



Wetland and Waterway Delineation Report

Delaware Water Gap National Recreation Area
S.R. 0209 over Adams Creek Bridge Repair Project

Delaware Township, Pike County, Pennsylvania

Prepared for:



Federal Highway Administration
Eastern Federal Lands Highway Division
21400 Ridgetop Circle
Sterling, Virginia 20166

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Prepared for:

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21400 Ridgetop Circle
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Prepared by:

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September 2018

ABSTRACT

This document reports on the results of a wetland and waterway investigation required for the proposed S.R. 0209 over Adams Creek bridge repair in Delaware Township, Pike County, Pennsylvania.

All wetlands and watercourses in the project area were delineated to satisfy both the Clean Water Act Section 404 wetland definition (Environmental Laboratory 1987) and the Federal Geographic Data Committee (FGDC) Wetlands Classification Standard. Wetlands were delineated using the methods outlined in *National Park Service (NPS) Procedural Manual #77-1: Wetland Protection* (NPS 2016). Sites that naturally lack vegetation, such as stream channels, were delineated as described in the *FGDC Wetlands Classification Standard* (FGDC 2013). For sites where vegetation and soils were present, wetlands were delineated following the U.S. Army Corps of Engineers' (USACE's) *Wetlands Delineation Manual* (Environmental Laboratory 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement, Version 2.0* (USACE 2012). Wetlands and watercourses were also delineated in accordance with the Pennsylvania Department of Environmental Protection (PADEP) Chapter 105 Regulations and Section 404 of the Federal Clean Water Act. Wetland habitats were classified according to the Federal Geographic Data Committee's (FGDC's) *Classification of Wetlands and Deepwater Habitats of the United States* (Second Addition; 2013).

No palustrine wetlands were identified within the project study area. Adams Creek (Stream 1) is a riverine, upper perennial, unconsolidated bottom, permanently flooded wetland per the FGDC standard and a USACE water of the United States (WOUS). No wetlands under the jurisdiction of USACE were identified within the project study area. According to the Pennsylvania Code, "Title 25, Environmental Protection, Chapter 93, Water Quality Standards," Adams Creek has a Chapter 93 Classification of Exceptional Value, Migratory Fishery (EV, MF). Adams Creek is listed as a naturally reproducing trout stream by the Pennsylvania Fish and Boat Commission (PFBC). The stream is not listed a trout stocked stream or Class A wild trout stream by PFBC. The bridge is approximately 0.25 mile upstream of the confluence with the Delaware River,

which is a Scenic and Recreational River within the Federal Wild and Scenic Rivers System (Department of the Interior, National Park Service [NPS]).

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I. Introduction

I. INTRODUCTION

A.D. Marble conducted a wetland and waterway investigation in the vicinity of the proposed S.R. 0209 over Adams Creek bridge in Delaware Township, Pike County, Pennsylvania (Appendix A: Figure 1). The bridge is located within the Delaware Water Gap National Recreation Area. The Federal Highway Administration (FHWA), in cooperation with the National Park Service (NPS), proposes to make repairs to the S.R. 0209 over Adams Creek bridge. The field investigation was conducted on July 12, 2018.

A. Project Description

The FHWA proposes to make repairs to the S.R. 0209 over Adams Creek bridge. The structural repairs include cleaning scuppers, repairing deteriorated areas of concrete on girders and an abutment/wing wall, grouting under the south abutment and installing rip-rap, and installing a rockery wall adjacent to the wing wall and backfilling behind the wall. Scour protection would include the selective installation of Class 4 riprap on the southwest abutment and grouting in place. Asphalt pavement patching would be done at the roadway approaches, and asphalt curbing would be installed on all four corners of the bridge to improve roadway drainage. Temporary construction access would be needed on the southeast corner of the bridge and at the northwest corner of the bridge, and a temporary sandbag/barrier stream diversion would be installed to install scour protection.

The project area is located in a forested setting within the Delaware Water Gap National Recreation Area. The S.R. 0209 over Adams Creek bridge is located in Pike County within a remote section of the recreation area. The surrounding terrain is heavily forested, with steep slopes on either side of the creek. A wooden footbridge is located upstream (northwest) of the bridge and provides hiking access across Adams Creek.

II. Investigation Methodology

II. INVESTIGATION METHODOLOGY

A. Preliminary Data Review

A literature review included the examination of the following maps: the U.S. Department of Agriculture, Natural Resources Conservation Service's (USDA-NRCS's) soils map; and the U.S. Fish and Wildlife Service's (USFWS's) National Wetlands Inventory (NWI) map.

B. Wetland and Waterway Investigation

The project study area was defined by the engineers to encompass all anticipated ground disturbance for the proposed bridge repairs. The project study area for the S.R. 0209 over Adams Creek bridge is approximately 0.36 acre in size and is depicted on Figures 2 and 3 (Appendix A). The project study area includes transportation, recreation, and forested land uses.

Two wetland investigation methodologies were followed. The U.S. Army Corps of Engineers method was utilized since a Pennsylvania Department of Environmental Protection General Permit will be required for the project. The National Park Service method was utilized due to the project location in the Delaware Water Gap National Recreation Area.

U.S. Army Corps of Engineers Method

This report was prepared to document the extent of wetlands and watercourses within the project study area. The wetland investigation was conducted in accordance with the U.S. Army Corps of Engineers' (USACE's) *Wetlands Delineation Manual* (Environmental Laboratory 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement, Version 2.0* (USACE 2012); the Pennsylvania Department of Environmental Protection (PADEP) Chapter 105 Regulations; and Section 404 of the Federal Clean Water Act. Wetland habitats were classified according to the Federal Geographic Data Committee's (FGDC's) *Classification of Wetlands and Deepwater Habitats of the United States* (Second Addition; 2013). Pertinent information, including dominant vegetation, hydric soil indicators, wetland hydrology indicators, and types of disturbance (if applicable), was recorded on wetland determination data forms.

National Park Service Method

The report was also prepared to document the extent of aquatic resources in the project area in accordance with the Federal Geographic Data Committee (FGDC) Wetlands Classification Standard following the methods outlined in *National Park Service (NPS) Procedural Manual #77-1: Wetland Protection* (NPS 2016).

III. Results

III. RESULTS

A. Background Information Review

Results from the background review and field investigation are indicated below. The soils map (Appendix A: Figure 2) indicates that one soil type is located within the project study area. Wyalusing fine sandy loam (143) is located in the proposed project study area and is considered predominantly hydric (Table 1).

Table 1. USDA-NRCS Soils within the Project Study Area.

Soil Mapping Symbol	Soil Mapping Unit	Hydric Status
143	Wyalusing fine sandy loam	Predominantly hydric

The NWI quadrangle for Pike County, Pennsylvania (Appendix A: Figure 2), indicates that one riverine, upper perennial, unconsolidated bottom, permanently flooded (R3UBH) wetland is located at the southern edge of the project study area. During the field view, the R3UBH wetland was field confirmed as Adams Creek. The actual boundaries of the creek were delineated during the field view.

B. Wetland and Waterway Field Investigation

The field investigation was conducted on July 12, 2018 in accordance with the USACE and National Park Service wetland evaluation methods.

As a result of the field investigations, one waterway was delineated within the project study area following the USACE method. No palustrine wetlands were delineated. Waterway limits were delineated at the ordinary high water mark (OHWM) and marked with flagging tape. The locations of each flag were recorded on a global positioning system (GPS) to sub-meter accuracy. The delineated boundaries of the waterway are shown on aerial photography (Appendix A: Figure 3). Waterway resources are summarized in Table 2, and a detailed description is provided below. Figure 3 depicts the locations of the aquatic resources as delineated during field investigations. Photographs are included as Appendix B, wetland data sheets are provided as Appendix C, and stream data sheets are provided as Appendix D.

