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

Prepared By:

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For

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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
LDO	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
UPL	Upland
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

ACRONYMS

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

The delineation consisted of the establishment of the wetland/upland margin with flagging hung at intervals that accurately depicted the outline of the boundary. The individual flags were then located using a Global Positioning System (GPS) receiver and later added to the Project 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 4-9).

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. Appendix B contains photographs of wetlands located within the study area. Appendix C provides a list of hydric soils known to occur within Dauphin County. Resumes of project personnel are included in Appendix D.

3.0 RESULTS

The field investigations identified one area within Dauphin County, located within the Southcentral Region of the proposed Pennsylvania Pipeline Project Addendum Study Area, that met the wetland criteria outlined in the *1987 Manual*, as amended by the *Corps Regional Supplement*. No streams were identified within the Project study area. A narrative summary of field data collected for this system is presented below. The detail maps provided as Figures 4-1 to 4-9 illustrate the wetland location 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 Dauphin County, PA is included in Appendix C. The NRCS soil survey maps are included as Figures 2-1 to 2-2. Confirmation of the soil mapping units was not performed during this site evaluation.

See Figures 3-1 to 3-2 for NWI wetlands that fall within the Addendum Study Area.

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

A USACE wetland determination data form that details the existing vegetation, soil characteristics, and hydrology was prepared for the wetland and its associated upland point (Appendix A).

Wetland S2

Wetland S2 (W-S2) is a 29,845-square foot (SF) PEM wetland (Figure 4-4). 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, geomorphic position, and a positive FAC-neutral test. Dominant vegetation consists of reed canary grass (*Phalaris arundiacea*), lamp rush (*Juncus effusus*), and bristly buttercup (*Ranunculus hispidus*). The soil between 0 and 6 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (10YR 5/6). The soil between 6 and 12 inches exhibits a low-chroma matrix (5YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/6).

3.2 STREAM IDENTIFICATION AND EVALUATION

Based on field evidence and best professional judgment, it was determined that no streams were identified within the evaluated study area.

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 4-9. There are 11 streams within Dauphin County with floodways that extend into the Project LOD.

4.0 CONCLUSIONS

During the field investigations in Dauphin 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).

No streams were identified within the evaluated study area.

There are 11 streams within Dauphin County with floodways that extend into the Project LOD.

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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TABLES

Table 1
Wetland and Stream Summary
Pennsylvania Pipeline Project

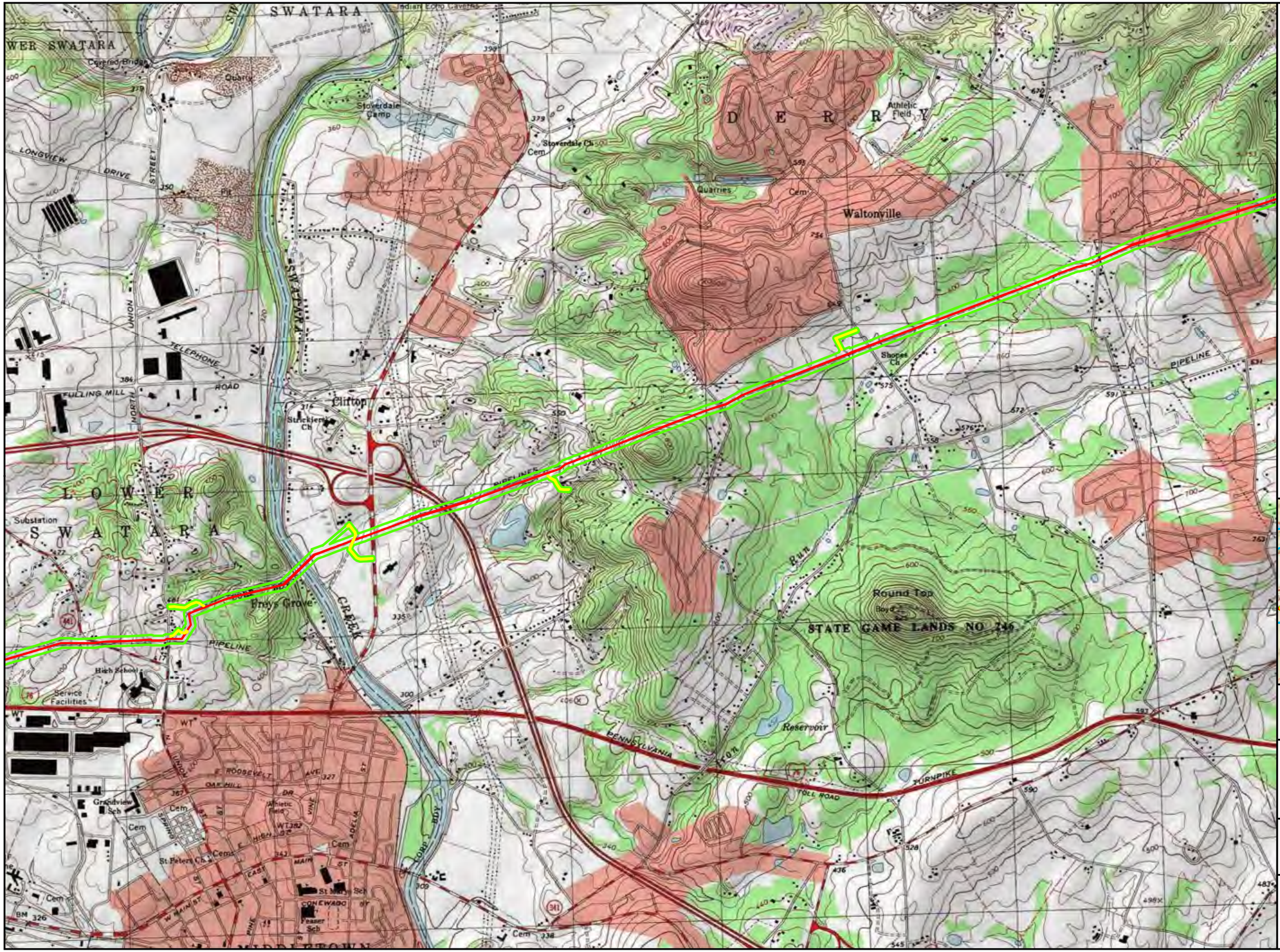
Water Resource	Dominant Plant Community/Flow Regime	Bank Full Width (ft.)	Water Depth	Channel Depth	Wetland Size (Square Feet)	Wetland Size (Acres)	Associated Water Resource
W-S2	PEM	-	-	-	29,845	0.69	N/A

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

Stream ID	Flow Regime	Bank Full Width (ft.)	Water Depth (in.)	Channel Depth (ft.)
S-A31a	Intermittent	3.0	0.5	1.50
S-A40	Ephemeral	3.0	1.0	1.00
S-A41	Intermittent	5.0	3.0	1.50
S-K20	Ephemeral	4.0	0.0	2.50
S-K21	Ephemeral	1.0	0.0	1.00
S-K22	Intermittent	6.0	1.0	2.00
S-J38	Perennial	12.0	12.0	2.00
S-B69	Intermittent	4.0	1.0	1.50
S-C53 (upstream)	Intermittent	4.0	2.0	2.00
S-C53 (downstream)	Intermittent	2.0	0.5	0.25
S-BB38	Perennial	13.0	14.0	5.00
S-CC17	Ephemeral	8.0	0.0	3.00

