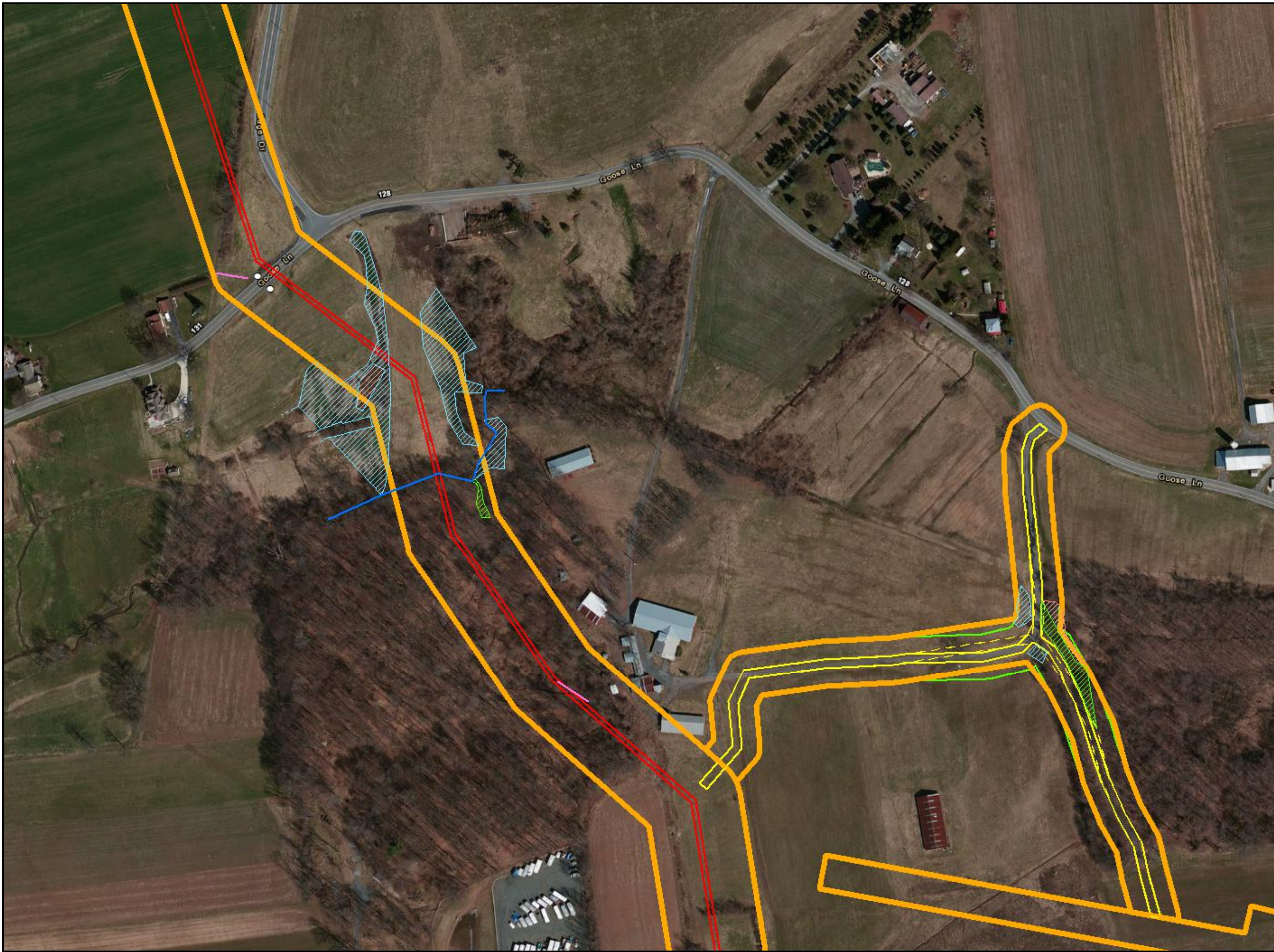


ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-2
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA

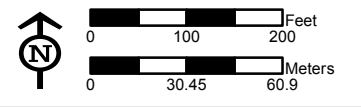
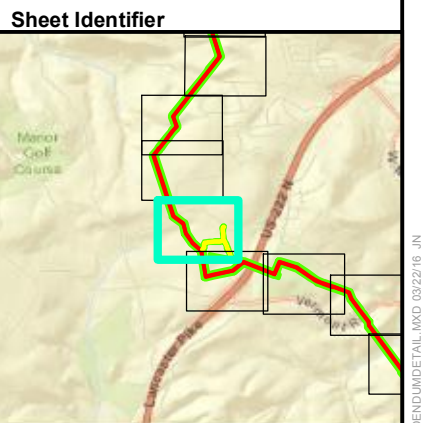


Notes:
 1) Aerial photograph provided by ESRI's ArcGIS Online WorldImagery map service (© 2011 ESRI and its data suppliers).
 2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP_WETLANDS\SC-2\PENNSYLVANIA PIPELINE_BERKS_CO_ADDENDUM\DETAIL.MXD 03/22/16 JIN



- Legend**
- Culvert
 - Sample Location
 - Photo Location
 - Drainage Feature
 - Stream
 - Wetland**
 - ▨ PEM
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 - ▨ PSS
 - ▨ PuB
 - New Wetland**
 - PEM
 - PFO
 - PSS
 - PuB
 - Access Road
 - Alignment Centerline
 - Study Area
 - - Access Road (8/2/15)
 - - Alignment Centerline (8/2/15)
 - Study Area (8/2/15)