The wetland investigation was also conducted following methods outlined in *National Park Service (NPS) Procedural Manual #77-1: Wetland Protection (NPS 2016)*. Aquatic resources were evaluated following the FGDC Wetlands Classification Standard resulting in Adams Creek being identified as Riverine Wetland.

Table 2. Wetlands/Waterways Summary.

Resource ID	Waterway Name	FGDC Classification	WOUS	Chapter 93 Classification	Approved Trout Water
Stream 1	Adams Creek	R3UBH - Upper Perennial, Unconsolidated Bottom, Permanently Flooded	Yes	EV, MF	Yes (Natural Reproducing)

EV, MF – Exceptional Value Waters and Migratory Fishery

Uplands

The area within the project study area is upland forest that declines steeply to Adams Creek (Stream 1). Four data points (Appendix C) were collected to document the area surrounding the bridge repair project. The four data points were collected in low spots on terraces in all four quadrants of the bridge. Hydrophytic vegetation was not present at any of the four data points. Dominant tree and shrub species included *Acer saccharum* (sugar maple, FACU), *Tilia americana* (basswood, FACU), *Ulmus rubra* (slippery elm, FAC), *Carya ovata* (shagbark hickory, FACU), *Tsuga canadensis* (eastern hemlock, FACU), *Berberis thunbergii* (Japanese barberry, FACU), and *Lindera benzoin* (spicebush, FACW). Dominant herbaceous species included *Parthenocissus quinquefolia* (Virginia creeper, FACU), *Toxicodendron radicans* (poison ivy, FACU), *Ambrosia artemisiifolia* (annual ragweed, FACU), *Pyrola americana* (American wintergreen, FACU), *Polystichum acrostichoides* (Christmas fern, FACU), and *Dryopteris marginalis* (marginal wood fern, FACU). No wetland hydrology indicators were observed with the project study area. A soil test pit was dug to observe soil characteristics at each data point. None of the four test pits revealed hydric soil indicators and were generally described as dry and rocky.

Wetlands/Waterways

One riverine wetland/waterway was delineated within the project study area. Adams Creek, delineated as Stream 1, is a perennial stream flowing northwest to southeast through the project study area. Adams Creek has a Chapter 93 Classification of Exceptional Value, Migratory Fishery (EV, MF). Adams Creek is listed as a naturally reproducing trout stream by the Pennsylvania Fish and Boat Commission (PFBC). The stream is not listed a trout stocked stream or Class A wild trout stream by PFBC. The bridge is approximately 0.25 mile upstream of the confluence with the Delaware River, which is a Scenic and Recreational River within the Federal Wild and Scenic Rivers System (Department of the Interior, National Park Service [NPS]). Within the project study area, Stream 1 averaged 10 inches deep and 20 feet wide. The delineated landward limits of Adams Creek are bounded by the channel bank and uplands as defined by FGDC Wetlands Classification Standard. The delineated waterway boundary is also the same as the USACE Ordinary High Water Mark. The substrate was predominantly cobble with large boulders. Macroinvertebrates were observed by examining the bottoms of rocks located on the streambed. Tricoptera (caddisfly) were abundant and Plecoptera (stonefly) and Ephemeroptera (mayfly) were common.

Riverine Wetland Functional Assessment

The USACE New England Method (also known as the Corps Descriptive Method) was utilized to assess the functions and values of the riverine wetland. The evaluator first determines if a wetland is suitable for particular functions and values, followed by a determination of what functions and values are principal to that wetland. The 13 functions and values that are considered by the Regulatory Branch for any Section 404 wetland permit are listed below. The list includes eight functions and five values. Values are grouped together at the end of the list. A Wetland Function-Value Data form is included in Appendix E. The principal functions for the wetland are summarized below:

- Groundwater recharge/discharge;
- Floodflow alteration;
- Fish and shellfish habitat;
- Sediment/toxicant/pathogen retention;
- Nutrient removal/retention/transformation;
- Production export (nutrient);

-
- Sediment/shoreline stabilization;
 - Wildlife habitat;
 - Recreation;
 - Educational/scientific value;
 - Uniqueness/heritage;
 - Visual quality/aesthetics; and
 - Threatened or endangered species habitat.

Adams Creek

Principal functions of Adams Creek include fish and shellfish habitat and recreation. These functions were selected due to the documented use of the riverine wetland by local fisherman and because the Adams Creek is a naturally reproducing trout stream.

IV. Summary and Conclusions

IV. SUMMARY AND CONCLUSIONS

A.D. Marble performed a wetland and waterway investigation on July 12, 2018, and conducted an aquatic resources investigation in the vicinity of the proposed S.R. 0209 over Adams Creek bridge repair in Delaware Township, Pike County, Pennsylvania. The survey identified and delineated one riverine wetland/waterway (Adams Creek) within the project study area.

Two wetland investigation methodologies were followed. The U.S. Army Corps of Engineers method was utilized since a Pennsylvania Department of Environmental Protection General Permit will be required for the project. The National Park Service method was utilized due to the project location in the Delaware Water Gap National Recreation Area.

The watercourse (Adams Creek) identified in the report meets the definition as formulated by the USACE, which has jurisdictional authority over “Waters of the U.S.” and includes waterways and wetlands under the purview of Section 404 of the Clean Water Act (CWA). Wetlands were delineated in accordance with procedures outlined in the USACE’s *Wetlands Delineation Manual* (Environmental Laboratory 1987) and recent guidance documents on CWA jurisdiction, in addition to the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement, Version 2.0* (USACE 2012). No palustrine wetlands were identified in the project study area.

The wetland investigation was also conducted following methods outlined in *National Park Service (NPS) Procedural Manual #77-1: Wetland Protection* (NPS 2016). Aquatic resources were evaluated following the FGDC Wetlands Classification Standard resulting in Adams Creek being identified as a riverine, upper perennial, unconsolidated bottom, permanently flooded wetland.

References

REFERENCES

- ArcGIS Map Service. “World Imagery” via <https://clarity.maprites.arcgis.com/arcgis/rest/services>. Data source: Pike County Soils 2017 and USFWS NWI 2018.
- Department of the Interior; National Park Service (NPS). “Interactive Map of NPS Wild and Scenic Rivers.” www.nps.org, accessed July 27, 2018.
- Environmental Laboratory. 1987. U.S. Army Corps of Engineers. *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-01. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.
- Federal Geographic Data Committee (FGDC). 2013. *Classification of Wetlands and Deepwater Habitats of the United States*. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, D.C.
- National Geographic Society. 2013. Pennsylvania Quadrangles: Guvlers Gap (1974), Edgemere and Milford (1984) and Lake Maskenozha (1975).
- National Park Service. 2016. National Park Service Procedural Manual #77-1: Wetland Protection.
- Pennsylvania Department of Environmental Protection (PADEP), Bureau of Water Quality Management. 2009. Pennsylvania Code, “Title 25, Environmental Protection, Chapter 93: Water Quality Standards.” Harrisburg, Pennsylvania.
- Pennsylvania Fish & Boat Commission (PFBC). *Class A Wild Trout Waters*. May 14, 2018. <http://www.fishandboat.com/Fish/PennsylvaniaFishes/Trout/Documents/classa.pdf>, accessed July 27, 2018.
- Pennsylvania Fish & Boat Commission (PFBC). *Pennsylvania Wild Trout Waters (Natural Reproduction)* (May 2018). http://www.fishandboat.com/Fish/PennsylvaniaFishes/Trout/Documents/trout_repro.pdf, accessed July 27, 2018.
- Pennsylvania Fish & Boat Commission (PFBC). *Stocked Trout Waters*. Summary Book 2018 Pennsylvania Fishing Laws and Regulations. http://www.fish.state.pa.us/fishpub/summary/troutregs_sc.htm, accessed July 27, 2018.
- Pennsylvania Spatial Data Access (PASDA): The Pennsylvania Geospatial Data Clearinghouse website. 2014. *National Wetlands Inventory for Pennsylvania*. 2018. U.S. Fish and Wildlife Service. <http://www.pasda.psu.edu/>.
-