* = Channel depth average

FIGURES



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- Alignment Centerline
- Study Area
- County Boundary

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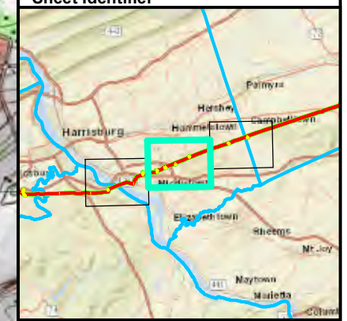


N

Feet
0 1,000 2,000

Meters
0 300 600

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

TETRA TECH

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

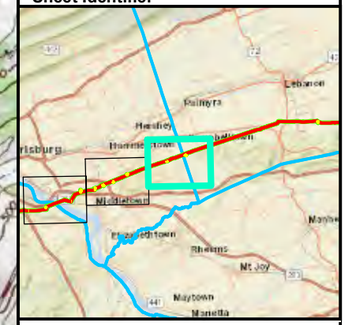
P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-2\PENNPIPELINE_DAUPHINCO_USGS.MXD 03/14/16 JN

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

Legend

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

Sheet Identifier



Feet
0 1,000 2,000

Meters
0 300 600

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

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

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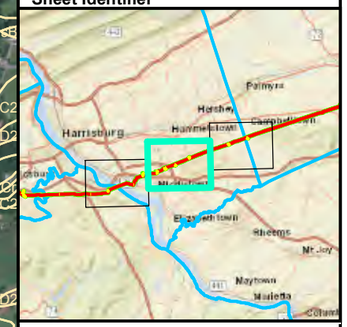

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0 1,000 2,000 Feet

0 300 600 Meters

NRCS SOILS MAP
FIGURE 2-1
PENNSYLVANIA PIPELINE PROJECT
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SUNOCO LOGISTICS, L.P.
DAUPHIN COUNTY, PA

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

Legend

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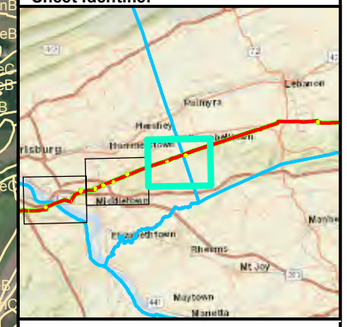

Feet
0 1,000 2,000

Meters
0 300 600

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

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Legend

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- Study Area
- County Boundary
- NWI Wetlands and Codes

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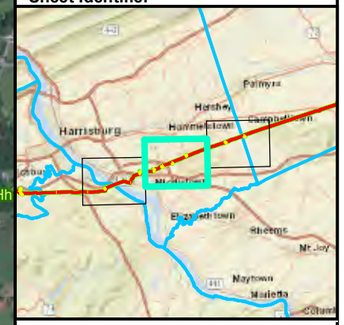

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0 1,000 2,000 Feet

0 300 600 Meters

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

TETRA TECH

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

Legend

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

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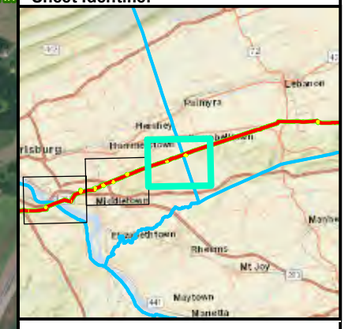

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0 300 600 Meters

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

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Start of Line
PADEP Southcentral Region
Dauphin County
Lat: 40° 11' 56.842" N
Lon: 76° 47' 54.988" W

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Page 2

Legend

- Access Road
- Alignment Centerline
- Study Area
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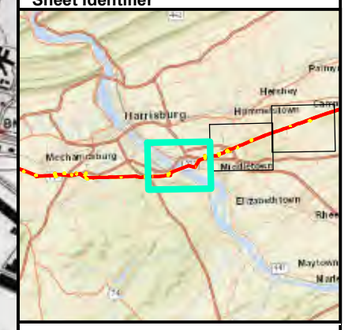

0 1,000 2,000 Feet

0 300 600 Meters

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

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Legend

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

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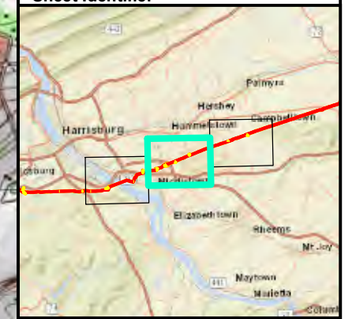

N

0 1,000 2,000 Feet

0 300 600 Meters

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

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

Legend

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

Sheet Identifier

N

0 1,000 2,000 Feet

0 300 600 Meters

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

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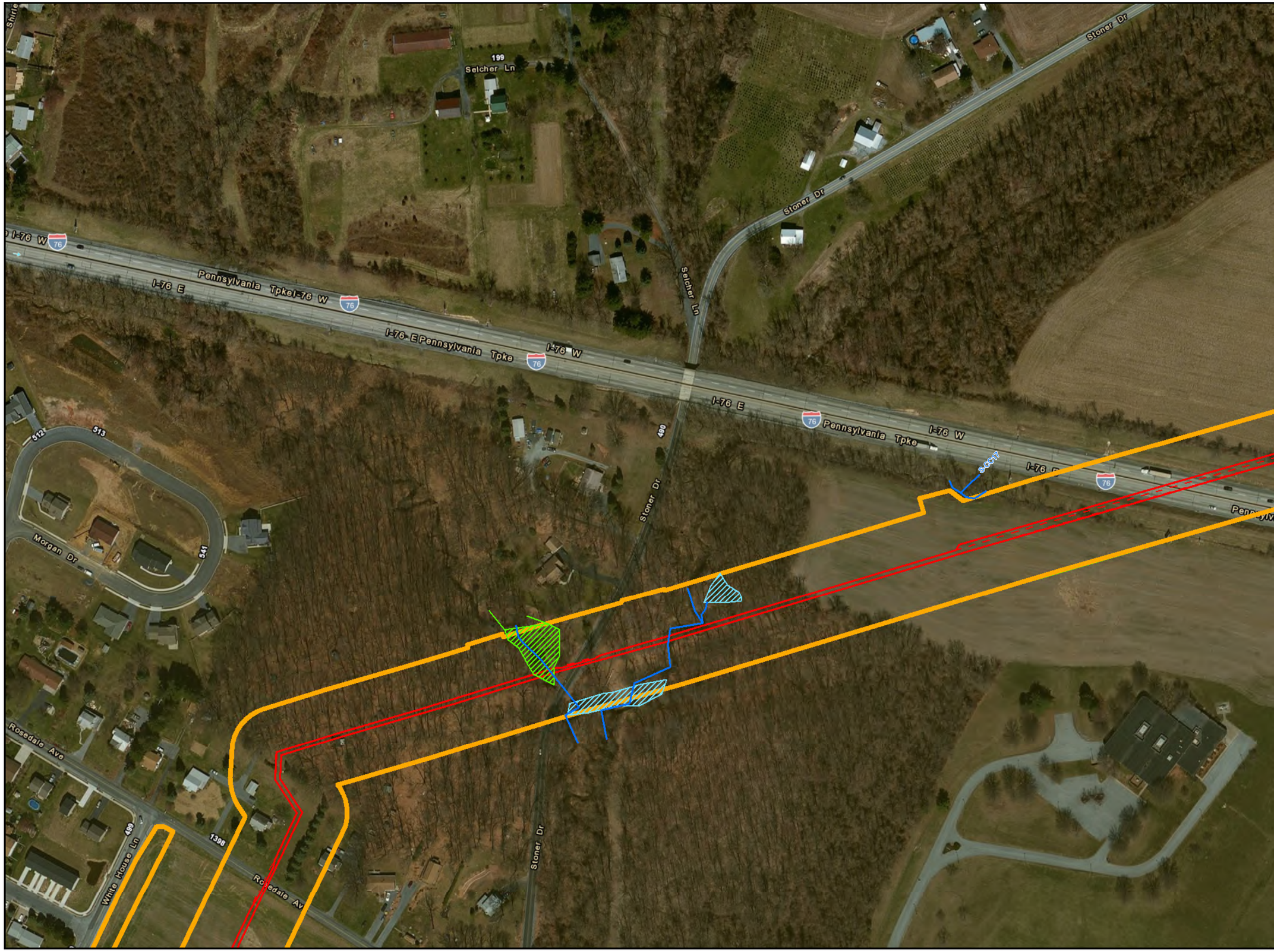