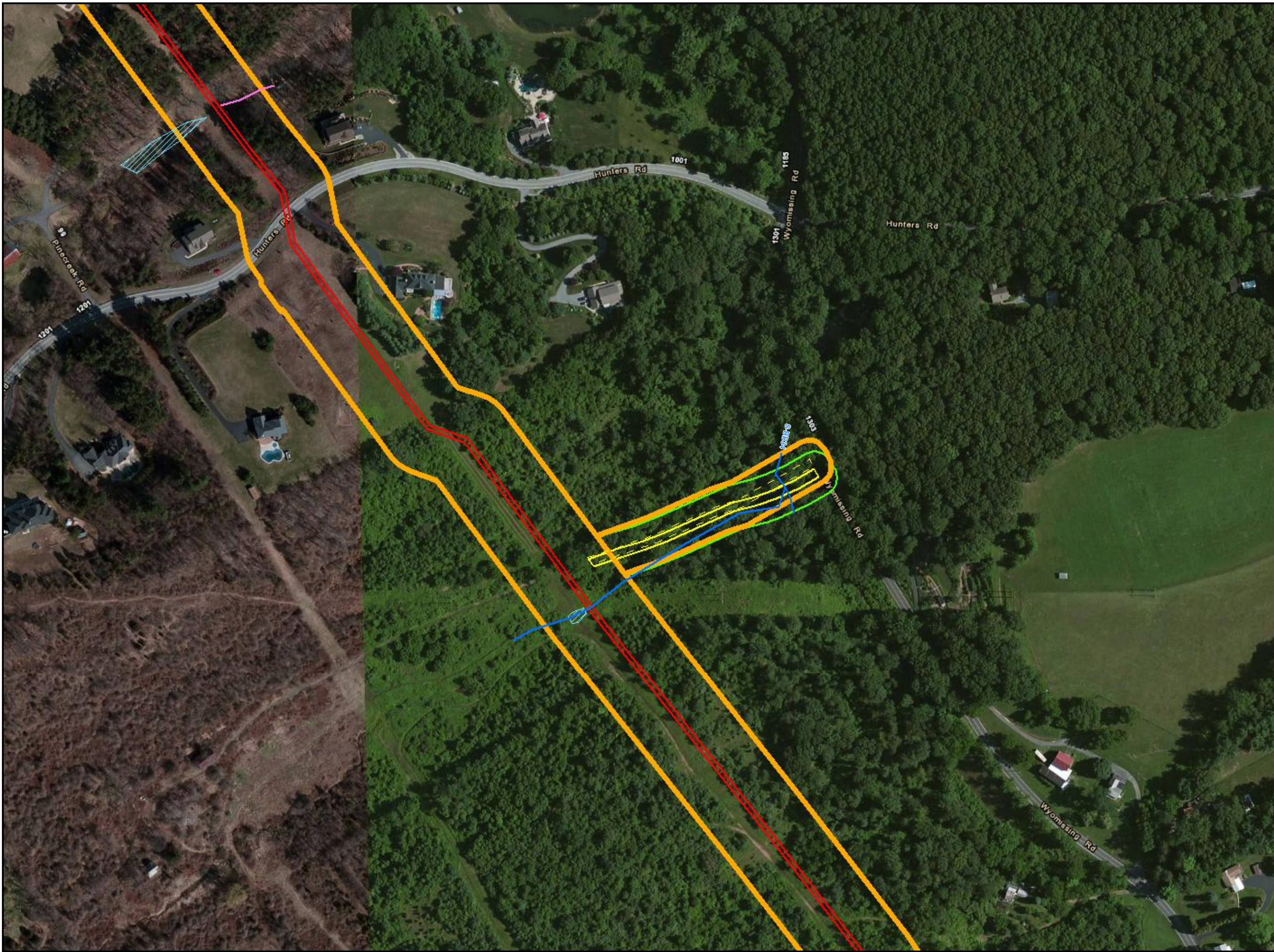


ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-3
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA

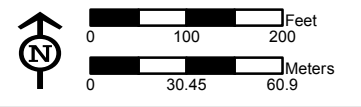
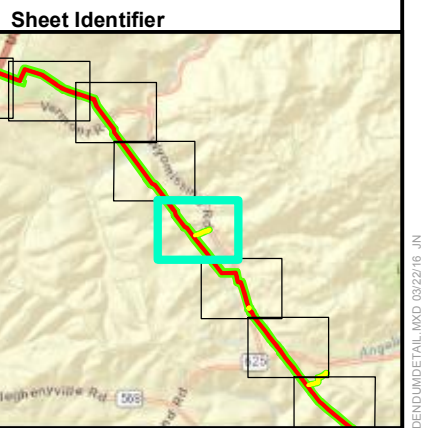


Notes:
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 2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH-P:\GIS\SUNOCO\MARINER_EAST_2\MDX\PPP_WETLANDS\SC-2\PENNSYLVANIA_PIPELINE_BERKS_CO_ADDENDUMDETAIL.MXD 03/22/16 JIN



- 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 (8/2/15)
 - Alignment Centerline (8/2/15)
 - Study Area (8/2/15)