U.S. Army Corps of Engineers (USACE). 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement, Version 2.0* (ERDC/EL TR-12-1) U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

U.S. Army Corps of Engineers New England District. The Highway Methodology Workbook Supplement, Wetland Functions and Values: A Descriptive Approach. NAEEP-3601-1-30a, September 1999

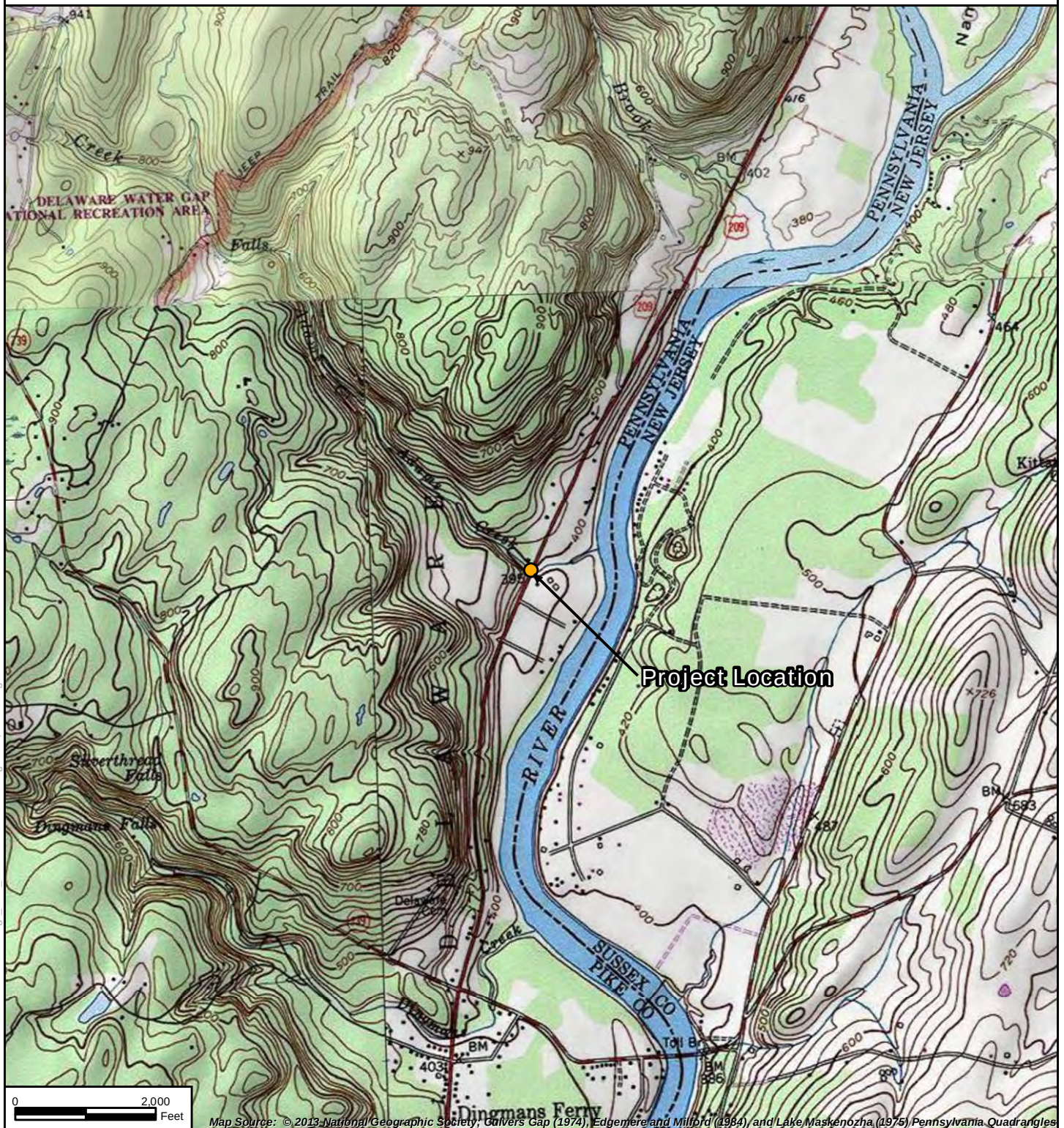
U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). Web Soil Survey website. <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>, accessed July 27, 2018.

X-rite, Incorporated. 2009. *Munsell Soil-Color Charts*, Grand Rapids, Michigan.

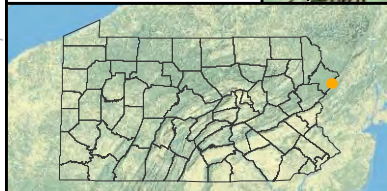
Appendix A

Figures

Figure 1
Project Location Map
S.R. 0209 over Adams Creek Bridge Repair Project
Delaware Township, Pike County, Pennsylvania



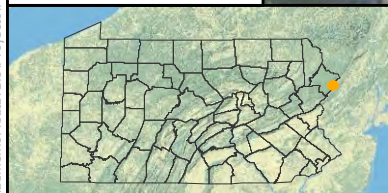
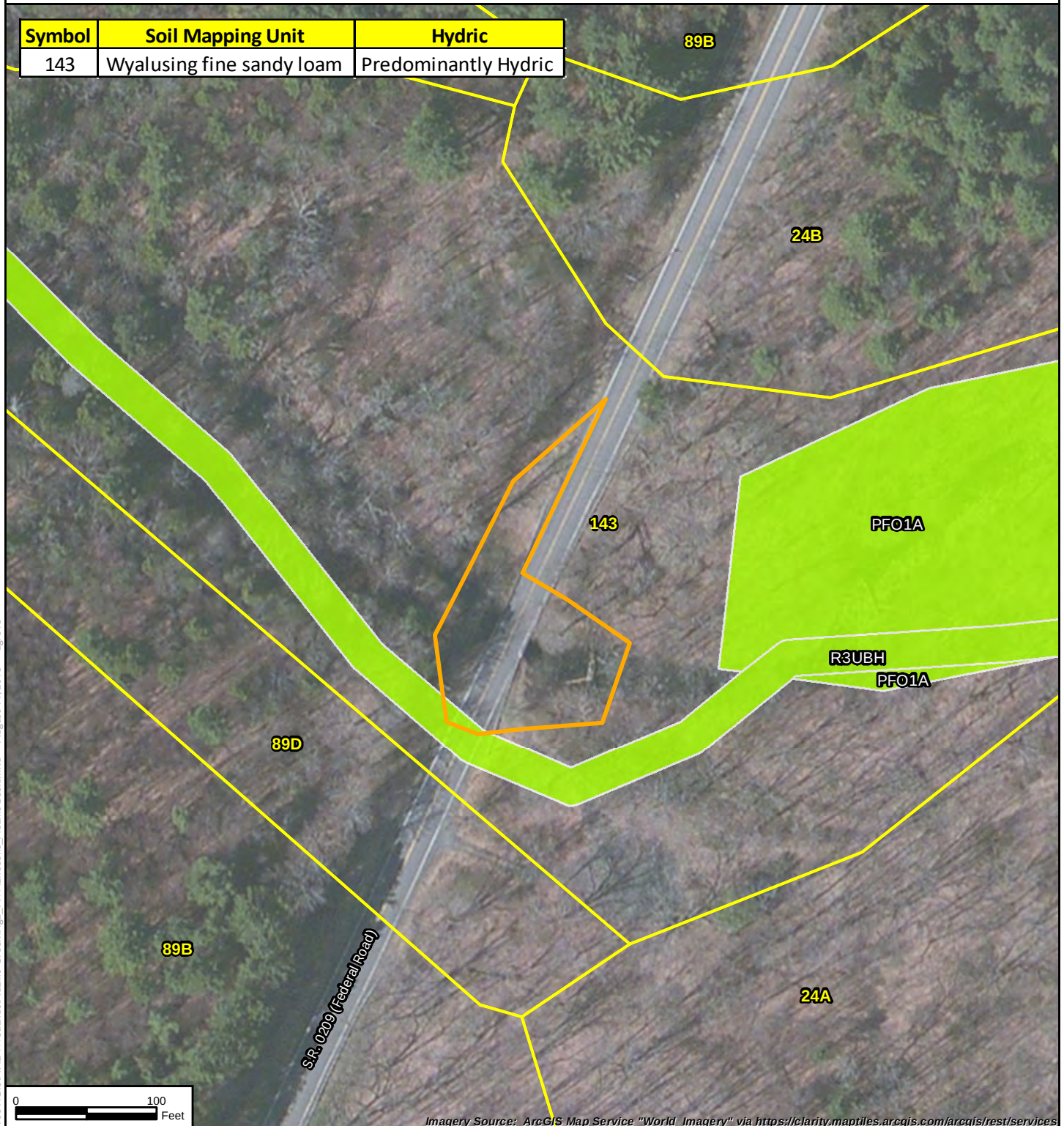
Site Coordinates: 41.239229, -74.866325