Legend

- 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)

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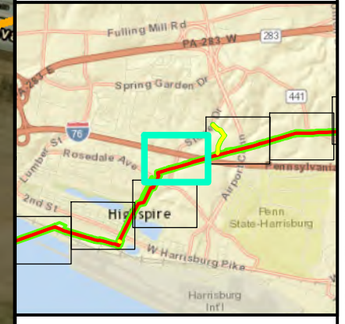

N

0 100 200 Feet

0 30.45 60.9 Meters

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

TETRA TECH

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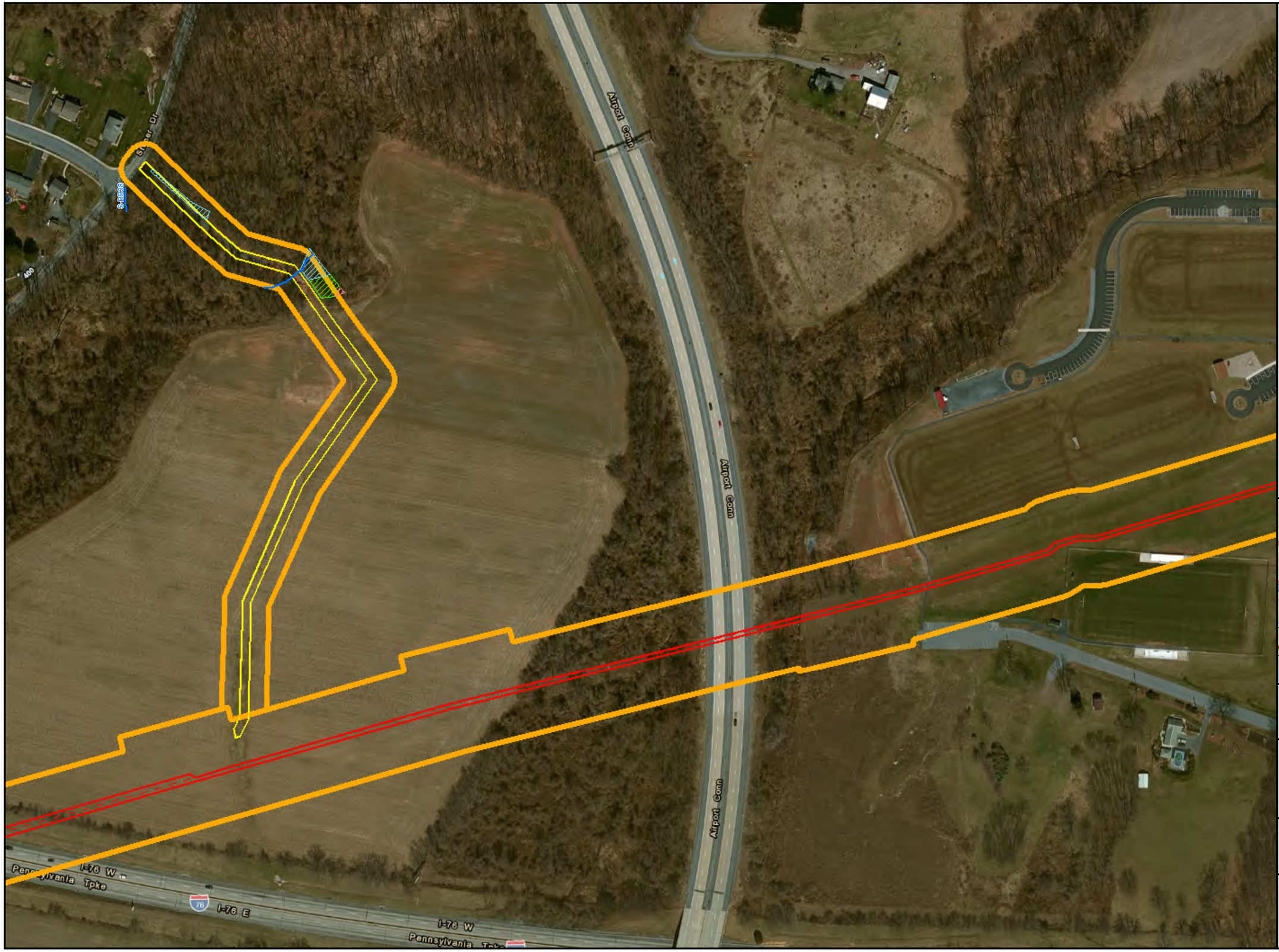

Legend

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

Wetland
- PEM
- PFO
- PSS
- PuB

New Wetland
- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/2/15)
- Alignment Centerline (8/2/15)
- Study Area (8/2/15)

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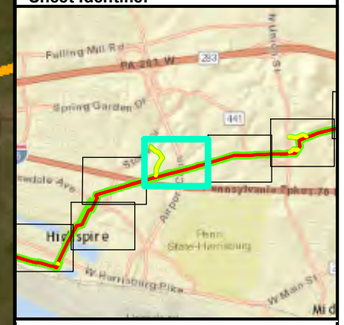