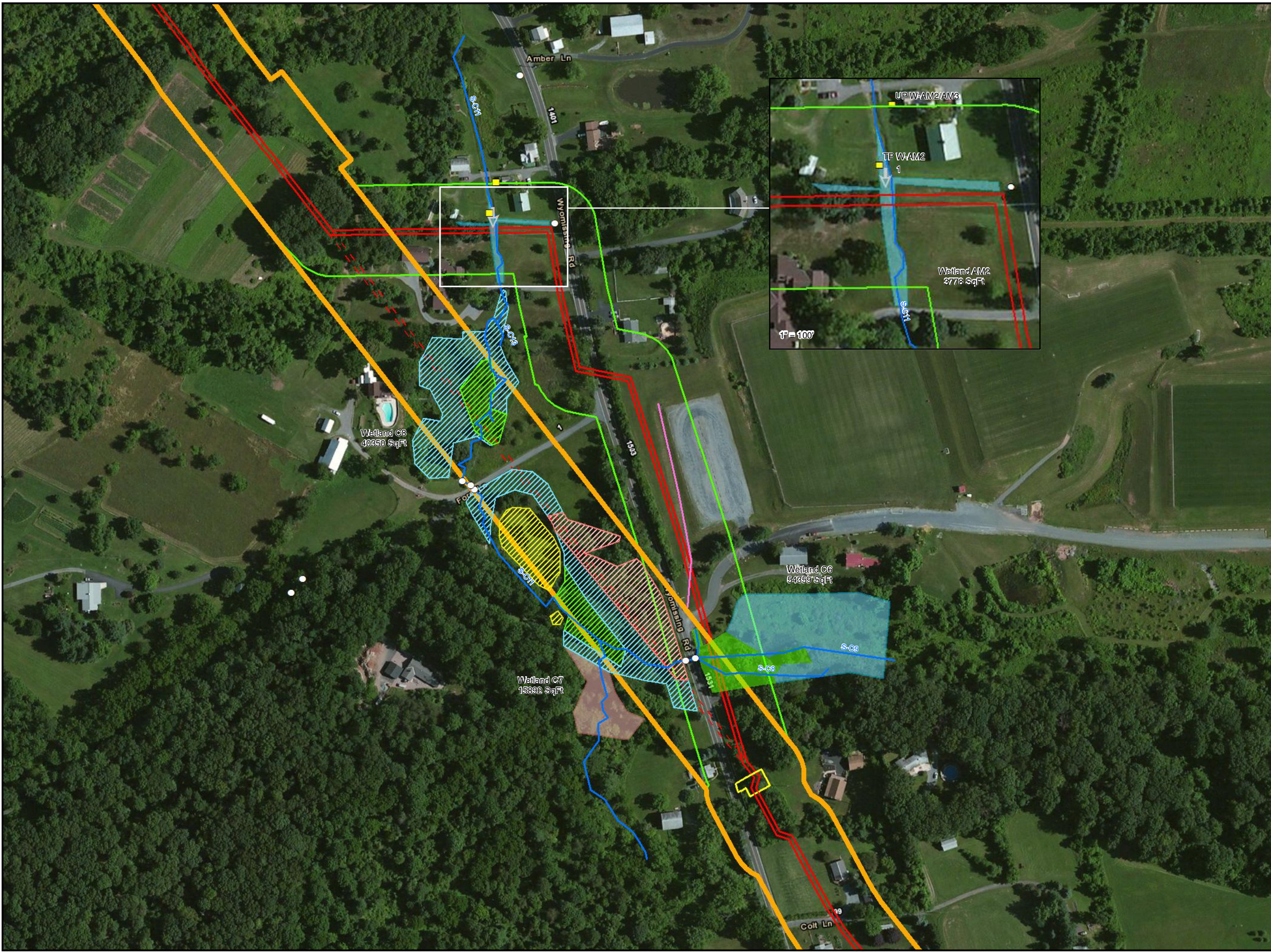


ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-4
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA

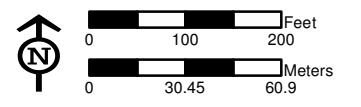
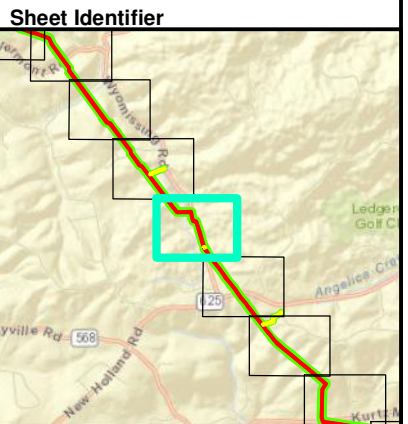


Notes:
 1) Aerial photograph provided by ESRI's ArcGIS Online WorldImagery map service (© 2011 ESRI and its data suppliers).
 2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.

PGH_P:\GIS\SUNOCO\MARINER_EAST_2\MDX\PPP_WETLANDS_SC-2\PENNSYLVANIA_PIPELINE_BERKS_CO_ADDENDUM\DETAIL.MXD 03/22/16 JIN



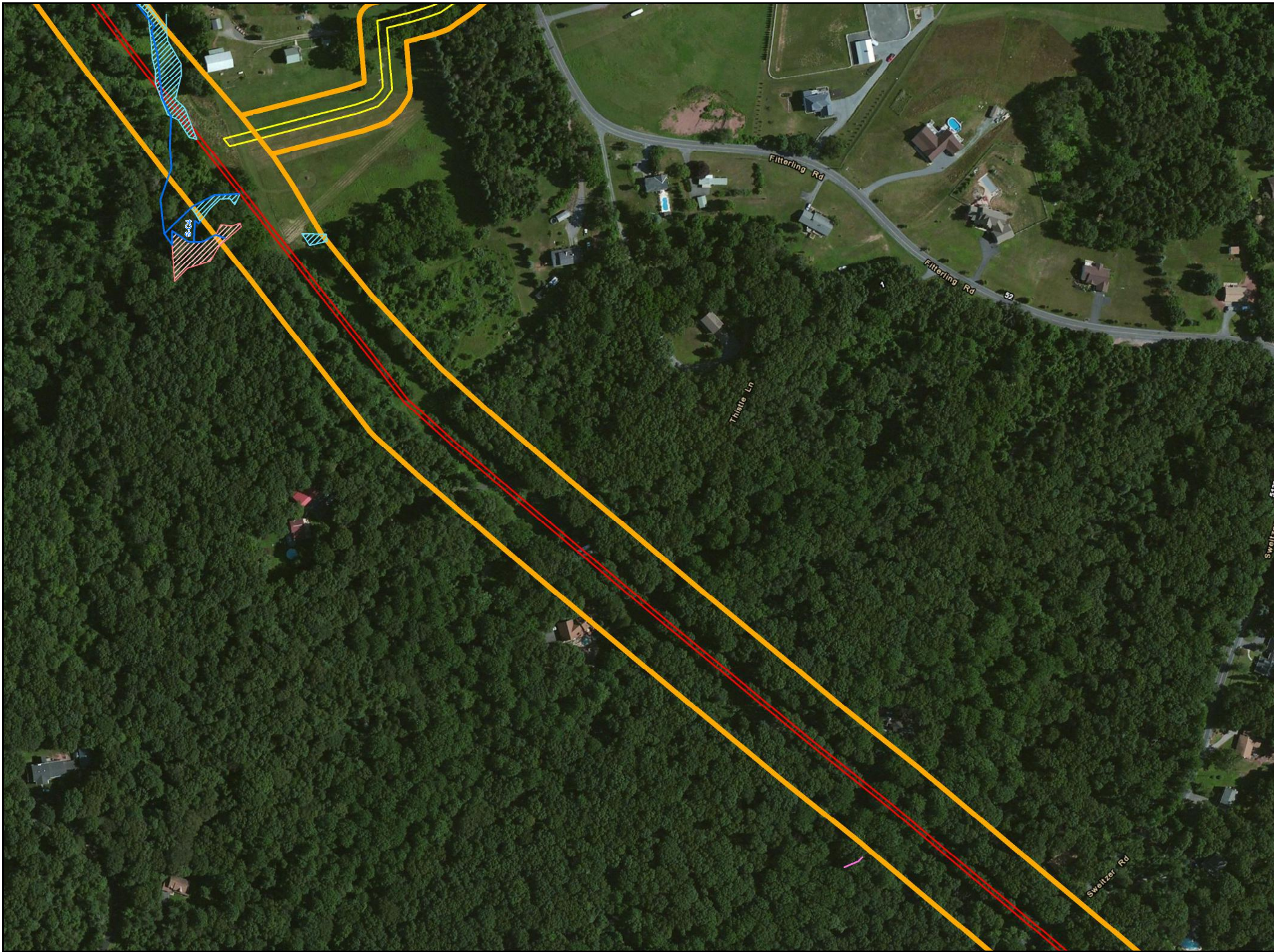
- Legend**
- Culvert
 - Sample Location
 - Photo Location
 - Drainage Feature
 - Stream
 - Wetland**
 - ▨ PEM
 - ▨ PFO
 - ▨ PSS
 - ▨ PuB
 - New Wetland**
 - ▨ PEM
 - ▨ PFO
 - ▨ PSS
 - ▨ PuB
 - Access Road
 - Alignment Centerline
 - Study Area
 - Access Road (8/2/15)
 - Alignment Centerline (8/2/15)
 - Study Area (8/2/15)