● Project Location

Figure 2
 NWI and Soils Map
 S.R. 0209 over Adams Creek Bridge Repair Project
 Delaware Township, Pike County, Pennsylvania

Symbol	Soil Mapping Unit	Hydric
143	Wyalusing fine sandy loam	Predominantly Hydric



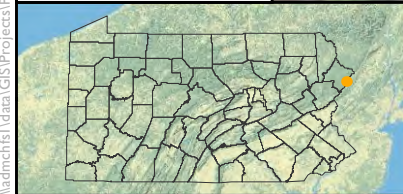
- Project Study Area
- NRCS Mapping Unit
- NWI Wetland

Data Source: USDA Pike County Soils 2017, USFWS NWI 2018



Imagery Source: ArcGIS Map Service "World Imagery" via <https://clarity.maptiles.arcgis.com/arcgis/rest/services>

Delineators: M. Marra and B. Gabel
Date of Delineation: July 12, 2018



- Project Study Area
- Footbridge
- Data Point

- Stream Flag
- Delineated Stream Boundary
- Photograph Location

Data Source: Eastern Federal Lands Highway Division 2018

Figure 3
Wetlands and Waterways
S.R. 0209 over Adams Creek Bridge Repair Project
Delaware Township, Pike County, Pennsylvania

Appendix B

Photographs



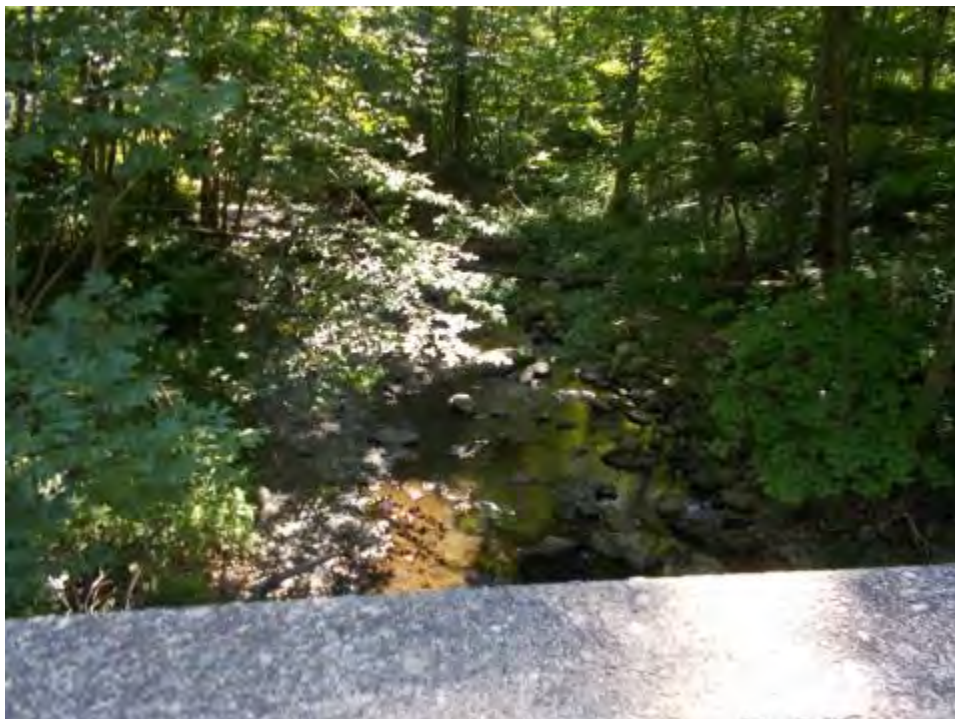
Photograph 1: View of the S.R. 0209 bridge over Adams Creek approach, facing southwest (July 2018).



Photograph 2: View of the S.R. 0209 bridge over Adams Creek approach, facing northeast (July 2018).



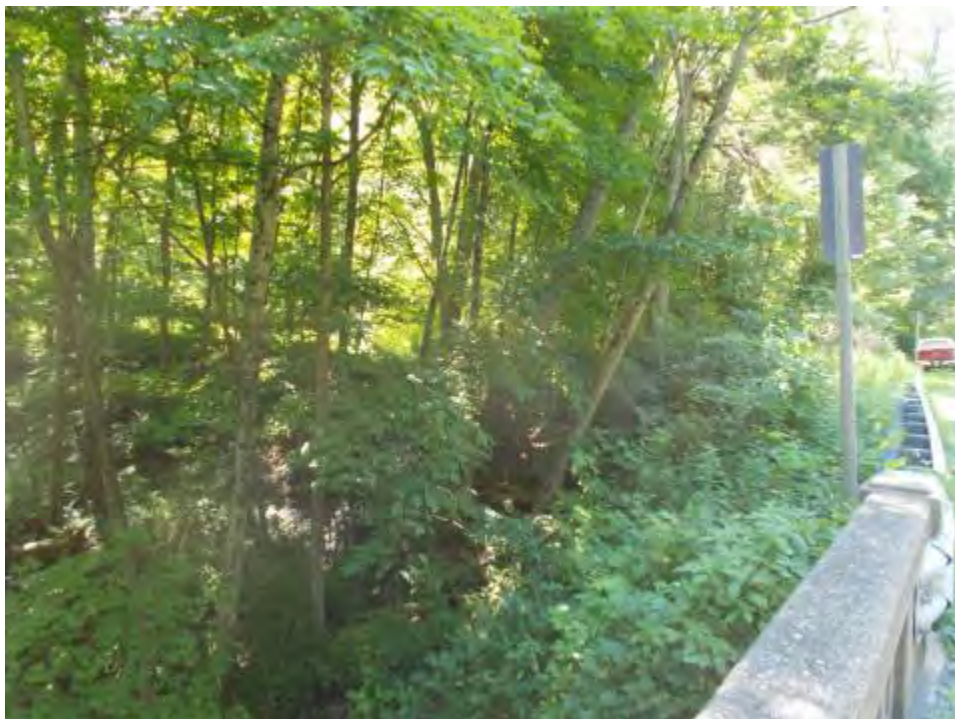
Photograph 3: Upstream view of Adams Creek, facing northwest. Photograph was taken from the S.R. 0209 bridge (July 2018).



Photograph 4: Downstream view of Adams Creek, facing southeast. Photograph was taken from the S.R. 0209 bridge (July 2018).



Photograph 5: View of the northeast quadrant of the bridge study area, facing northeast (July 2018).



Photograph 6: View of the southeast quadrant of the bridge study area, facing southeast (July 2018).



