PW Parkway ES

Prince William County, Virginia

WSSI #21315.03

Waters of the U.S. (Including Wetlands) Delineation and Resource Protection Area Evaluation

October 23, 2015

Prepared for:
Prince William County Public Schools
P.O. Box 389
Manassas, Virginia 20108

Prepared by:

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Waters of the U.S. (Including Wetlands) Delineation And Resource Protection Area (RPA) Evaluation

PW Parkway ES (±25 acres) WSSI #21315.03

Introduction

Wetland Studies and Solutions, Inc. (WSSI) has determined the boundaries of the jurisdictional wetlands and other waters of the U.S. (i.e., streams and ponds) on the referenced site. Additionally, Resource Protection Area (RPA) core components on and within 100 feet of the site were evaluated to determine the extent of the RPA on the project site. As discussed in this report, jurisdictional wetlands and other waters of the U.S. are present on the study area. These waters of the U.S. include unnamed perennial and intermittent tributaries to the Occoquan River, and palustrine forested and palustrine emergent wetlands associated with these tributaries. An RPA associated with the perennial streams is also present on the study area. Our findings are depicted (as a surveyed map) on the Waters of the U.S. (Including Wetlands) Delineation and Resource Protection Area Evaluation Map (Attachment I) and are discussed briefly below.

Project Location

The site is located southeast of the intersection of Prince William Parkway (Route 3000) and Old Bridge Road at the terminus of Trowbridge Drive in Prince William County, Virginia. Exhibit 1 is a vicinity map that depicts the approximate boundaries of the study area and its general location.

Methodology

This wetland delineation was performed pursuant to the "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1 (1987 Manual) and subsequent guidance, and modified by the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region*, Version 2.0 dated April 2012. The Routine On-Site Wetland Determination Method for sites more than 5 acres was used, with multiple transects performed as depicted on Attachment I. Field work was performed by Jessica M. Campo, PWS, CT[1] and Grace McCroskey on October 7 and 8, 2015.

Prior to conducting field work, relevant background information was reviewed, including, WSSI's Waters of the U.S. (Including Wetlands) Reconnaissance Report and Sketch dated December 22, 2005, site topography, the Occoquan, VA 1994 USGS quadrangle (Exhibit 2) and Digital National Wetlands Inventory (Exhibit 3; downloaded September 2014) maps, Prince William County Soils Map data (Exhibit 4), the Prince William County Resource Protection Area (RPA) Map (Exhibit 5), and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, Panel 51153C0212D (Exhibit 6; Effective 01/05/1995). Aerial photographs of the study area, including a Spring 2004 WSSI Color Infrared Orthophotograph (Exhibit 7) and March 2013 natural color photograph from Pictometry® (Exhibit 8), were also examined to investigate whether signatures indicative of wetlands are found on the site and to document recent land use changes in the vicinity of the project site.

[1] *Professional Wetland Scientist #2601, Society of Wetlands Scientists Certification Program, Inc.; Certified Level 1 Taxonomist: All Phyla, Society for Freshwater Science (SFS); ISA Certified Certified Arborist MA-5740A.*

An Environmental Constraints Analysis study was previously performed on a portion of the PW Parkway ES study area in August 2015. This ECA study area included the portion of the PW Parkway ES study area north of Stream Reach 2-A and west of SR 1-A in the north-central portion of the study area.

Stream evaluation methods developed by the North Carolina Division of Water Quality (NCDWQ)[2] and the Fairfax County Department of Public Works and Environmental Services (DPWES)[3] were applied in the field to determine whether the streams on the site and within 100 feet of the project site are ephemeral, intermittent, or perennial. WSSI also reviewed the Palmer Drought Severity Index (Exhibit 9a) and U.S. Drought Monitor (Exhibit 9b) maps for the week preceding delineation field work to determine if drought conditions that could affect stream flows were present at the time of the stream assessment field work. Both the Palmer Index and the U.S. Drought Monitor show that this area is in a period of near-normal rainfall at the time of field work.