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

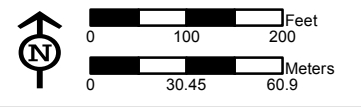
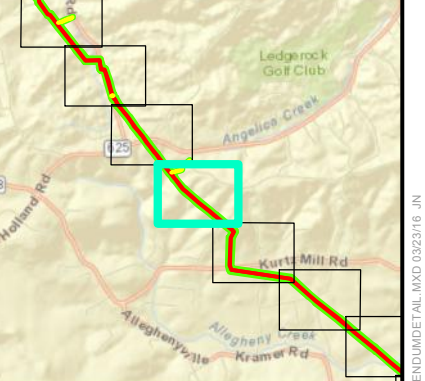


Notes:
 1) Aerial photograph provided by ESRI's ArcGIS Online WorldImagery map service (© 2011 ESRI and its data suppliers).
 2) Map insets are at a scale of 1 inch = 50 feet unless otherwise noted.



- 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 (8/2/15)
 - Alignment Centerline (8/2/15)
 - Study Area (8/2/15)

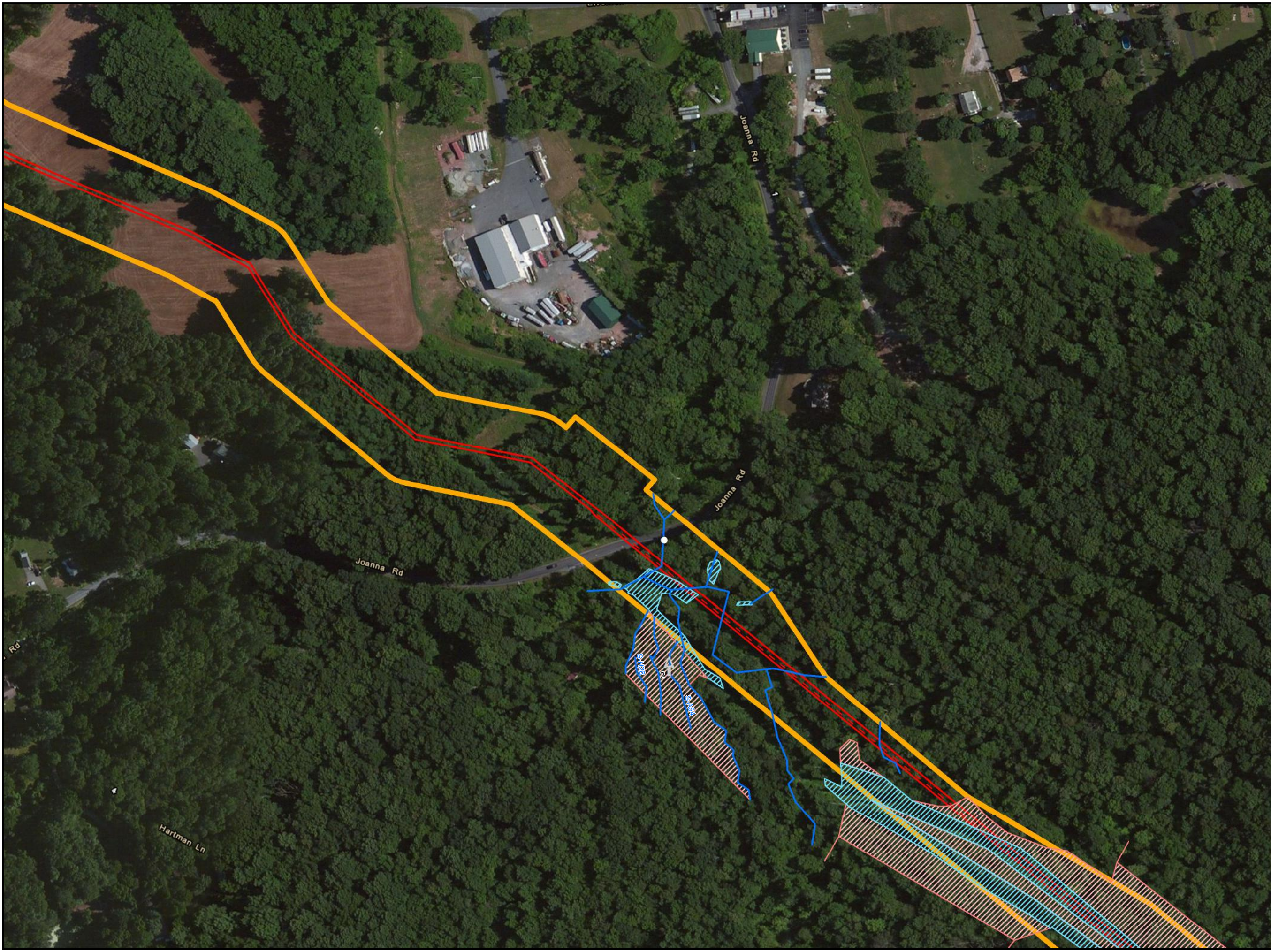
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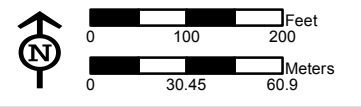
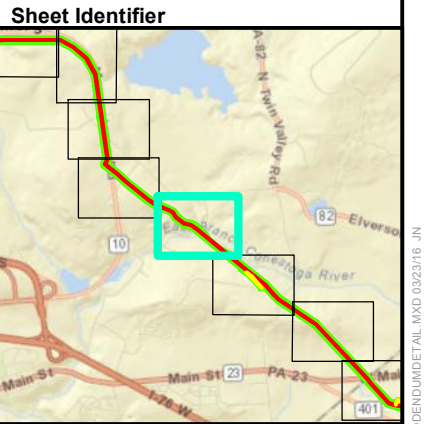
ADDENDUM WETLANDS DETAIL MAP
FIGURE 4-6
PENNSYLVANIA PIPELINE PROJECT
FEBRUARY 25, 2016 ALIGNMENT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PA