Photograph 7: View of the southwest quadrant of the bridge study area, facing southwest (July 2018).



Photograph 8: View of the northwest quadrant of the bridge study area, facing northwest (July 2018).



Photograph 9: View of the northwest quadrant of the bridge study area, facing southwest (July 2018).



Photograph 10: View of the footbridge across Adams Creek, facing west. The footbridge is located northwest of the bridge study area (July 2018).



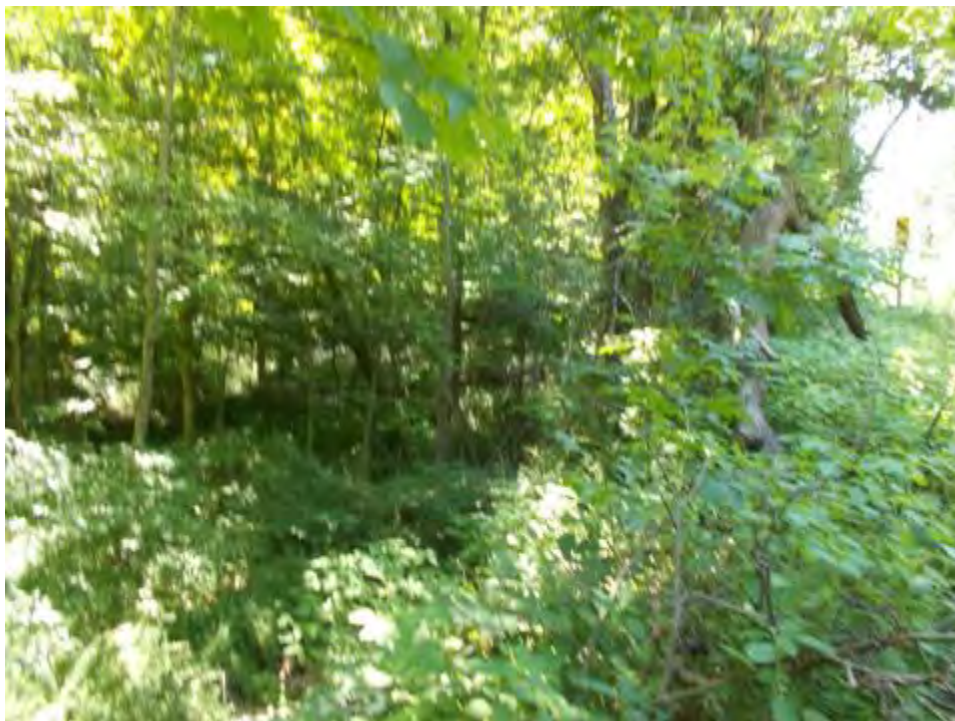
Photograph 11: View of the southwest quadrant of the bridge study area, facing southeast (July 2018).



Photograph 12: Downstream view of Adams Creek, facing southeast. The photograph also shows the S.R. 0209 bridge over Adams Creek (center; July 2018).



Photograph 13: View of the southeast quadrant of the bridge study area, showing an old access road in this quadrant, facing southeast (July 2018).



Photograph 14: View of the northeast quadrant of the bridge study area, facing southeast (July 2018).

Appendix C

Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM --Northcentral and Northeast Region

Project/Site: Adams Creek Bridge City/County: Delaware Twp/ Pike County Sampling Date: 7/12/2018
 Applicant/Owner: Federal Highway Administration State: PA Sampling Point: DP1
 Investigator(s): A.D. Marble (B. Gabel, M. Marra) Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%) 0
 Subregion (LRR or MLRA): MLRA R Lat: 41.239292 Long: -74.866063 Datum: WGS 1984
 Soil Map Unit Name: Wyalusing fine sandy loam (143) NWI classification: NA

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

VEGETATION -- Use Scientific Names of Plants

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Acer saccharum</i>	40	Yes	FACU
2. <i>Tilia americana</i>	20	Yes	FACU
3. <i>Carya ovata</i>	10	No	FACU
4. <i>Ulmus rubra</i>	5	No	FAC
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
	75 = Total Cover		

Sapling/Shrub Stratum (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Berberis thunbergii</i>	40	Yes	FACU
2. <i>Acer saccharum</i>	20	Yes	FACU
4. <i>Lindera benzoin</i>	15	Yes	FACW
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	75 = Total Cover		

Herb Stratum (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Parthenocissus quinquefolia</i>	20	Yes	FACU
2. <i>Toxicodendron radicans</i>	15	Yes	FAC
3. <i>Urtica dioica</i>	10	No	FAC
4. <i>Alliaria petiolata</i>	5	No	FACU
5. <i>Sanguinaria canadensis</i>	5	No	FACU
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
	55 = Total Cover		

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	0 = Total Cover		

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW or FAC 29 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = <u>0</u>
FACW species _____	x 2 = <u>0</u>
FAC species _____	x 3 = <u>0</u>
FACU species _____	x 4 = <u>0</u>
UPL species _____	x 5 = <u>0</u>
Column Totals: <u>0</u> (A)	<u>0</u> (B)
Prevalence Index = B/A = <u>#DIV/0!</u>	

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Vegetation
 ____ Dominance Test is >50%
 ____ Prevalence Index is $\leq 3.0^1$
 ____ Morphological Adaptations¹ (Provide supporting data in Remarks or on separate sheet)
 ____ Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in DBH, regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

Woody vines - All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: (Include photo numbers here or on separate sheet.) Hydrophytic vegetation was not present at DP1.

SOIL

Sampling Point: **DP1**

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		
0-16	10YR 2/2	100					loam	dry; gravelly

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand C²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)
☐ Histic Epipedon (A2)	☐ (LRR R, MLRA 149B)
☐ Black Histic (A3)	☐ Thin Dark Surface (S9)
☐ Hydrogen Sulfide (A4)	☐ (LRR R, MLRA 149B)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1) (LRR K, L)
☐ Depleted Below Dark Surface (A11)	☐ Loamy Gleyed Matrix (F2)
☐ Thick Dark Surface (A12)	☐ Depleted Matrix (F3)
☐ Sandy Mucky Mineral (S1)	☐ Redox Dark Surface (F6)
☐ Sandy Gleyed Matrix (S4)	☐ Depleted Dark Surface (F7)
☐ Sandy Redox (S5)	☐ Redox Depressions (F8)
☐ Stripped Matrix (S6)	
☐ Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ Coast Prairie Redox (A16) (LRR K, L, R)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Dark Surface (S7) (LRR K, L)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
☐ Red Parent Material (TF2)
☐ 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: _____ Rock _____
 Depth (inches): _____ 16 _____

Hydric Soil Present? Yes _____ No X

Remarks: Hydric soils were not present at DP1. The soil was a dark gravelly loam. A restrictive rock layer was observed at 16 inches.

HYDROLOGY**Wetland Hydrology Indicators:**

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

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☐ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ Marl Deposits (B15)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Other (Explain in Remarks)
☐ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ 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 <u>X</u>	Depth (inches): _____
Water Table Present?	Yes _____ No <u>X</u>	Depth (inches): _____
Saturation Present?	Yes _____ No <u>X</u>	Depth (inches): _____

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No X

Remarks: Wetland hydrology indicators were not present at DP1.

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

Hydrophytic Vegetation present?	Yes _____ No <u>X</u>	Is the Sample Area
Hydric Soils Present?	Yes _____ No <u>X</u>	within a wetland? Yes _____ No <u>X</u>
Wetland Hydrology Present?	Yes _____ No <u>X</u>	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.) DP1 did not meet any of the three wetland criteria. DP1 was the representative upland data point in the forested upland within the northeast quadrant of the project study area. DP1 was located on the first level terrace approximately 10 feet above the stream.