Observations of vegetation, soils and hydrology were recorded at representative locations in the wetlands and adjacent non-wetland areas to determine the wetland boundaries. Routine Wetland Determination data forms describing representative plant communities, hydrology indicators, and soil characteristics are included as Exhibit 10. Stream evaluation data forms that provide the results of the two stream evaluation methods and summarize WSSI's stream-flow determinations are provided in Exhibit 11. Photographs of the data point locations, representative wetland and non-wetland communities, and other existing site conditions are included in Exhibit 12. The surveyed locations of delineated wetlands, other waters of the U.S., data sites, and assessed stream reaches and the approximate locations of photographs are depicted on Attachment I.

Waters of the U.S. Delineation Findings

In WSSI's opinion, jurisdictional wetlands and other waters of the U.S. (i.e., streams) are present on this study area. These jurisdictional waters of the U.S. include two unnamed perennial tributaries and four intermittent tributaries to the Occoquan River which generally flow in an eastern direction through the northern and southern portions of the study area, and palustrine forested and palustrine emergent wetlands associated with these tributaries.

One stream in the northwestern portion of the study area was too short to assess using the NCDWQ and DPWES methods but because it has a continuous ordinary high water mark, has hydric soils, and is upstream of Stream Reach 2-A, an assessed intermittent tributary, this stream reach is considered intermittent.

Resource Protection Area Evaluation

Based on WSSI's field work, the limits of the field-verified RPA on the site are more extensive than the County-mapped RPA boundary depicted on the Prince William County RPA Map (Exhibit 5). In accordance with Section 740.03 (B) of the amended Prince William County Chesapeake Bay Preservation Ordinance (12/3/02), the unnamed perennial streams and all

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[2] *NC Division of Water Quality. 2010. Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, NC.*

[3] *Fairfax County Department of Public Works and Environmental Services. Perennial Stream Field Identification Protocol. May 2003.*

wetlands that are contiguous and connected by surface flow to the perennial stream are components of the RPA, and the field-verified RPA extends 100 feet landward of these features.

WSSI placed four "RPA cutoffs" at the site. Two were placed at the point where the intermittent streams leading into perennial streams were no longer contiguous and connected by surface flow to the perennial water body, and two were placed along narrow wetland swales at the point where these wetland swales were no longer contiguous and connected to the perennial streams. The locations of these RPA cutoffs are depicted on Attachment I.

The field-verified RPA boundary, based on WSSI's delineation and survey, stream flow evaluations, and RPA evaluation, is depicted on Attachment I. The RPA delineation will be confirmed upon approval of a Preservation Area Site Assessment by Prince William County.

Summary

In WSSI's opinion, jurisdictional wetlands and other waters of the U.S are present within the study area, based on our site observations, as described above and depicted on Attachment I. There also is an RPA located along two perennial streams and adjacent wetlands in the eastern portion of this study area.

The waters of the U.S. on the site (i.e., the wetlands and streams) are regulated by Sections 401 and 404 of the Clean Water Act and by state wetlands laws and cannot be disturbed without the appropriate permits. Such permits may include permits from local agencies, as well as the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality, depending upon the extent and type of impacts.

Limitations

This study is based on examination of the vegetation, soils and hydrology and available reference documents. Field indicators can change with variations in hydrology and other factors. Therefore, our conclusions may vary significantly from future observation by others. This report assesses the potential for wetlands at the site at the time of our review and does not address conditions at a given time in the future.

Our review and report have been prepared in accordance with generally accepted guidelines for the conduct of a survey for potential wetlands. We make no other warranties, either expressed or implied, and our report is not a recommendation to buy, sell or develop the property.

We offer no opinion and do not purport to opine on the possible application of various building codes, zoning ordinances, other land use or platting regulations, environmental or health laws and other similar statutes, laws, ordinances, code and regulations affecting the possible use and occupancy of the Property for the purpose for which it is being used, except as specifically provided above.

The foregoing opinions are based on applicable laws, ordinances, and regulations in effect as of the date hereof and should not be construed to be an opinion as to the matters set out herein should such laws, ordinances or regulations be modified, repealed or amended.