Notes:
 1) Aerial photograph provided by ESRI's ArcGIS Online WorldImagery map service (© 2011 ESRI and its data suppliers).
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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 (8/2/15)
 - Alignment Centerline (8/2/15)
 - Study Area (8/2/15)



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



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

APPENDIX A
WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Berks County Sampling Date: 02/24/2016
 Applicant/Owner: Sunoco State: _____ Sampling Point: W-C6 PEM
 Investigator(s): J. McGuirk, A. Mengel Section, Township, Range: NAD 83
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 3-5
 Subregion (LRR or MLRA): LRRN Lat: 40.255112 Long: -75.989247 Datum: NAD 83
 Soil Map Unit Name: Croton silt loam, occasionally ponded, 0-3 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 <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: Cowardin Code: <u>PEM</u> HGM: <u>Riverine</u> WT: <u>RPWWD</u>	

HYDROLOGY

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

Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
--	--

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

Remarks:
Heavy rains today

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-C6 PEM

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:
1. <u>Catalpa speciosa</u>	<u>10</u>	<input checked="" type="checkbox"/>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A)
2. <u>Acer rubrum</u>	<u>5</u>	<input checked="" type="checkbox"/>	<u>FAC</u>	Total Number of Dominant Species Across All Strata: <u>7</u> (B)
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>86%</u> (A/B)
4. _____				
5. _____				
6. _____				
7. _____				
$\frac{15}{100} = \text{Total Cover}$ 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>				Prevalence Index worksheet:
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				Total % Cover of: _____ Multiply by:
1. <u>Rosa multiflora</u>	<u>10</u>	<input checked="" type="checkbox"/>	<u>FACU</u>	OBL species _____ x 1 = _____
2. <u>Salix nigra</u>	<u>10</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	FACW species _____ x 2 = _____
3. _____				FAC species _____ x 3 = _____
4. _____				FACU species _____ x 4 = _____
5. _____				UPL species _____ x 5 = _____
6. _____				Column Totals: _____ (A) _____ (B)
7. _____				Prevalence Index = B/A = _____
8. _____				
9. _____				
$\frac{20}{100} = \text{Total Cover}$ 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				Hydrophytic Vegetation Indicators:
Herb Stratum (Plot size: <u>5'</u>)				<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
1. <u>Carex stricta</u>	<u>30</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
2. <u>Typha angustifolia</u>	<u>25</u>	<input checked="" type="checkbox"/>	<u>OBL</u>	<input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$
3. <u>Microstegium vimineum</u>	<u>15</u>	<input checked="" type="checkbox"/>	<u>FAC</u>	<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
4. <u>Onoclea sensibilis</u>	<u>10</u>		<u>FACW</u>	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
5. <u>Epilobium coloratum</u>	<u>10</u>		<u>FACW</u>	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
6. <u>Solidago species</u>	<u>10</u>		<u>ND</u>	
7. <u>Symplocarpus foetidus</u>	<u>5</u>		<u>OBL</u>	Definitions of Four Vegetation Strata:
8. <u>Scirpus cyperinus</u>	<u>5</u>		<u>OBL</u>	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
9. <u>Phalaris arundinacea</u>	<u>5</u>		<u>FACW</u>	Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
10. _____				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
11. _____				Woody vine – All woody vines greater than 3.28 ft in height.
$\frac{115}{100} = \text{Total Cover}$ 50% of total cover: <u>57.5</u> 20% of total cover: <u>23</u>				
Woody Vine Stratum (Plot size: <u>15'</u>)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
$\frac{0}{100} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: W-C6 PEM

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	2.5Y 2/1	100					MK	
4-12	10YR 4/2	100					SIL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: 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 Soils³:

- 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)

³Indicators 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: Berks Sampling Date: 01/09/2014
 Applicant/Owner: Sunoco State: PA Sampling Point: W-C6 UPL
 Investigator(s): J. McGuirk, A. Grech, D. Quinn Section, Township, Range: Cumru
 Landform (hillslope, terrace, etc.): side slope Local relief (concave, convex, none): linear Slope (%): 3-5%
 Subregion (LRR or MLRA): LRRS Lat: 40.254867 Long: -75.989436 Datum: NAD 83
 Soil Map Unit Name: Joanna 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 <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: UPLAND	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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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-C6 UPL

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u>		20% of total cover: <u>0</u>		
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u>		20% of total cover: <u>0</u>		
Herb Stratum (Plot size: <u>5'</u>)				
1. <u>Poa sp.</u>	<u>85</u>	<input checked="" type="checkbox"/>	<u>ND</u>	
2. <u>Trifolium repens</u>	<u>10</u>	_____	<u>FACU</u>	
3. <u>Taraxacum officianale</u>	<u>5</u>	_____	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>50</u>		20% of total cover: <u>20</u>		
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>0</u>		20% of total cover: <u>0</u>		
Dominance Test worksheet:				
Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u>				(A)
Total Number of Dominant Species Across All Strata: <u>0*</u>				(B)
Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u>				(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:				
<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation				
<input type="checkbox"/> 2 - Dominance Test is >50%				
<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹				
<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)				
<input type="checkbox"/> 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 <input checked="" type="checkbox"/>				
Remarks: (Include photo numbers here or on a separate sheet.)				
ND- Not determined				
*Vegetation not ID'd down to species level not included in dominance test.				