WETLAND DETERMINATION DATA FORM --Northcentral and Northeast Region

Project/Site: Adams Creek Bridge City/County: Delaware Twp/ Pike County Sampling Date: 7/12/2018
 Applicant/Owner: Federal Highway Administration State: PA Sampling Point: DP2
 Investigator(s): A.D. Marble (B. Gabel, M. Marra) Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%) 5
 Subregion (LRR or MLRA): MLRA R Lat: 41.23957 Long: -74.866228 Datum: WGS 1984
 Soil Map Unit Name: Wyalusing fine sandy loam (143) NWI classification: NA

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

VEGETATION -- Use Scientific Names of Plants

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
0 = Total Cover			

Sapling/Shrub Stratum (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
0 = Total Cover			

Herb Stratum (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Ambrosia artemisiifolia</i>	90	Yes	FACU
2. <i>Toxicodendron radicans</i>	10	No	FAC
3. <i>Erigeron annuus</i>	5	No	FACU
4. <i>Solidago canadensis</i>	3	No	FACU
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
108 = Total Cover			

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
0 = Total Cover			

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (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 = <u>0</u>
FACW species _____	x 2 = <u>0</u>
FAC species _____	x 3 = <u>0</u>
FACU species _____	x 4 = <u>0</u>
UPL species _____	x 5 = <u>0</u>
Column Totals: <u>0</u> (A)	<u>0</u> (B)
Prevalence Index = B/A = <u>#DIV/0!</u>	

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Vegetation
 ____ Dominance Test is >50%
 ____ Prevalence Index is $\leq 3.0^1$
 ____ Morphological Adaptations¹ (Provide supporting data in Remarks or on separate sheet)
 ____ Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in DBH, regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

Woody vines - All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: (Include photo numbers here or on separate sheet.) Hydrophytic vegetation was not present at DP2.

SOIL

Sampling Point: **DP2**

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	7.5YR 4/3	100					silt loam	dry

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand C²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)
☐ Histic Epipedon (A2)	☐ (LRR R, MLRA 149B)
☐ Black Histic (A3)	☐ Thin Dark Surface (S9)
☐ Hydrogen Sulfide (A4)	☐ (LRR R, MLRA 149B)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1) (LRR K, L)
☐ Depleted Below Dark Surface (A11)	☐ Loamy Gleyed Matrix (F2)
☐ Thick Dark Surface (A12)	☐ Depleted Matrix (F3)
☐ Sandy Mucky Mineral (S1)	☐ Redox Dark Surface (F6)
☐ Sandy Gleyed Matrix (S4)	☐ Depleted Dark Surface (F7)
☐ Sandy Redox (S5)	☐ Redox Depressions (F8)
☐ Stripped Matrix (S6)	
☐ Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ Coast Prairie Redox (A16) (LRR K, L, R)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Dark Surface (S7) (LRR K, L)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
☐ Red Parent Material (TF2)
☐ 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: _____ Rock _____
 Depth (inches): _____ 3 _____

Hydric Soil Present? Yes _____ No X

Remarks: Hydric soils were not present at DP2. A restrictive rock layer was observed at 3 inches.

HYDROLOGY**Wetland Hydrology Indicators:**

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

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☐ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ Marl Deposits (B15)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Other (Explain in Remarks)
☐ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ 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 <u>X</u>	Depth (inches): _____
Water Table Present?	Yes _____	No <u>X</u>	Depth (inches): _____
Saturation Present?	Yes _____	No <u>X</u>	Depth (inches): _____
(includes capillary fringe)			

Wetland Hydrology Present? Yes _____ No X

Remarks: Wetland hydrology indicators were not present at DP2.

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

Hydrophytic Vegetation present?	Yes	<u> </u>	No	<u> X </u>	Is the Sample Area within a wetland?	Yes	<u> </u>	No	<u> X </u>
Hydric Soils Present?	Yes	<u> </u>	No	<u> X </u>					
Wetland Hydrology Present?	Yes	<u> </u>	No	<u> X </u>		If yes, optional Wetland Site ID: <u> </u>			

Remarks: (Explain alternative procedures here or in a separate report.) DP2 did not meet any of the three wetland criteria. DP2 was the representative upland data point in the forested upland within the northwest quadrant of the project study area. DP2 was taken in an opening along S.R. 0209 in an area that may have, at one point, been used as an access road for bridge work.

WETLAND DETERMINATION DATA FORM --Northcentral and Northeast Region

Project/Site: Adams Creek Bridge City/County: Delaware Twp/ Pike County Sampling Date: 7/12/2018
 Applicant/Owner: Federal Highway Administration State: PA Sampling Point: DP3
 Investigator(s): A.D. Marble (B. Gabel, M. Marra) Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%) 2
 Subregion (LRR or MLRA): MLRA R Lat: 41.238974 Long: -74.866282 Datum: WGS 1984
 Soil Map Unit Name: Wyalusing fine sandy loam (143) NWI classification: NA

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X 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.)

VEGETATION -- Use Scientific Names of Plants

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Acer saccharum</i>	40	Yes	FACU
2. <i>Ulmus rubra</i>	20	Yes	FAC
3. <i>Carya ovata</i>	15	Yes	FACU
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
	<u>75</u> = Total Cover		

Sapling/Shrub Stratum (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Berberis thunbergii</i>	60	Yes	FACU
2. <i>Acer saccharum</i>	15	No	FACU
4. <i>Lindera benzoin</i>	10	No	FACW
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	<u>85</u> = Total Cover		

Herb Stratum (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Toxicodendron radicans</i>	15	Yes	FAC
2. <i>Pyrola americana</i>	5	Yes	FACU
3. <i>Polystichum acrostichoides</i>	2	No	FACU
4. <i>Parthenocissus quinquefolia</i>	2	No	FACU
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
	<u>24</u> = Total Cover		

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	<u>0</u> = Total Cover		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW or FAC 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = <u>0</u>
FACW species _____	x 2 = <u>0</u>
FAC species _____	x 3 = <u>0</u>
FACU species _____	x 4 = <u>0</u>
UPL species _____	x 5 = <u>0</u>
Column Totals: <u>0</u> (A)	<u>0</u> (B)
Prevalence Index = B/A = <u>#DIV/0!</u>	

Hydrophytic Vegetation Indicators:

____ Rapid Test for Hydrophytic Vegetation
 ____ Dominance Test is >50%
 ____ Prevalence Index is $\leq 3.0^1$
 ____ Morphological Adaptations¹ (Provide supporting data in Remarks or on separate sheet)
 ____ Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in DBH, regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

Woody vines - All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: (Include photo numbers here or on separate sheet.) Hydrophytic vegetation was not present at DP3. Heavy leaf litter covered the sample area.

SOIL

Sampling Point: **DP3**

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		
0-15	7.5YR 4/5	100					silt loam	dry

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand C²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)
☐ Histic Epipedon (A2)	☐ (LRR R, MLRA 149B)
☐ Black Histic (A3)	☐ Thin Dark Surface (S9)
☐ Hydrogen Sulfide (A4)	☐ (LRR R, MLRA 149B)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1) (LRR K, L)
☐ Depleted Below Dark Surface (A11)	☐ Loamy Gleyed Matrix (F2)
☐ Thick Dark Surface (A12)	☐ Depleted Matrix (F3)
☐ Sandy Mucky Mineral (S1)	☐ Redox Dark Surface (F6)
☐ Sandy Gleyed Matrix (S4)	☐ Depleted Dark Surface (F7)
☐ Sandy Redox (S5)	☐ Redox Depressions (F8)
☐ Stripped Matrix (S6)	
☐ Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ Coast Prairie Redox (A16) (LRR K, L, R)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Dark Surface (S7) (LRR K, L)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
☐ Red Parent Material (TF2)
☐ 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: Rock

Depth (inches): 15

Hydric Soil Present? Yes ☐ No ☒

Remarks: Hydric soils were not present at DP3. A restrictive rock layer was observed at 15 inches.