This report does not constitute a jurisdictional determination of waters of the U.S. since such determinations must be verified by the U.S. Army Corps of Engineers or the Natural Resources Conservation Service (as applicable), and are subject to review by the U.S. Environmental Protection Agency. This report does not constitute a stream characterization determination; nor does it constitute a Resource Protection Area determination since such determinations must be verified by Prince William County.

WETLAND STUDIES AND SOLUTIONS, INC.

Grace McCroskey
Environmental Technician

Jessica M. Campo, PWS, CT
Project Environmental Scientist

Benjamin N. Rosner, PWS, PWD, CT, CE
Manager – Environmental Science

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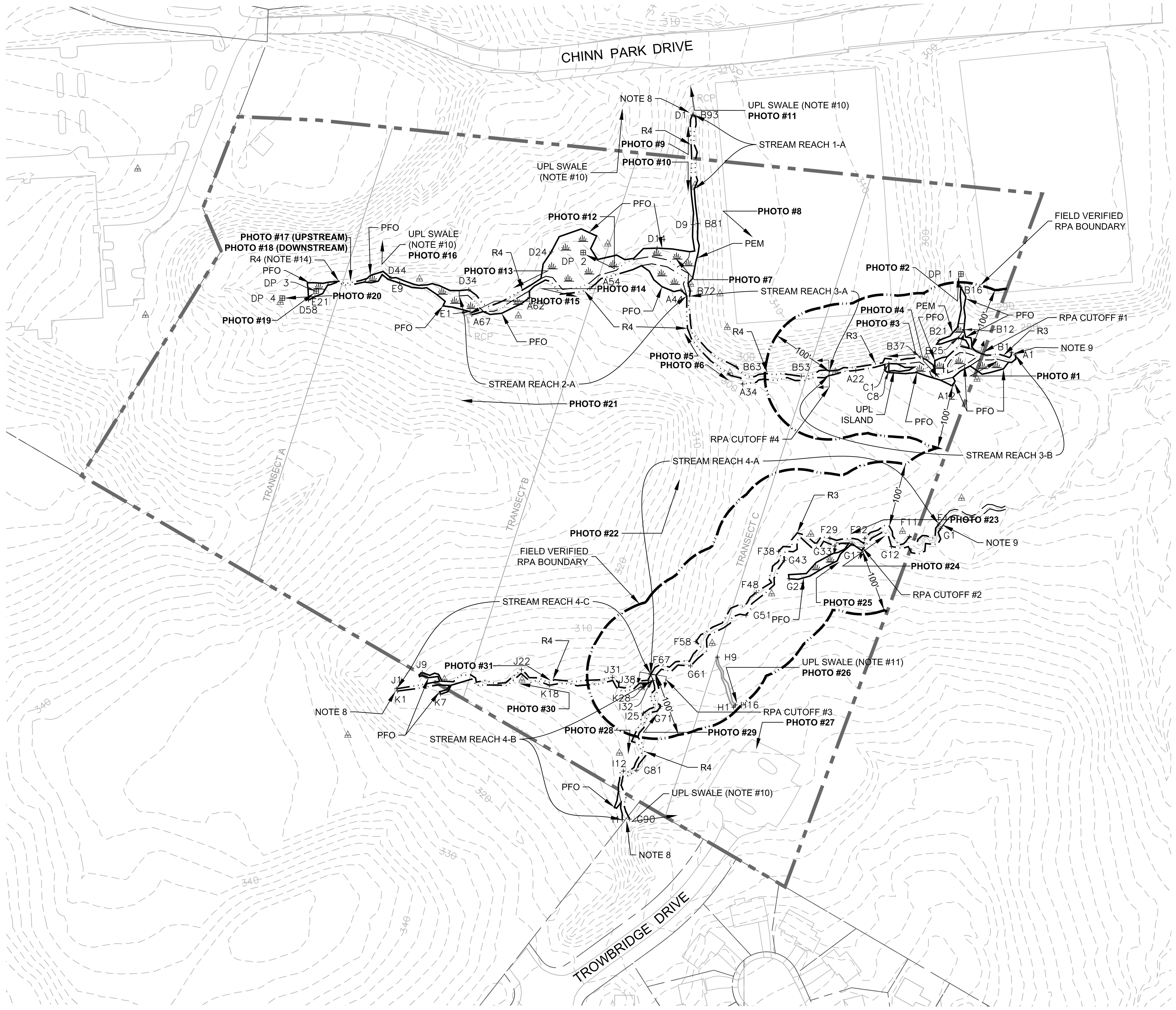
Attachment I



GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

LEGEND

- STUDY AREA BOUNDARY
- PERENNIAL STREAM (PER WSSI'S OBSERVATIONS)
- APPROXIMATE LIMITS OF PERENNIAL STREAM (PER WSSI OBSERVATIONS - NOT SURVEYED)
- INTERMITTENT STREAM (PER WSSI'S OBSERVATIONS)
- APPROXIMATE LIMITS OF INTERMITTENT STREAM (PER WSSI OBSERVATIONS - NOT SURVEYED)
- JURISDICTIONAL WETLAND AREAS
- NON-JURISDICTIONAL FEATURE (NOTE # 11)
- FIELD VERIFIED RESOURCE PROTECTION AREA BOUNDARY
- RPA CUTOFF
- D6 + WETLAND FLAGGING POINT/NUMBER (pink-glo)
- DP2 ⊞ DATA POINT LOCATION/NUMBER (orange and pink-glo) (SURVEYED)
- RCP REINFORCED CONCRETE PIPE
- △ FLY POINT (WSSI)

WATERS OF THE U.S. DELINEATION AND SURVEY NOTES:

1. This map has been oriented to The Virginia Coordinate System of 1983, North Zone, using real time DGPS. Wetlands and other Waters of the U.S. (i.e. streams) flags, data points, and the monumentation shown were located in the field using conventional survey methods. Accuracy of field locations of wetlands meets or exceeds the standards set by the U.S. Army Corps of Engineers Memo CENAO-CO-R, dated September 30, 1998. Field locations were completed on October 12, 2015.

2. The boundary line information shown hereon is for information purposes only and does not constitute a boundary survey by Wetland Studies and Solutions, Inc. (WSSI). Monumentation, including traverse stations and fly points, shown on this drawing should be used to orient wetland locations to any future boundary, topographic, or location survey.

3. Periodic flag numbers are shown depicting the survey-located boundary of wetlands and other waters of the U.S. (i.e., streams, ponds, etc.). Waters of the U.S. flags are pink-glo in color. Data points are flagged with orange-glo and pink-glo flagging tied together.

4. Topography provided by Prince William County Digital Data and study area boundary information provided by Prince William County Public Schools were used as the base for this Attachment.

5. This delineation was performed pursuant to the "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1 (1987 Manual) and subsequent guidance and modification by the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)* dated April 2012.

6. The Routine On-Site Wetland Determination Method for sites more than 5 acres was used for this site, with multiple transects performed as depicted on this Attachment.

7. Field work was performed on October 7 and October 8, 2015 by Jessica M. Campo, PWS, CT and Grace McCroskey.

8. This water of the U.S. (i.e., stream) originates outside of the study area, upslope.

9. This water of the U.S. (i.e., stream) continues outside of the study area, downslope.

10. Swales labeled "UPL SWALE (NOTE #10)" lack an ordinary high water mark and there was no evidence of flow during our field work. Hydric soil is also absent. Therefore, in WSSI's opinion, these swales are not jurisdictional waters of the U.S. (subject to COE concurrence).

11. While the swale labeled "UPL SWALE (NOTE #11)" possesses segments of a continuous ordinary high water mark, hydric soils are only present within the areas containing an ordinary high water mark (which was flagged as the non-jurisdictional feature on the map), the hydrology source is runoff from the adjacent parking lot, and the swale terminates in uplands, thereby lacking a jurisdictional connection with waters of the U.S. Therefore, in WSSI's opinion, this swale is not a jurisdictional water of the U.S. (subject to COE concurrence).

12. Stream evaluation methods developed by the North Carolina Division of Water Quality (NCDWQ) and the Fairfax County Department of Public Works and Environmental Services (DPWES) were used in the field to distinguish between ephemeral and intermittent streams (based on the NCDWQ method) and between intermittent and perennial streams (based on both methods). These methods were used to characterize representative reaches of the streams on-site and within 100 feet of the site.