N

0 100 200 Feet

0 30.45 60.9 Meters

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

TETRA TECH

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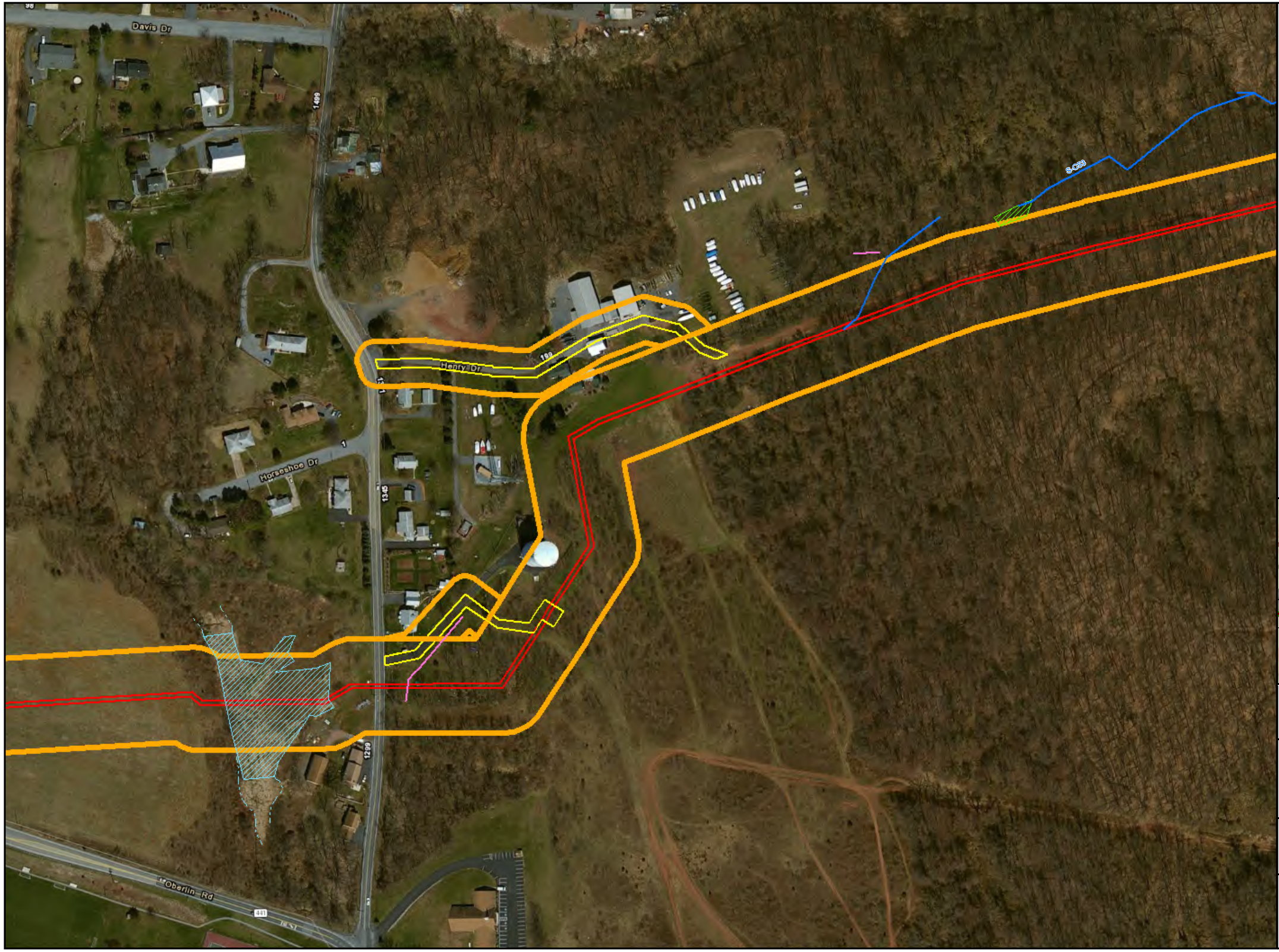


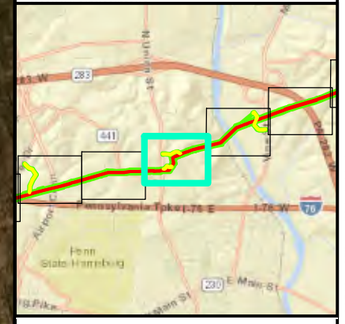
Legend

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

Wetland
- PEM
- PFO
- PSS
- PuB

New Wetland
- PEM
- PFO
- PSS
- PuB
- Access Road
- Alignment Centerline
- Study Area
- Access Road (8/2/15)
- Alignment Centerline (8/2/15)
- Study Area (8/2/15)