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Berks County Sampling Date: 02/24/2016
 Applicant/Owner: Sunoco State: PA Sampling Point: W-AM2
 Investigator(s): J. McGuirk, A. Mengel Section, Township, Range: Cumru
 Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): Concave Slope (%): 2-4
 Subregion (LRR or MLRA): LRRN Lat: 40.257673 Long: -75.991209 Datum: NAD 83
 Soil Map Unit Name: Bowmansville-Knauers silt loams NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: Cowardin Code: PEM HGM: Riverine WT: RPWWD	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0</u> Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Heavy rain 2 days prior

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-AM2

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
$\frac{0}{0} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				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 = _____
Sapling/Shrub Stratum (Plot size: <u>15'</u>)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
$\frac{0}{0} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Herb Stratum (Plot size: <u>5'</u>)	1. <u>Microstegium vimineum</u>	<u>50</u>	<input checked="" type="checkbox"/> <u>FAC</u>	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>Phalaris arundinacea</u>	<u>40</u>	<input checked="" type="checkbox"/> <u>FACW</u>		
3. <u>Scirpus atrovirens</u>	<u>5</u>	<u>OBL</u>		
4. _____	_____	_____		
5. _____	_____	_____		
6. _____	_____	_____		
7. _____	_____	_____		
8. _____	_____	_____		
9. _____	_____	_____		
10. _____	_____	_____		
11. _____	_____	_____		
$\frac{95}{47.5} = \text{Total Cover}$ 50% of total cover: <u>47.5</u> 20% of total cover: <u>19</u>				
Woody Vine Stratum (Plot size: <u>15'</u>)	1. _____	_____	_____	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.
2. _____	_____	_____		
3. _____	_____	_____		
4. _____	_____	_____		
5. _____	_____	_____		
6. _____	_____	_____		
$\frac{0}{0} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: W-AM2

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10YR 4/2	100					SIL	
3-12	10YR 4/1	97	5YR 4/4	3	C	M/PL	SIL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: 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 Soils³:

- 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)

³Indicators 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: Berks Sampling Date: 02/24/2016
 Applicant/Owner: Sunoco State: PA Sampling Point: W-AM2 UPL
 Investigator(s): J. McGuirk, A. Mengel Section, Township, Range: Cumru
 Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): Convex Slope (%): 0-3
 Subregion (LRR or MLRA): LRRN Lat: 40.257838 Long: -75.991163 Datum: NAD 83
 Soil Map Unit Name: Bowmansville-Knauers silt loams NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: Upland	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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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-AM2 UPL

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>1*</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet:
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	OBL species _____ x 1 = _____
7. _____	_____	_____	_____	FACW species _____ x 2 = _____
$\frac{0}{0} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				FAC species _____ x 3 = _____
Sapling/Shrub Stratum (Plot size: <u>15'</u>)				FACU species _____ x 4 = _____
1. _____	_____	_____	_____	UPL species _____ x 5 = _____
2. _____	_____	_____	_____	Column Totals: _____ (A) _____ (B)
3. _____	_____	_____	_____	Prevalence Index = B/A = _____
4. _____	_____	_____	_____	Hydrophytic Vegetation Indicators:
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	<input type="checkbox"/> 2 - Dominance Test is >50%
7. _____	_____	_____	_____	<input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$
8. _____	_____	_____	_____	<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
9. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
$\frac{0}{0} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: <u>5'</u>)				Definitions of Four Vegetation Strata:
1. <u>Poa sp.*</u>	<u>40</u>	<input checked="" type="checkbox"/>	<u>ND</u>	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
2. <u>Trifolium pratense</u>	<u>40</u>	<input checked="" type="checkbox"/>	<u>FACU</u>	Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
3. _____	_____	_____	_____	Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
4. _____	_____	_____	_____	Woody vine – All woody vines greater than 3.28 ft in height.
5. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/>
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
$\frac{80}{80} = \text{Total Cover}$ 50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				
Woody Vine Stratum (Plot size: <u>15'</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
$\frac{0}{0} = \text{Total Cover}$ 50% of total cover: <u>0</u> 20% of total cover: <u>0</u>				
Remarks: (Include photo numbers here or on a separate sheet.)				
Maintained lawn				
ND - Not determined				
*Not identified to species level, not included in dominance test				

SOIL

Sampling Point: W-AM2 UPL

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	7.5YR 4/2	95	7.5YR 4/6	5	C	M	GRSIL	
4+"								Refusal coarse fragements

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

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

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

Restrictive Layer (if observed): Type: <u>Refusal coarse fragements</u> Depth (inches): <u>4"</u>	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
--	---

Remarks:

APPENDIX B
WETLAND PHOTOGRAPHS



Photograph Number: 1 **Feature Name:** W-AM2 **Date:** 02/24/2016
Direction: S **Plant Community:** PEM **Remarks:** N/A



Photograph Number: 3 **Feature Name:** W-C6 PEM **Date:** 02/24/2016
Direction: E **Plant Community:** PEM **Remarks:** N/A

APPENDIX C
STREAM DATA SHEETS

Tetra Tech Stream Data Sheet

Surveyors: J. Mcguirk, D. Quinn, A.J. Grech Date: 12/06/2013 Resource ID Number: S-A64
Project: PPP State: PA County: Berks
Photo Number (s): _____ Canopy Cover: 70 % Location: 40.169507, -75.863307

Flow Direction: NE Bank Width: 2.5 Feet Water Width: 2 Feet
High Water Depth: 0.5 Feet Water Depth: 2.00 Inches Turbidity: None
Flow Stage: Low
Flow Regime: [] Perennial [] Intermittent [] Ephemeral [] Flowing Ditch [] Dry/Stagnant Ditch

Sinuosity: [] Low [] Medium [] High
Features: [] Riffles [] Pools [] Rapids [] Sand/Mud Bar [] Gravel Bar [] Aquatic Vegetation [] Run/Glide [] Braided [] Other _____

Substrate: [] Bedrock ___% [] Boulder ___% [] Cobble/Gravel ___% <input checked="" type="checkbox"/> Sand <u>20</u> % <input checked="" type="checkbox"/> Silt/Clay <u>80</u> % [] Organic ___%	Bank Substrate: Height: Left <u>6"</u> Right <u>6"</u> [] Bedrock [] [] Boulder [] [] Gravel [] [] Sand [] <input checked="" type="checkbox"/> Silt/Clay <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Organic <input checked="" type="checkbox"/>	Floodplain Width: Left Right <input checked="" type="checkbox"/> <10 feet <input checked="" type="checkbox"/> [] <25 feet [] [] <50 feet [] [] <100 feet [] [] >100 feet []
--	--	--

Dominant Vegetation:
 Forested
Species: Acer rubrum, Fraxinus pennsylvanica
 Shrub
Species: Fagus grandifolia
 Herbaceous
Species: Polystichum acrostichoides

Wildlife Observed/Notes:

Sketch:
See Attached Figure.