HYDROLOGY**Wetland Hydrology Indicators:**

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

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☐ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ Marl Deposits (B15)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Other (Explain in Remarks)
☐ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ 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): <u> </u>
Water Table Present?	Yes ☐ No ☒	Depth (inches): <u> </u>
Saturation Present?	Yes ☐ No ☒	Depth (inches): <u> </u>

(includes capillary fringe)

Wetland Hydrology Present? Yes ☐ No ☒

Remarks: Wetland hydrology indicators were not present at DP3.

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

Hydrophytic Vegetation present?	Yes ☐ No ☒	Is the Sample Area
Hydric Soils Present?	Yes ☐ No ☒	within a wetland? Yes ☐ No ☒
Wetland Hydrology Present?	Yes ☐ No ☒	If yes, optional Wetland Site ID: <u> </u>

Remarks: (Explain alternative procedures here or in a separate report.) DP3 did not meet any of the three wetland criteria. DP3 was the representative upland data point in the forested upland within the southeast quadrant of the project study area. The sample area was collected south of an old access road at the top of a terrace above the steep stream bank that covered the entire southeast quadrant of the bridge.

WETLAND DETERMINATION DATA FORM --Northcentral and Northeast Region

Project/Site: Adams Creek Bridge City/County: Delaware Twp/ Pike County Sampling Date: 7/12/2018
 Applicant/Owner: Federal Highway Administration State: PA Sampling Point: DP4
 Investigator(s): A.D. Marble (B. Gabel, M. Marra) Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%) 40
 Subregion (LRR or MLRA): MLRA R Lat: 41.239226 Long: -74.866494 Datum: WGS 1984
 Soil Map Unit Name: Wyalusing fine sandy loam (143) NWI classification: NA

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

VEGETATION -- Use Scientific Names of Plants

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Carya ovata</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Acer saccharum</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>
3. <u>Tsuga canadensis</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>
4. <u>Rhus typhina</u>	<u>5</u>	<u>No</u>	<u>NI</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
	<u>50</u> = Total Cover		

Sapling/Shrub Stratum (Plot size: <u>15'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Berberis thunbergii</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Lindera benzoin</u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>
4. <u>Hamamelis virginiana</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	<u>30</u> = Total Cover		

Herb Stratum (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Polystichum acrostichoides</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Dryopteris marginalis</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
	<u>30</u> = Total Cover		

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	<u>0</u> = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

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

Percent of Dominant Species That Are OBL, FACW or FAC 14 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = <u>0</u>
FACW species _____	x 2 = <u>0</u>
FAC species _____	x 3 = <u>0</u>
FACU species _____	x 4 = <u>0</u>
UPL species _____	x 5 = <u>0</u>
Column Totals: <u>0</u> (A)	<u>0</u> (B)
Prevalence Index = B/A = <u>#DIV/0!</u>	

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
☐ Dominance Test is >50%
☐ Prevalence Index is $\leq 3.0^1$
☐ Morphological Adaptations¹ (Provide supporting data in Remarks or on separate sheet)
☐ Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in DBH, regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall.

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

Woody vines - All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: (Include photo numbers here or on separate sheet.) Hydrophytic vegetation was not present at DP4. Heavy leaf litter covered the sample area.

SOIL

Sampling Point: **DP4**

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		
0-9	7.5YR 4/4	100					loam	rocky/dry

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand C²Location: PL=Pore Lining, M=Matrix.**Hydric Soil Indicators:**

☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)
☐ Histic Epipedon (A2)	☐ (LRR R, MLRA 149B)
☐ Black Histic (A3)	☐ Thin Dark Surface (S9)
☐ Hydrogen Sulfide (A4)	☐ (LRR R, MLRA 149B)
☐ Stratified Layers (A5)	☐ Loamy Mucky Mineral (F1) (LRR K, L)
☐ Depleted Below Dark Surface (A11)	☐ Loamy Gleyed Matrix (F2)
☐ Thick Dark Surface (A12)	☐ Depleted Matrix (F3)
☐ Sandy Mucky Mineral (S1)	☐ Redox Dark Surface (F6)
☐ Sandy Gleyed Matrix (S4)	☐ Depleted Dark Surface (F7)
☐ Sandy Redox (S5)	☐ Redox Depressions (F8)
☐ Stripped Matrix (S6)	
☐ Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ Coast Prairie Redox (A16) (LRR K, L, R)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Dark Surface (S7) (LRR K, L)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
☐ Red Parent Material (TF2)
☐ 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: Rock

Depth (inches): 9

Hydric Soil Present? Yes ☐ No ☒

Remarks: Hydric soils were not present at DP4. A restrictive rock layer was observed at 9 inches.

HYDROLOGY**Wetland Hydrology Indicators:**

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

☐ Surface Water (A1)	☐ Water-Stained Leaves (B9)
☐ High Water Table (A2)	☐ Aquatic Fauna (B13)
☐ Saturation (A3)	☐ Marl Deposits (B15)
☐ Water Marks (B1)	☐ Hydrogen Sulfide Odor (C1)
☐ Sediment Deposits (B2)	☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Drift Deposits (B3)	☐ Presence of Reduced Iron (C4)
☐ Algal Mat or Crust (B4)	☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Iron Deposits (B5)	☐ Thin Muck Surface (C7)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Other (Explain in Remarks)
☐ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ 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): <u> </u>
Water Table Present?	Yes ☐ No ☒	Depth (inches): <u> </u>
Saturation Present?	Yes ☐ No ☒	Depth (inches): <u> </u>

(includes capillary fringe)

Wetland Hydrology Present? Yes ☐ No ☒

Remarks: Wetland hydrology indicators were not present at DP4.

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

Hydrophytic Vegetation present?	Yes ☐ No ☒	Is the Sample Area
Hydric Soils Present?	Yes ☐ No ☒	within a wetland? Yes ☐ No ☒
Wetland Hydrology Present?	Yes ☐ No ☒	If yes, optional Wetland Site ID: <u> </u>

Remarks: (Explain alternative procedures here or in a separate report.) DP4 did not meet any of the three wetland criteria. DP4 was the representative upland data point in the forested upland within the southwest quadrant of the project study area. The sample area was collected on a steep hillslope that covered the entire southwest quadrant of the bridge.

Appendix D

Stream Data Forms

STREAM PHYSICAL CHARACTERIZATION / WATER QUALITY FIELD DATA SHEET

STREAM NAME	Adams Creek				CLIENT	FHWA	
PROJECT	Adams Creek Bridge Repair				LATITUDE	41.239229	
INVESTIGATORS	Brook Gabel	DATE	7/12/18	MM/DD/YY	LONGITUDE	-74.866325	
	Mike Marra	TIME	9:30	24 HOUR (I.E. 16:45)	FLAGGED	S1	

WEATHER CONDITIONS	NOW	WEATHER CONDITIONS		PAST 24 HOURS	HEAVY RAIN IN THE LAST 7 DAYS?		☐ YES	☒ NO
	☐	STORM (HEAVY RAIN)		☐	WETLAND FRINGE	☐ YES	☐ NO	☐ ABUTTING / ☐ ADJACENT
	☐	RAIN (STEADY RAIN)		☐	WETLAND ID	N/A		
	☐	SHOWERS (INTERMITTENT)		☐	AIR TEMPERATURE	78	°F	
	☐		% CLOUD COVER	☐	NOTES			
	☒	CLEAR/SUNNY		☒				