Sheet Identifier



N

0 100 200 Feet

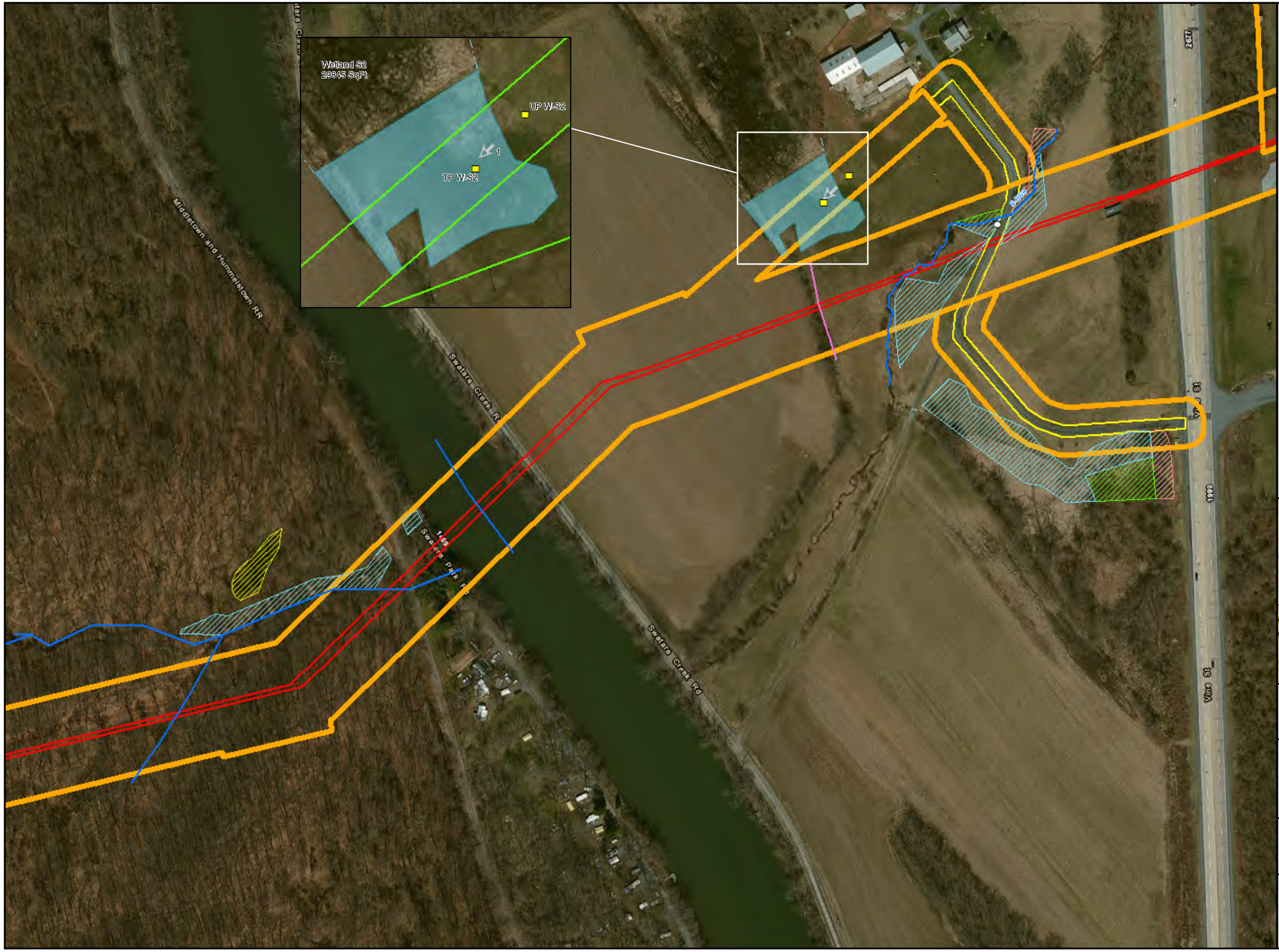
0 30.45 60.9 Meters

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

TETRA TECH

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

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-24\PENNPIPELINE_DAUPHINCO_ADDENDUMDETAILMXD 03/23/16 JN



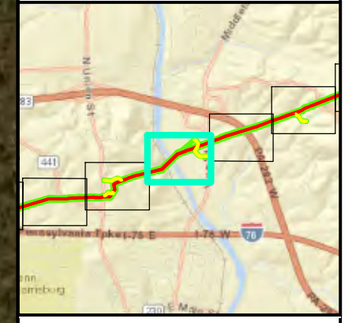
Legend

- 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)

Sheet Identifier



Feet
0 100 200

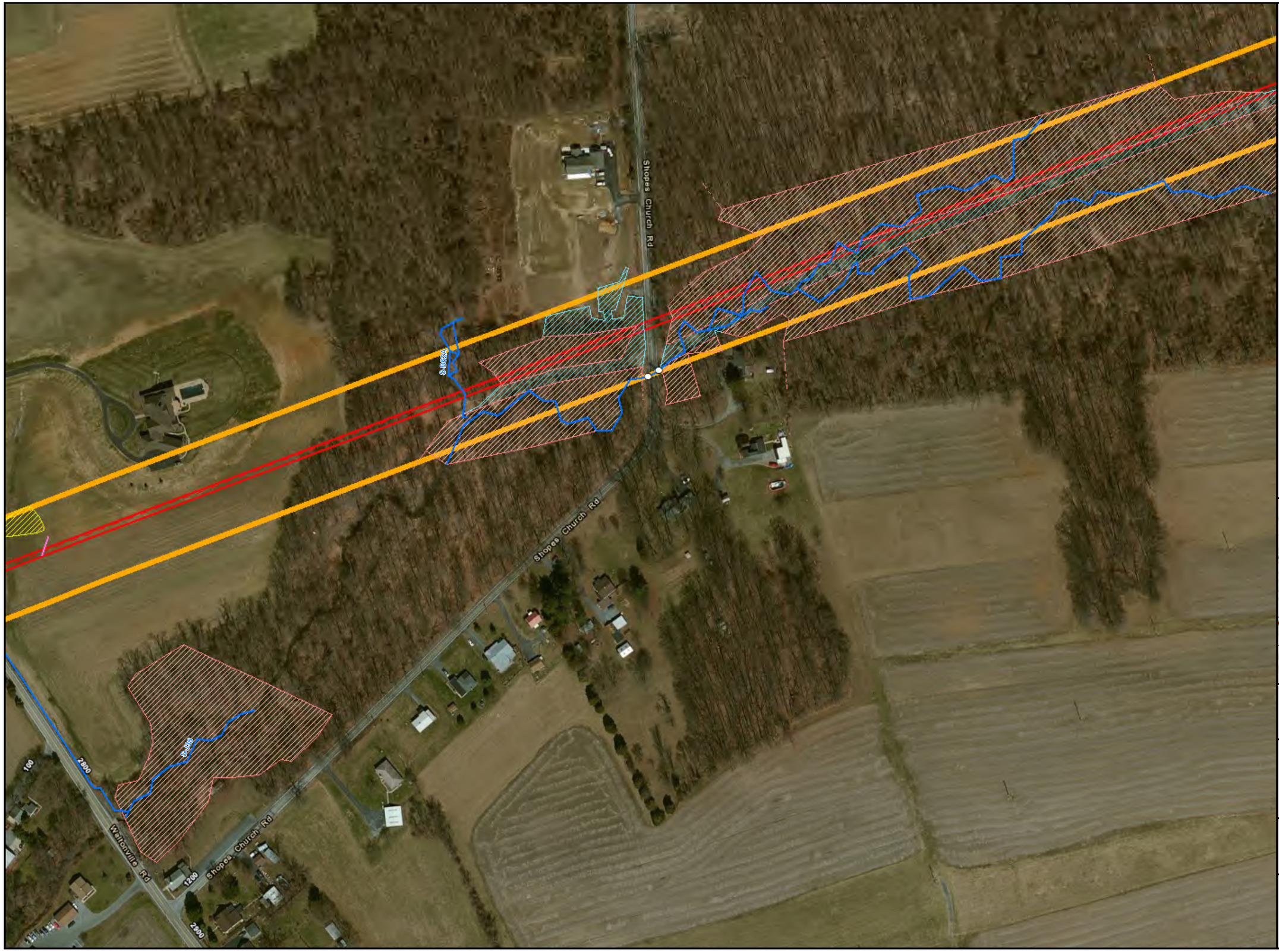
Meters
0 30.45 60.9

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

TETRA TECH

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

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-2\PENNPIPELINE_DAUPHINCO_ADDENDUMDETAILMXD 03/23/16 JN



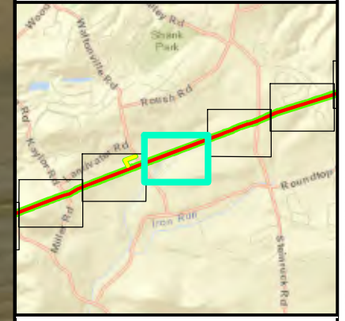
Legend

- 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)