APPENDIX D
STREAM PHOTOGRAPHS



Photograph Number:	2	Feature Name:	S-A64	Date:	12/06/2013
Direction:	N, Upstream	Flow Regime:	Intermittent	Remarks:	N/A

APPENDIX E
HYDRIC SOILS LIST

Hydric Soils List

Berks County, Pennsylvania

Map Unit Symbol	Map Unit Name	Component Name and Phase	Component Percent	Landforms
AbA	Abbottstown silt loam, 0 to 3 percent slopes	Croton	5	depressions
AbB	Abbottstown silt loam, 3 to 8 percent slopes	Croton	5	depressions
AnA	Andover-Buchanan gravelly loams, 0 to 3 percent slopes	Andover	55	hillslopes
AnB	Andover-Buchanan gravelly loams, 3 to 8 percent slopes	Andover	55	hillslopes
AoB	Andover-Buchanan gravelly loams, 0 to 8 percent slopes, extremely stony	Andover, extremely stony	55	hillslopes
BfB	Bedington-Berks complex, 3 to 8 percent slopes	Brinkerton	3	depressions
BfC	Bedington-Berks complex, 8 to 15 percent slopes	Brinkerton	3	depressions
BkA	Berks-Weikert complex, 0 to 3 percent slopes	Brinkerton	3	depressions
BkB	Berks-Weikert complex, 3 to 8 percent slopes	Brinkerton	3	depressions
BkC	Berks-Weikert complex, 8 to 15 percent slopes	Brinkerton	3	depressions
BkD	Berks-Weikert complex, 15 to 25 percent slopes	Brinkerton	3	depressions
BkF	Berks-Weikert complex, 25 to 60 percent slopes	Brinkerton	2	depressions

BmA	Birdsboro silt loam, 0 to 3 percent slopes	Lamington	3	terraces
BmB	Birdsboro silt loam, 3 to 8 percent slopes	Lamington	3	terraces
Bo	Bowmansville-Knauers silt loams	Knauers	40	flood plains
BtA	Brinkerton-Comly silt loams, 0 to 3 percent slopes	Brinkerton	75	hills
BtB	Brinkerton-Comly silt loams, 3 to 8 percent slopes	Brinkerton	75	hills
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	Andover	10	depressions
BvB	Buchanan gravelly loam, 0 to 8 percent slopes, extremely stony	Andover, extremely stony	5	depressions
BvD	Buchanan gravelly loam, 8 to 25 percent slopes, extremely stony	Andover, extremely stony	10	depressions
CaB	Calvin-Klinesville channery silt loams, 3 to 8 percent slopes	Brinkerton	5	depressions
CaC	Calvin-Klinesville channery silt loams, 8 to 15 percent slopes	Brinkerton	5	depressions
CaD	Calvin-Klinesville channery silt loams, 15 to 25 percent slopes	Brinkerton	5	depressions
CmA	Clarksburg silt loam, 0 to 3 percent slopes	Thorndale	5	depressions
CmB	Clarksburg silt loam, 3 to 8 percent slopes	Thorndale	5	depressions
CpA	Comly silt loam, 0 to 3 percent slopes	Brinkerton	5	depressions
CpB	Comly silt loam, 3 to 8 percent slopes	Brinkerton	5	depressions
CwA	Croton silt loam, 0 to 3 percent slopes	Croton	90	depressions
CwB	Croton silt loam, 3 to 8 percent slopes	Croton	90	depressions

DbA	Duffield silt loam, 0 to 3 percent slopes	Thorndale	2	depressions
DbB	Duffield silt loam, 3 to 8 percent slopes	Thorndale	2	depressions
DfC	Duffield-Ryder silt loams, 8 to 15 percent slopes	Thorndale	3	depressions
DfD	Duffield-Ryder silt loams, 15 to 25 percent slopes	Thorndale	3	depressions
EdB	Edgemont channery sandy loam, 0 to 8 percent slopes, extremely stony	Andover, extremely stony	2	drainageways
EdD	Edgemont channery sandy loam, 8 to 25 percent slopes, extremely stony	Andover, extremely stony	3	drainageways
EdF	Edgemont channery sandy loam, 25 to 60 percent slopes, extremely stony	Andover, extremely stony	3	drainageways
EhB	Edgemont channery loam, 3 to 8 percent slopes	Andover	3	drainageways
EhC	Edgemont channery loam, 8 to 15 percent slopes	Andover	3	drainageways
EhD	Edgemont channery loam, 15 to 25 percent slopes	Andover	3	drainageways
Gc	Gibraltar silt loam	Holly	5	flood plains
GeB	Gladstone gravelly loam, 3 to 8 percent slopes	Cokesbury	3	depressions
GeC	Gladstone gravelly loam, 8 to 15 percent slopes	Cokesbury	5	depressions
GeD	Gladstone gravelly loam, 15 to 25 percent slopes	Cokesbury	5	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 55 percent slopes, very bouldery	Cokesbury	5	depressions

GnA	Glenville silt loam, 0 to 3 percent slopes	Baile	5	depressions
GnB	Glenville silt loam, 3 to 8 percent slopes	Baile	5	depressions
HaB	Hagerstown-Duffield silt loams, 3 to 8 percent slopes	Thorndale	2	depressions
Ho	Holly silt loam	Holly	94	flood plains
Ho	Holly silt loam	Brinkerton	2	depressions
JnB	Joanna loam, 3 to 8 percent slopes	Croton	5	depressions
JnC	Joanna loam, 8 to 15 percent slopes	Croton	5	depressions
JnD	Joanna loam, 15 to 25 percent slopes	Croton	5	depressions
JnE	Joanna loam, 25 to 35 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 60 percent slopes, extremely stony	Croton	2	depressions
KIF	Klinesville-Calvin channery silt loams, 25 to 60 percent slopes	Brinkerton	5	depressions
LbB	Laidig very gravelly loam, 0 to 8 percent slopes, extremely stony	Andover	4	hillslopes
LbD	Laidig very gravelly loam, 8 to 25 percent slopes, extremely stony	Andover, extremely stony	4	hillslopes
LbF	Laidig very gravelly loam, 25 to 55 percent slopes, extremely stony	Andover, extremely stony	5	hillslopes
LdF	Laidig-Rubble land complex, 25 to 55 percent slopes	Andover	5	hillslopes