STREAM BACKGROUND									
STREAM TYPE	☒ PERENNIAL	☐ INTERMITTENT	☐ OTHER						
CHAPTER 93	EV, MF	EXISTING USE CLASSIFICATIONS			None				
WILD - SCENIC RIVER/STREAM		☐ YES	☒ NO	PFBC - APPROVED TROUT WATER		☐ YES	☒ NO		
CLASS A WILD TROUT		☐ YES	☒ NO	NATURALLY REPRODUCING TROUT		☒ YES	☐ NO		
IN STREAM FEATURES									
CHANNELIZED	☐ YES	☒ NO	DESCRIPTION						
STREAM GRADIENT	☐ HIGH	☒ MODERATE	☐ LOW	EMBEDDEDNESS (%)		10			
DIMENSIONS	AVERAGE WIDTH (FT)		20		AVERAGE DEPTH (FT)		10 inches		
CANOPY COVER	☐ OPEN	☐ PARTLY OPEN	☒ PARTLY SHADED	☐ SHADED					
RIPARIAN VEG. (18 M. BUFFER)	INDICATE THE DOMINANT TYPE AND RECORD THE DOMINANT SPECIES PRESENT								
	☒ TREES	☐ SHRUBS	☐ GRASSES	☐ HERBACEOUS					
WATERSHED FEATURES	PREDOMINANT SURROUNDING LAND USE								
	☒ FOREST	☐ AGRICULTURAL	☐ COMMERCIAL	☐ INDUSTRIAL					
	☐ FIELD/PASTURE	☐ RESIDENTIAL	☐ OTHER	Transportation					

MACROINVERTEBRATES (ORDER / ABUNDANCE: F-FEW C-COMMON A-ABUNDANT)	
Trichoptera (A)	
Plecoptera (C)	
Ephemeroptera (C)	

COMMENTS: S1 is the perennial Adams Creek. The bridge is approximately 0.25 mile upstream of the confluence with the Delaware River, which is a wild and scenic river.

STREAM SUBSTRATE: INORGANIC SUBSTRATE COMPONENTS (ADD TO 100%) / ORGANIC SUBSTRATE COMPONENTS (MAY BE < 100%)					
SUBSTRATE TYPE	DIAMETER	% COMPOSITION IN SAMPLING REACH	SUBSTRATE TYPE	DIAMETER	% COMPOSITION IN SAMPLING REACH
BEDROCK	-		SAND	0.06 -0.2 MM (GRITTY)	5
BOULDER	256 MM (10"+)	15	SILT	0.004 – 0.06 MM	
COBBLE	64 – 256 MM (2.5 – 10")	70	CLAY	<0.004 MM (SLICK)	
GRAVEL	2 – 64 MM (0.1 – 2.5")	10	ORGANIC (i.e. Detritus, Muck, etc.)		

PHOTOGRAPHS : Appendix B

Appendix E

Wetland Function-Value Evaluation Form

Wetland Function-Value Evaluation Form

Total Area of Wetland	<u>N/A (Waterway)</u>	Human made?	<u>No</u>	Is wetland part of a wildlife corridor?	<u>Yes</u> or a "habitat island"?
Adjacent land use	<u>Transporation, Forested (Floodplain)</u>	Distance to nearest roadway or other development	<u>10'</u>	Contiguous undeveloped buffer zone present	<u>Yes</u>
Hydrogeomorphic Position	<u>Riverine</u>	If not, where does the wetland lie in the drainage basin?	<u>Mainstem</u>	Wildlife & vegetation diversity/abundance (see attached list)	
Is the wetland a separate hydraulic system?	<u>No</u>	How many tributaries contribute to the wetland?	<u>5+</u>		

Wetland I.D.	<u>Adams Creek</u>
Latitude	<u> </u>
Longitude	<u> </u>
Prepared by:	<u>JV</u>
Wetland Impact: ?	Date: <u>9/18/2018</u>
Type	<u>R3UBH</u>
Area	<u>N/A</u>
Evaluation based on:	
Office	<u>X</u>
Field	<u>X</u>
Corps manual wetland delineation completed?	Y <u>X</u> N <u> </u>

Function/Value	Occurrence		Rationale (Reference #)*	Principal Functions(s)/ Values	Comments
Yes	No				
Groundwater Recharge/Discharge		X	4, 7		
Floodflow Alteration	X		7, 8, 10, 13		Riverine wetland able to alter limited floodflow
Fish and Shellfish Habitat	X		1, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 17	X	Adams Creek is a perennial stream; creek is a naturally reproducing trout stream.
Sediment/Toxicant Retention		X	10		
Nutrient Removal		X	2, 5		
Production Export		X	4, 6, 10		
Sediment/Shoreline Stabilization	X		1, 4, 6, 8, 9, 12, 14		Riverine wetland; Streambanks are stabilized by dense vegetation
Wildlife Habitat	X		1, 3, 4, 5, 6, 8, 16, 17, 19		Adams Creek is a naturally reproducing trout stream.
Recreation	X		1, 2, 4, 5, 6, 8, 10	X	Project located in Delaware Water Gap National Recreation Area; area is regularly used by local fisherman; foot bridge located across waterway.
Educational Scientific Value		X			
Uniqueness/Heritage		X			
Visual Quality/Aesthetics		X			
Endangered Species		X			
Other		X			

Notes: *Refer to back up list of numbered rational factors. Any rational factors that were answered with a "Yes" were recorded in the Rationale (Reference #) column of this data form.



Appendix A

Wetland evaluation supporting documentation; Reproducible forms.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.



GROUNDWATER RECHARGE/DISCHARGE— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other



FLOODFLOW ALTERATION (Storage & Desynchronization) — This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.



CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
 2. Abundance of cover objects present.
- STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE**
3. Size of this wetland is able to support large fish/shellfish populations.
 4. Wetland is part of a larger, contiguous watercourse.
 5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
 6. Stream width (bank to bank) is more than 50 feet.
 7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
 8. Streamside vegetation provides shade for the watercourse.
 9. Spawning areas are present (submerged vegetation or gravel beds).
 10. Food is available to fish/shellfish populations within this wetland.
 11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
 12. Evidence of fish is present.
 13. Wetland is stocked with fish.
 14. The watercourse is persistent.
 15. Man-made streams are absent.
 16. Water velocities are not too excessive for fish usage.
 17. Defined stream channel is present.
 18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

CONSIDERATIONS/QUALIFIERS

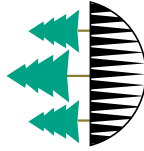
1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other



SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
 2. Potential or known sources of toxicants are in the watershed above the wetland.
 3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
 4. Fine grained mineral or organic soils are present.
 5. Long duration water retention time is present in this wetland.
 6. Public or private water sources occur downstream.
 7. The wetland edge is broad and intermittently aerobic.
 8. The wetland is known to have existed for more than 50 years.
 9. Drainage ditches have not been constructed in the wetland.
- STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.**
10. Wetland is associated with an intermittent or perennial stream or a lake.
 11. Channelized flows have visible velocity decreases in the wetland.
 12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
 13. No indicators of erosive forces are present. No high water velocities are present.
 14. Diffuse water flows are present in the wetland.
 15. Wetland has a high degree of water and vegetation interspersion.
 16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
 17. Other



NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

CONSIDERATIONS/QUALIFIERS

1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
 5. Wetland saturated for most of the season. Ponded water is present in the wetland.
 6. Deep organic/sediment deposits are present.
 7. Slowly drained fine grained mineral or organic soils are present.
 8. Dense vegetation is present.
 9. Emergent vegetation and/or dense woody stems are dominant.
 10. Opportunity for nutrient attenuation exists.
 11. Vegetation diversity/abundance sufficient to utilize nutrients.
- STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.**
12. Waterflow through this wetland is diffuse.
 13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
 14. Water moves slowly through this wetland.
 15. Other



PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.

CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. “Flushing” of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other



SEDIMENT/ShORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.

CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10') borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other



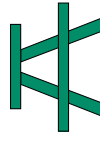
WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.¹

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersed vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

¹In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WETings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.

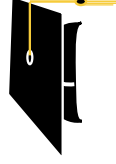
RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.



CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

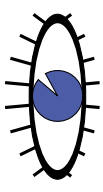


UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersed vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

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CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.