13. The terms "Intermittent" and "Perennial" used on this Attachment classify and describe the flow regime character of streams, are based on WSSI's field observations, and are only provided for state and local regulatory purposes. The flow regimes of streams are not verified by the COE; however, the geographic limits of these streams are all subject to COE jurisdiction, and the COE's approval of this delineation represents only the approval of the geographic limits of waters of the U.S.

14. One stream in the northwestern portion of the study area was too short to assess but because it has a continuous ordinary high water mark, has hydric soils, and is upstream of Stream Reach 2-A, an assessed intermittent tributary, this stream reach is considered intermittent.

15. The field-verified limits of the Resource Protection Area (RPA) depicted on this Attachment are based on the surveyed location of the perennial water bodies and jurisdictional wetlands that are RPA core components. The RPA extends 100 feet landward of the RPA core components. An exact RPA delineation can be completed after a Preservation Area Site Assessment (PASA) has been prepared. The RPA delineation will be confirmed upon approval of the PASA by Prince William County.

16. The remainder of this site is designated as a Resource Management Area (RMA), as are all areas of the County not included as an RPA.

17. All wetlands and non-perennial (i.e., intermittent) streams leading into perennial streams were examined in the field to determine the RPA cutoff, the point at which these features are no longer contiguous and connected by surface flow to the perennial water body. As depicted on this Attachment, four RPA cutoffs were identified, two along intermittent streams at the point where the intermittent streams flow into or become perennial waterbodies, and two along narrow wetland swales at the point where these wetland swales were no longer contiguous and connected to the perennial streams.

18. WSSI has delineated and surveyed the outer limits of jurisdictional areas within the project site. Many of the jurisdictional areas on the site are composed of systems containing different wetland (i.e., PFO and PEM) and stream (i.e., R3, and R4) types. The approximate limits of the different wetland and stream types within the surveyed jurisdictional areas are depicted as a thin black line of the associated line type.

COWARDIN CLASSIFICATION

R3	RIVERINE UPPER PERENNIAL
R4	RIVERINE INTERMITTENT
PFO	PALUSTRINE FORESTED WETLAND
PEM	PALUSTRINE EMERGENT WETLAND

SUMMARY OF JURISDICTIONAL AREAS WITHIN THE PW PARKWAY ES PROPERTY*

COWARDIN CLASSIFICATION	AREA		LINEAR FEET OF STREAMBED
	(SQUARE FEET)	(ACRE)	
R3	7,289	0.17	937
R4	10,018	0.23	1,458
PFO	17,283	0.40	N/A
PEM	1,727	0.04	N/A
TOTAL	36,317	0.84	2,395

* These numbers are based on the surveyed and approximate locations of the delineated WOUS boundaries within the study area boundary.

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ATTACHMENT I:
WATERS OF THE U.S. (INCLUDING WETLANDS) DELINEATION AND RESOURCE PROTECTION AREA EVALUATION MAP

Prepared For: Prince William County Public Schools

PW Parkway ES

Prince William County, Virginia

REVISIONS

No.	Date	Description	Rev. By	App. By

DATE: October 23, 2015 | SCALE: 1" = 100' | C.I.: 2'

Horizontal Datum: VCS NAD 83

Vertical Datum: NAVD 1988

Boundary and Topo Source:
Prince William County Digital Data
Prince William County Public Schools

Design	Draft	Approved
GCM	JMC	BNR

Sheet # 1 of 1

Computer File Name:

Exhibit 1

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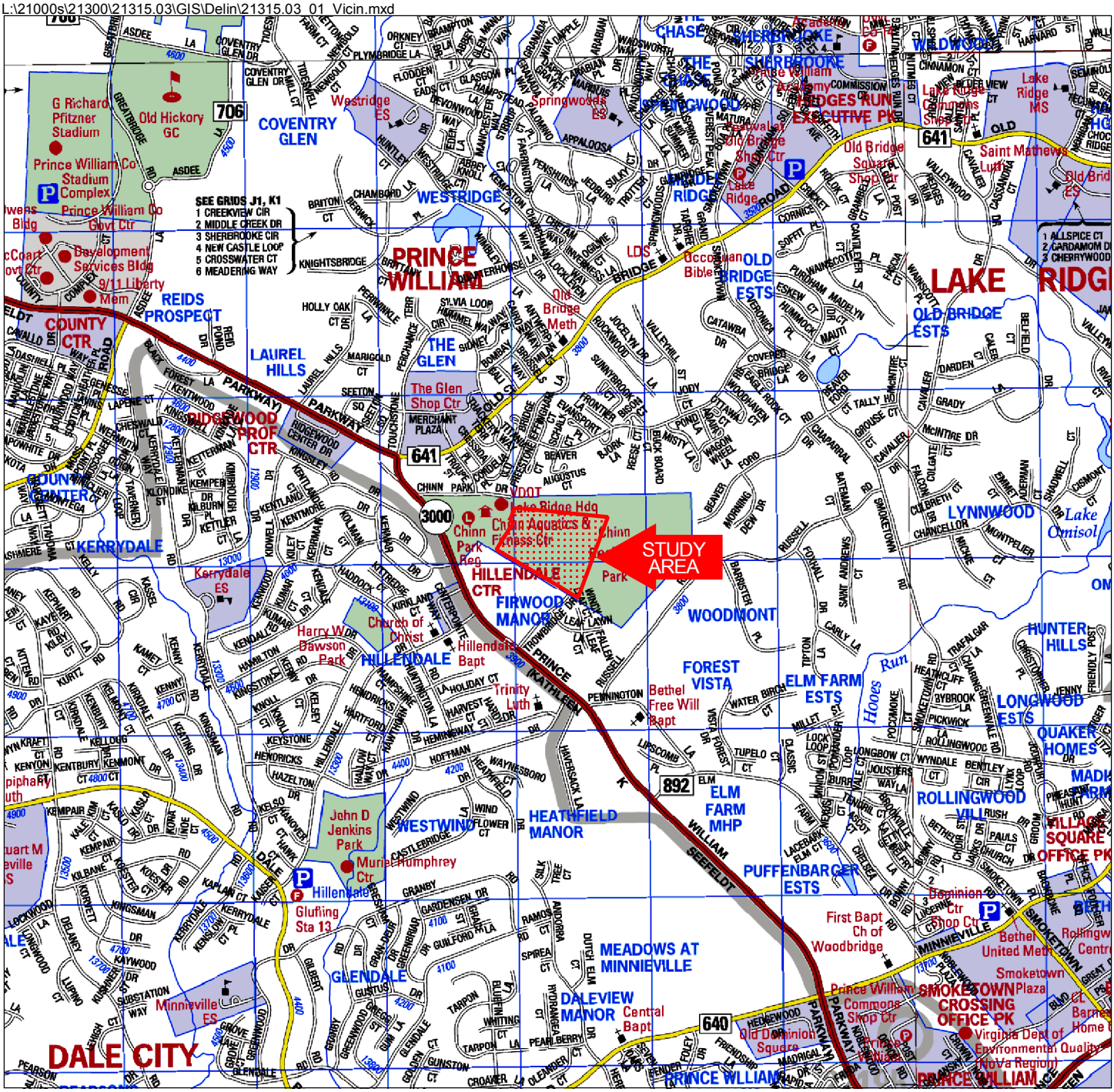

Vicinity Map
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 2000'