LfA	Lamington silt loam, 0 to 3 percent slopes	Lamington	85	terraces
LmA	Lehigh silt loam, 0 to 3 percent slopes	Croton	8	depressions
LmB	Lehigh silt loam, 3 to 8 percent slopes	Croton	8	depressions
Lv	Linden loam	Holly	3	flood plains
Me	Middlebury silt loam	Holly	5	flood plains
MgB	Monongahela silt loam, 3 to 8 percent slopes	Lamington	5	terraces
MIB	Mount Lucas silt loam, 3 to 8 percent slopes	Towhee	6	depressions
MmB	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
MuC	Murrill gravelly loam, 8 to 15 percent slopes	Thorndale	2	depressions
NaB	Neshaminy silt loam, 3 to 8 percent slopes	Towhee	3	depressions
NaC	Neshaminy silt loam, 8 to 15 percent slopes	Towhee	5	depressions
NaD	Neshaminy silt loam, 15 to 25 percent slopes	Towhee	5	depressions
NhB	Neshaminy gravelly silt loam, 0 to 8 percent slopes, extremely bouldery	Towhee, extremely stony	5	depressions
NhD	Neshaminy gravelly silt loam, 8 to 25 percent slopes, extremely bouldery	Towhee, extremely stony	3	depressions
NhF	Neshaminy gravelly silt loam, 25 to 60 percent slopes, extremely bouldery	Towhee, extremely stony	3	depressions
PeB	Penn channery silt loam, 3 to 8 percent slopes	Croton	3	depressions

PeC	Penn channery silt loam, 8 to 15 percent slopes	Croton	3	depressions
PeD	Penn channery silt loam, 15 to 25 percent slopes	Croton	3	depressions
PkC	Penn-Klinesville channery silt loams, 8 to 15 percent slopes	Croton	2	depressions
PkD	Penn-Klinesville channery silt loams, 15 to 25 percent slopes	Croton	5	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
RhA	Reaville silt loam, 0 to 3 percent slopes	Croton	6	depressions
RhB	Reaville silt loam, 3 to 8 percent slopes	Croton	2	depressions
Ro	Rowland silt loam	Knauers	8	flood plains
ThA	Thorndale-Penlaw silt loams, 0 to 3 percent slopes	Thorndale	55	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
TwB	Towhee silt loam, 0 to 8 percent slopes, very stony	Towhee, very stony	90	depressions
Udp	Udorthents, sanitary landfill	Croton	2	depressions
UkB	Urban land-Berks complex, 0 to 8 percent slopes	Brinkerton	5	depressions

UkD	Urban land-Berks complex, 8 to 25 percent slopes	Brinkerton	5	depressions
UmB	Urban land-Duffield complex, 0 to 8 percent slopes	Thorndale	2	depressions
UmD	Urban land-Duffield complex, 8 to 25 percent slopes	Thorndale	2	depressions
UnB	Urban land-Gladstone complex, 0 to 8 percent slopes	Cokesbury	5	depressions
UnD	Urban land-Gladstone complex, 8 to 25 percent slopes	Cokesbury	5	depressions
UpB	Urban land-Joanna complex, 0 to 8 percent slopes	Croton	4	depressions
UpD	Urban land-Joanna complex, 8 to 25 percent slopes	Croton	4	depressions
UsB	Urban land-Laidig complex, 0 to 8 percent slopes	Andover	5	hillslopes
UsD	Urban land-Laidig complex, 8 to 25 percent slopes	Andover	5	hillslopes
UxB	Urban land-Penn complex, 0 to 8 percent slopes	Croton	4	depressions
UxD	Urban land-Penn complex, 8 to 25 percent slopes	Croton	4	depressions
WeB	Weikert-Berks complex, 3 to 8 percent slopes	Brinkerton	5	depressions
WeD	Weikert-Berks complex, 15 to 25 percent slopes	Brinkerton	5	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 from 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 from 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 from the PA DCNR.

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

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

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

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

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

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

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.



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.



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 throughout 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 performing 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



EXPERIENCE SUMMARY

Mr. Adam Mengel has two years of experience as an environmental scientist/ wildlife biologist with a background in ecology and conservation. His education background includes studies in chemistry, biology, mathematics, statistics, botany, terrestrial ecology, population ecology, herpetology, evolutionary biology, wetland ecosystems, wetland assessment and delineation, geographic information systems and other environmental related fields. Adam has performed numerous wildlife and vegetation surveys, stream assessments, and habitat assessments. As an Environmental Scientist, Adam has had the opportunity of working fulltime on wetland delineations under Environmental Wetland Specialists, primarily for Marcellus shale projects. He also has experience in performing both acoustic and mist net surveys for the Northern long-eared bat species in Pennsylvania and the Midwest. Additionally, he has experience in performing radio telemetry and emergence counts.

RELEVANT EXPERIENCE

Crew Lead; Line 66 and Sandpiper Pipeline Project; Enbridge; WI, MN, ND; May – August 2014. Mr. Mengel led acoustic and radio telemetry surveys for the Northern long-eared bat in the Midwest. He has also performed roost counts and mist net surveys.

Research Technician; Golden-winged Warbler Habitat Conservation Plan; Delaware State Forest; May – July 2013. Mr. Mengel monitored Golden-winged Warbler nesting success and assisted in locating a state record of 51 nests for the threatened species.

EDUCATION

B.S. Biology: Environmental Science, 2012, Saint Francis University

REGISTRATIONS

Wild Plant Management Permit, PA, 2015, Permit # 15-674

TRAINING/CERTIFICATIONS

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

First aid, CPR, AED

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

2

YEARS WITH TETRA TECH

1

CHRONOLOGICAL HISTORY

Environmental Scientist/Wildlife Biologist I, Tetra Tech, Inc., December, 2014 – Present, Pittsburgh, PA

Research Technician, WEST, Inc., May – August, 2014, Bloomington, IN

Research Technician, Indiana University of Pennsylvania, May – July, 2014, Indiana, PA

SCIENTIFIC/TECHNICAL PUBLICATIONS

Loya, L.J., C. Clair, P.H. Harchack, and A.J. Mengel. 2014. "Odonate Diversity at an Acid Mine Drainage Remediation Site in Cambria, County, Pennsylvania." *Argia*. 26(3):14-17