Sheet Identifier



N

Feet
0 100 200

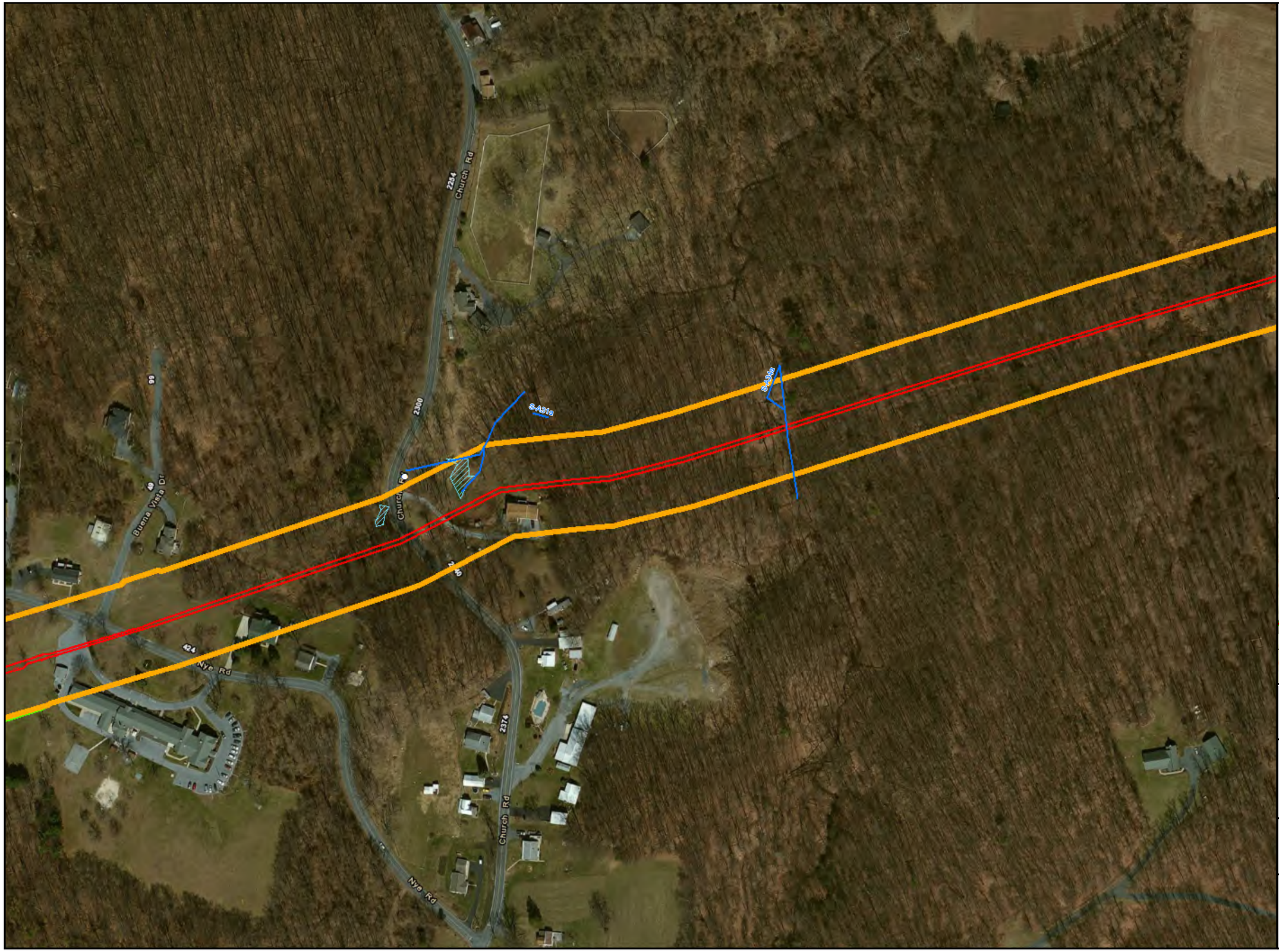
Meters
0 30.45 60.9

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

TETRA TECH

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

P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-2\PENNPIPELINE_DAUPHINCO_ADDENDUMDETAILMXD 03/23/16 JN



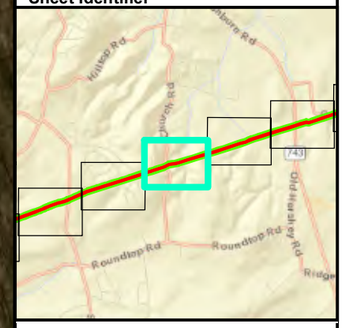
Legend

- 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)

Sheet Identifier



N

Feet
0 100 200

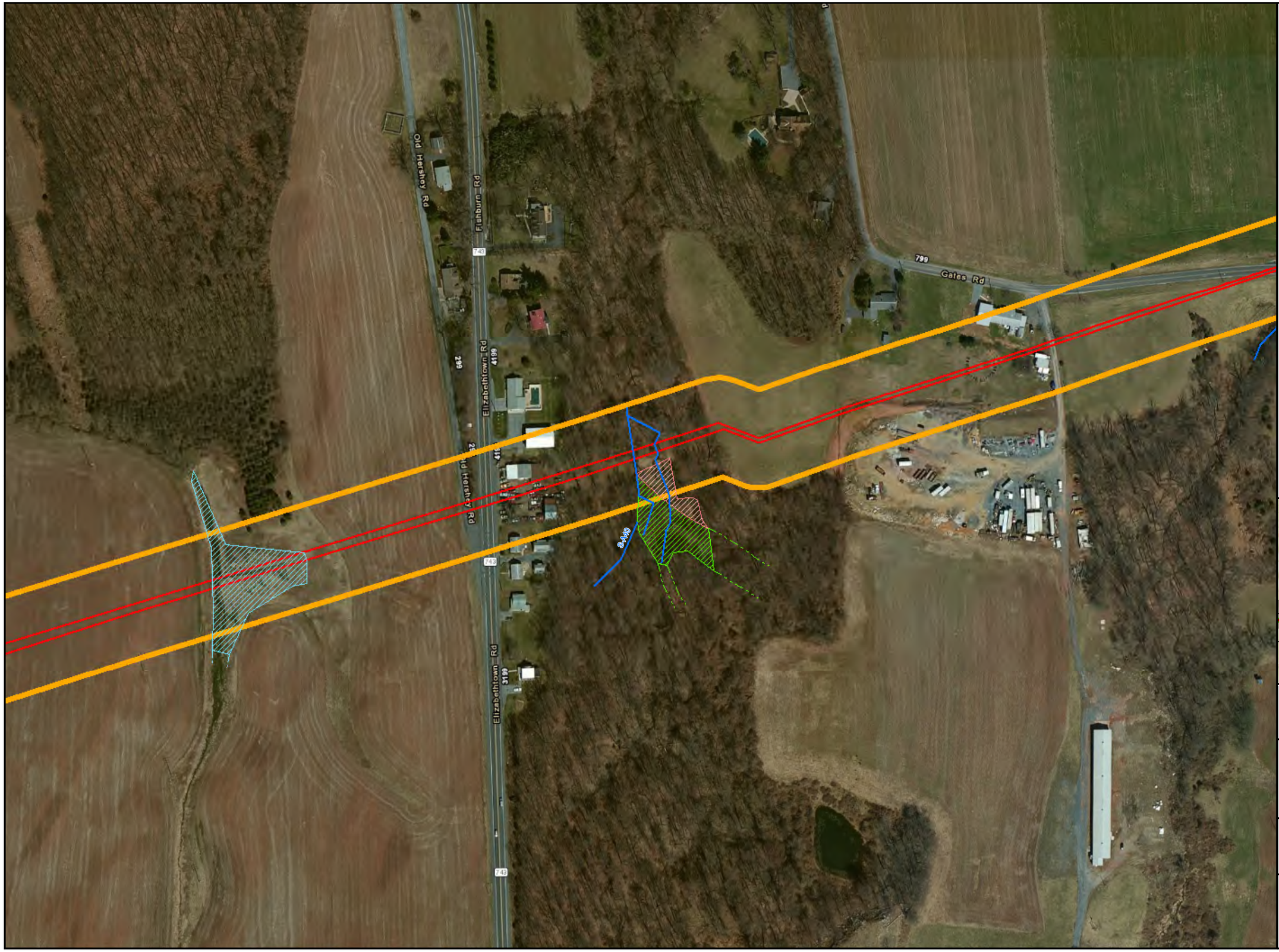
Meters
0 30.45 60.9

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

TETRA TECH

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

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-2\PENNPIPELINE_DAUPHINCO_ADDENDUMDETAIL.MXD 03/23/16 JN



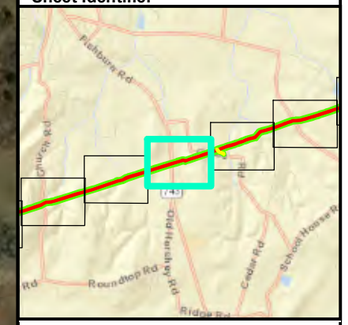
Legend

- 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)