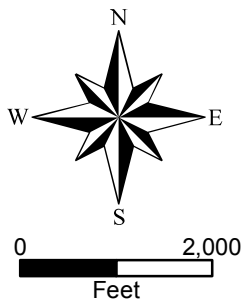

Exhibit 2

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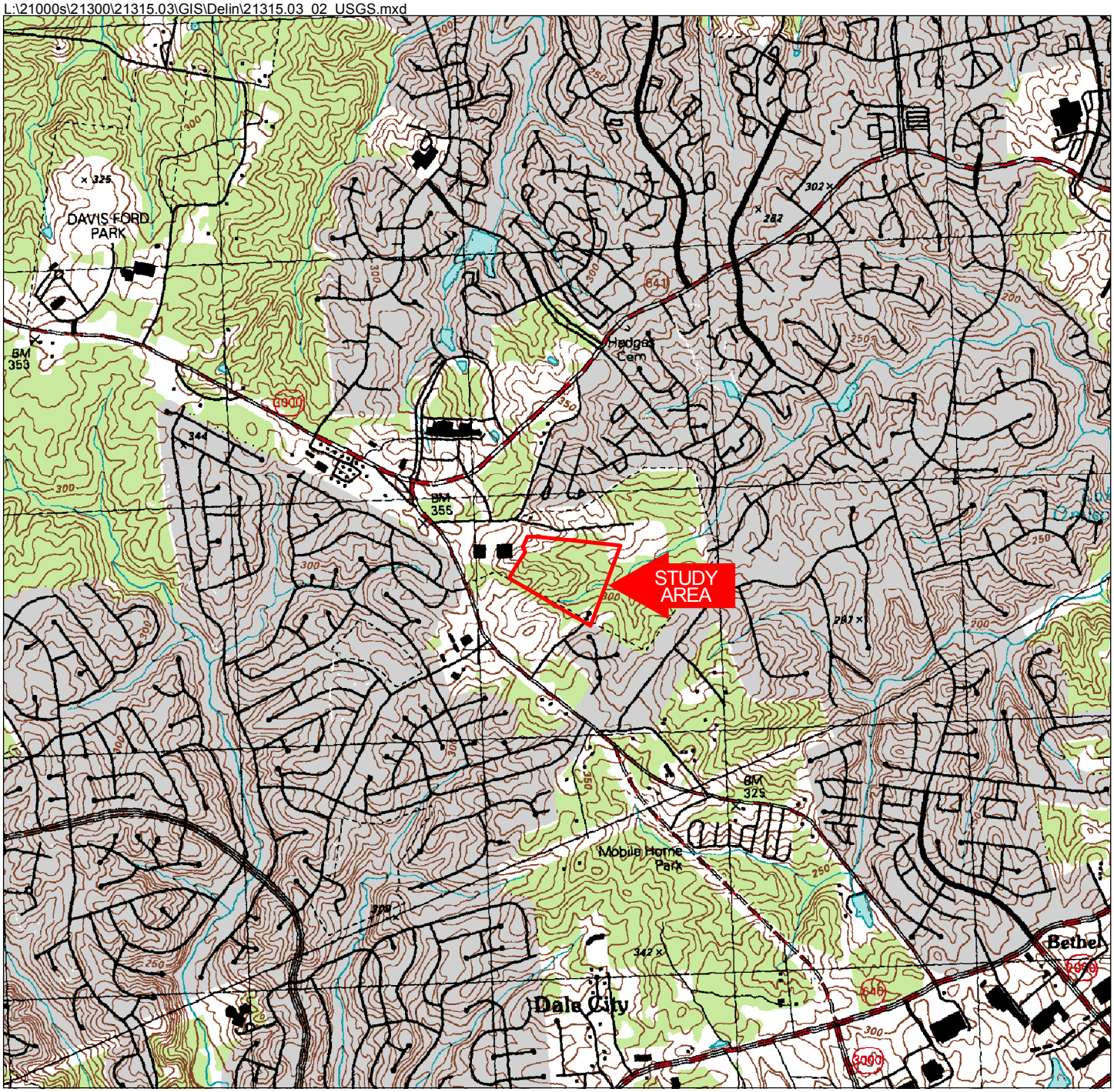

USGS Quad Map
Occoquan, VA 1994
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 2000'

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Latitude: 38°40'09" N
Longitude: 77°19'44" W
Hydrologic Unit Code (HUC): 020700100802
Stream Class: III
Name of Watershed: Occoquan River/Occoquan Reservoir
COE Region: Eastern Mountains and Piedmont