Sheet Identifier



N

0 100 200 Feet

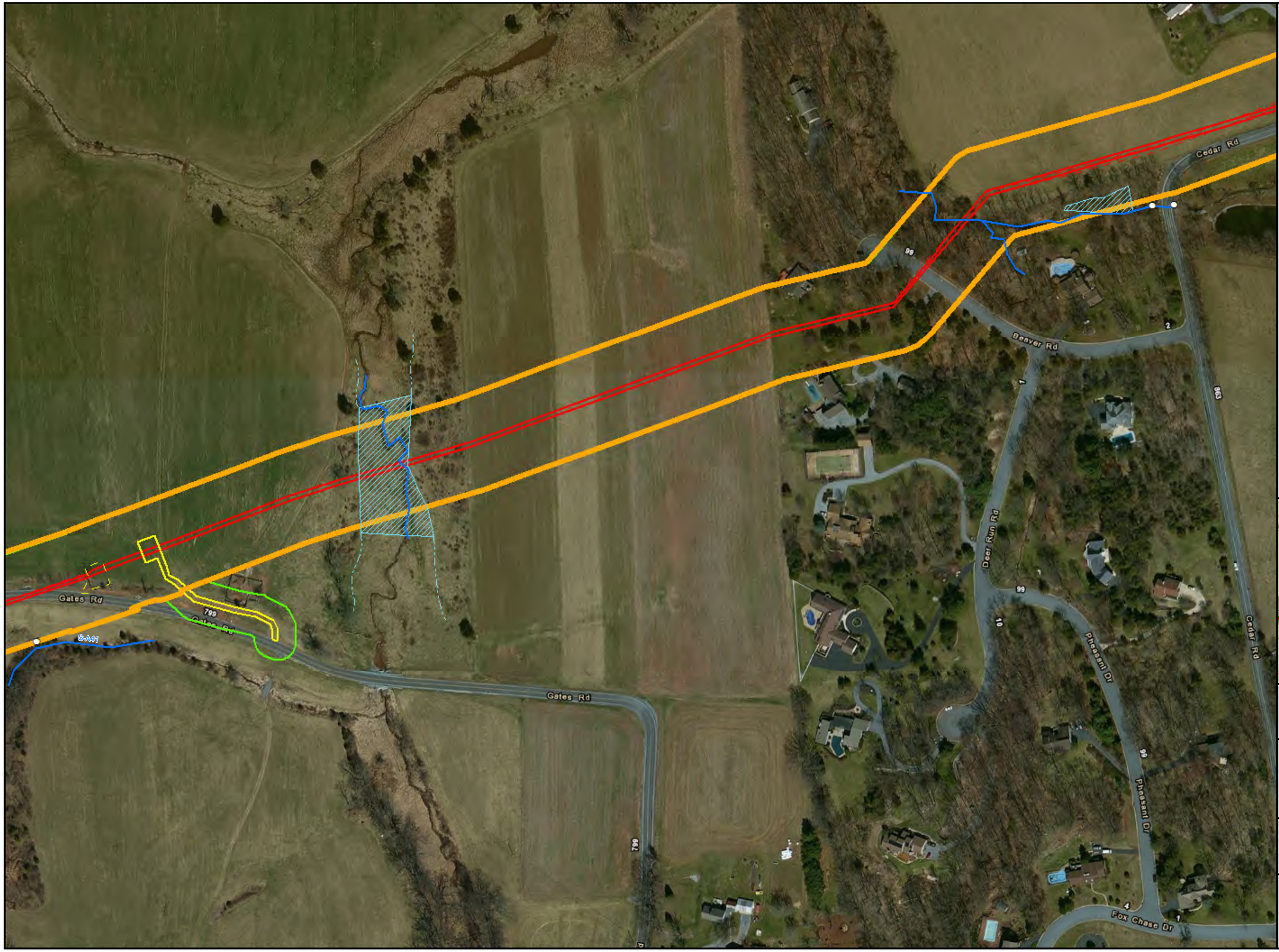
0 30.45 60.9 Meters

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

TETRA TECH

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

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-2\PENNPIPELINE_DAUPHINCO_ADDENDUMDETAILMXD 03/23/16 JN



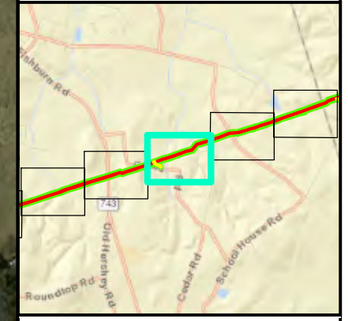
Legend

- 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)

Sheet Identifier



N

Feet
0 100 200

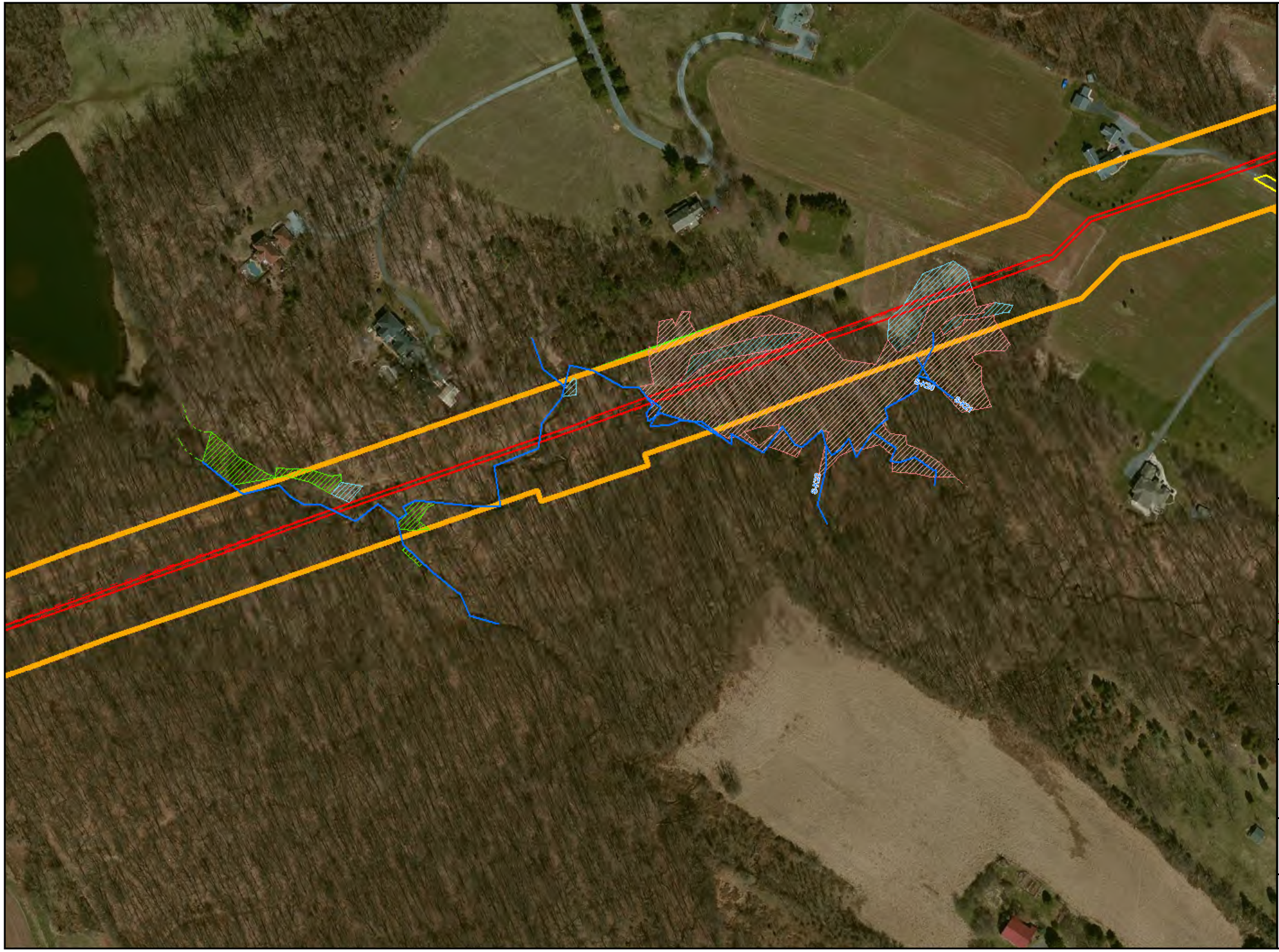
Meters
0 30.45 60.9

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

TETRA TECH

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

PGH P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-2\PENNPIPELINE_DAUPHINCO_ADDENDUMDETAILMXD 03/23/16 JN



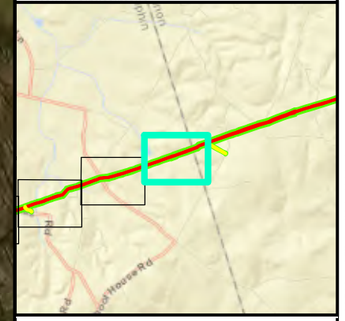
Legend

- 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)

Sheet Identifier



N

0 100 200 Feet

0 30.45 60.9 Meters

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

TETRA TECH

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

P:\GIS\SUNOCO\MARINER EAST 2\MXD\PPP WETLANDS SC-2\PENNPIPELINE_DAUPHINCO_ADDENDUMDETAILMXD 03/24/16 JN

APPENDIX A
WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Dauphin Sampling Date: 02/08/2016

Applicant/Owner: Sunoco State: PA Sampling Point: W-S2

Investigator(s): J. McGuirk, A. Mengel Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): flloodplain Local relief (concave, convex, none): Concave Slope (%): 3-5

Subregion (LRR or MLRA): LRRN Lat: 40.2206 Long: -76.7220 Datum: NAD 83

Soil Map Unit Name: Atkins silt loam (At) NWI classification: None

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

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

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

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

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

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

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes ✔ No ____

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-S2

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Herb Stratum (Plot size: 5')			
1. Phalaris arundinacea	20	✔	FACW
2. Juncus effusus	20	✔	FACW
3. Ranunculus hispidus	20	✔	FAC
4. Trifolium pratense	15		FACU
5. Microstegium vimineum	15		FAC
6. Boehmeria cylindrica	10		FACW
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

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

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes ✔ No ___

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

SOIL Sampling Point: W-S2

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	95	10YR 5/6	5	C	M/PL	CL	
6-12	5YR 4/2	90	7.5YR 4/6	10	C	M	CL	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PPP City/County: Dauphin Sampling Date: 02/08/2016

Applicant/Owner: Sunoco State: PA Sampling Point: W-S2 UPL

Investigator(s): J. McGuirk, A. Mengel Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Concave Slope (%): 3-5

Subregion (LRR or MLRA): LRRN Lat: 40.2208 Long: -76.7218 Datum: NAD 83

Soil Map Unit Name: Basher silt loam (Bc) NWI classification: None

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

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

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

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

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

Remarks:
Upland

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

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

Field Observations:

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

Wetland Hydrology Present? Yes _____ No ✔

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

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W-S2 UPL

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		
Herb Stratum (Plot size: 5')			
1. Dactylis glomerata	20	✔	FACU
2. Phleum pratense	20	✔	FACU
3. Trifolium pratense	15	✔	FACU
4. Arctium minus	10		FACU
5. Rosa multiflora	5		FACU
6. Plantago lanceolata	5		FACU
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		
50% of total cover: 37.5	20% of total cover: 15		
Woody Vine Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0	20% of total cover: 0		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 3 (B)

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

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

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

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

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

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

Hydrophytic Vegetation Present? Yes ___ No ✔

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

Lawn

SOIL

Sampling Point: W-S2 UPL

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/4	100					CL	

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

Hydric Soil Indicators:

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

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

Remarks:

APPENDIX B
WETLAND PHOTOGRAPHS

Photograph Number:	1	**Feature Name:**	W-S2	**Date:**	02/25/2016
Direction:	SW	**Plant Community:**	PEM	**Remarks:**	N/A

APPENDIX C
HYDRIC SOILS LIST

Hydric Soils List
Dauphin County, Pennsylvania

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

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

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

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

APPENDIX D
RESUMES

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

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

EXPERIENCE SUMMARY:

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

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

RELEVANT PROJECT EXPERIENCE:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHRONOLOGICAL WORK HISTORY:

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

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

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

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

TETRA TECH

Jason McGuirk
Wetland/Environmental Scientist IV

EXPERIENCE SUMMARY

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

RELEVANT EXPERIENCE

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

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

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

EDUCATION

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

REGISTRATIONS

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

AREA OF EXPERTISE

Wetland Delineation and Stream Identification, Fisheries, and Botanical Surveys

TRAINING/CERTIFICATIONS

Winter Vegetation ID, Rutgers University, 2012

Amtrak Contractor Certification, 2014

Certified Wetland Assessment Delineator, NY, 2009

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

6+

YEARS WITH TETRA TECH

2+

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

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

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

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

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

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

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

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

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

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

CHRONOLOGICAL HISTORY

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

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

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

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

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

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

SCIENTIFIC/TECHNICAL PUBLICATIONS

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

MEMBERSHIPS

- N/A

AWARDS

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

TETRA TECH

Adam Mengel

Environmental Scientist/Wildlife Biologist I

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

EDUCATION

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

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