Exhibit 3

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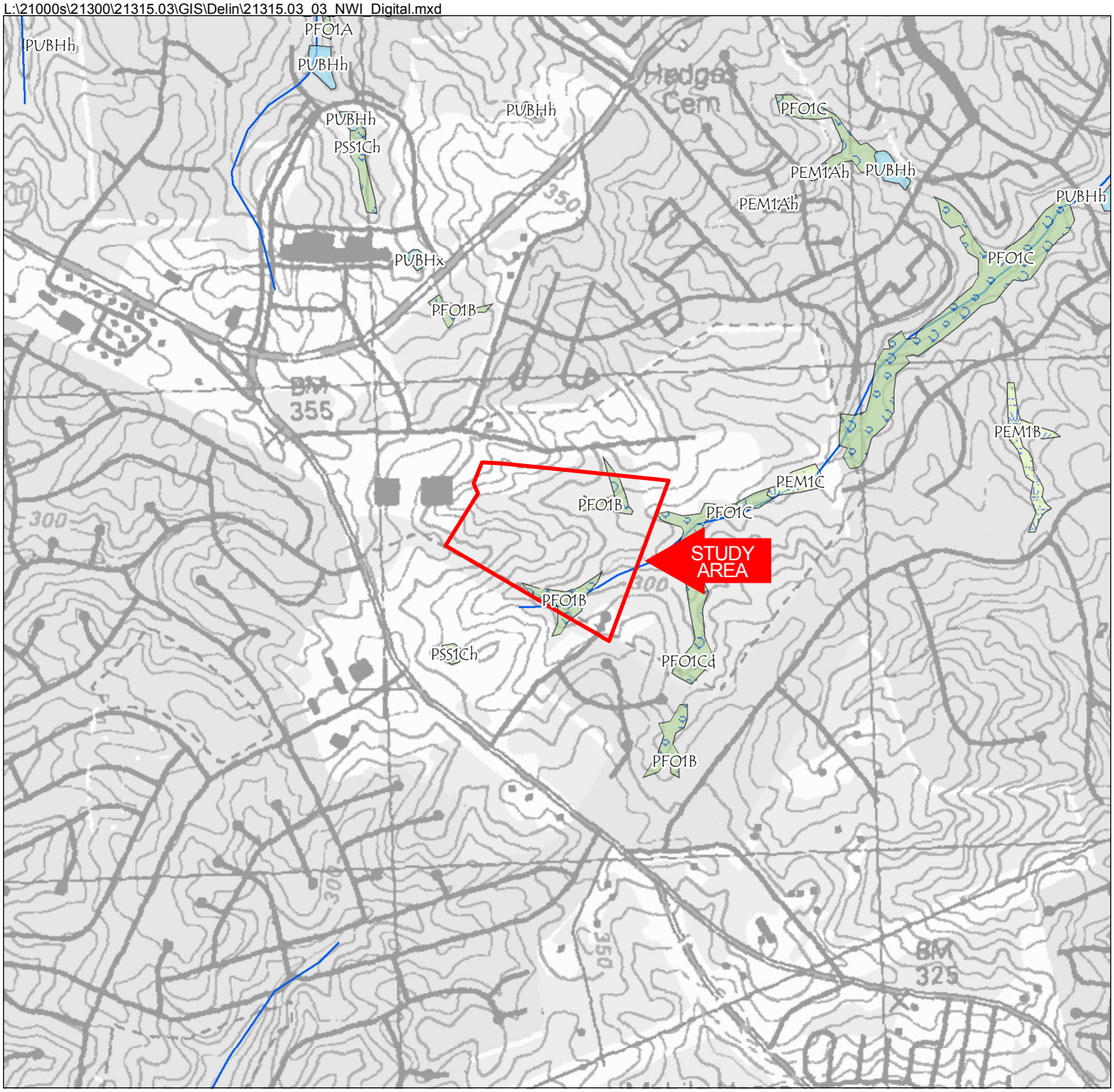

Digital National Wetlands Inventory Map
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 1000'

Wetland Type

- Open Water
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Other Wetland

Download Date: September 2014
Source: http://www.fws.gov/wetlands/Data/State-Downloads.html

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Wetland Studies and Solutions, Inc.
a DAVEY company

Exhibit 3

Exhibit 4

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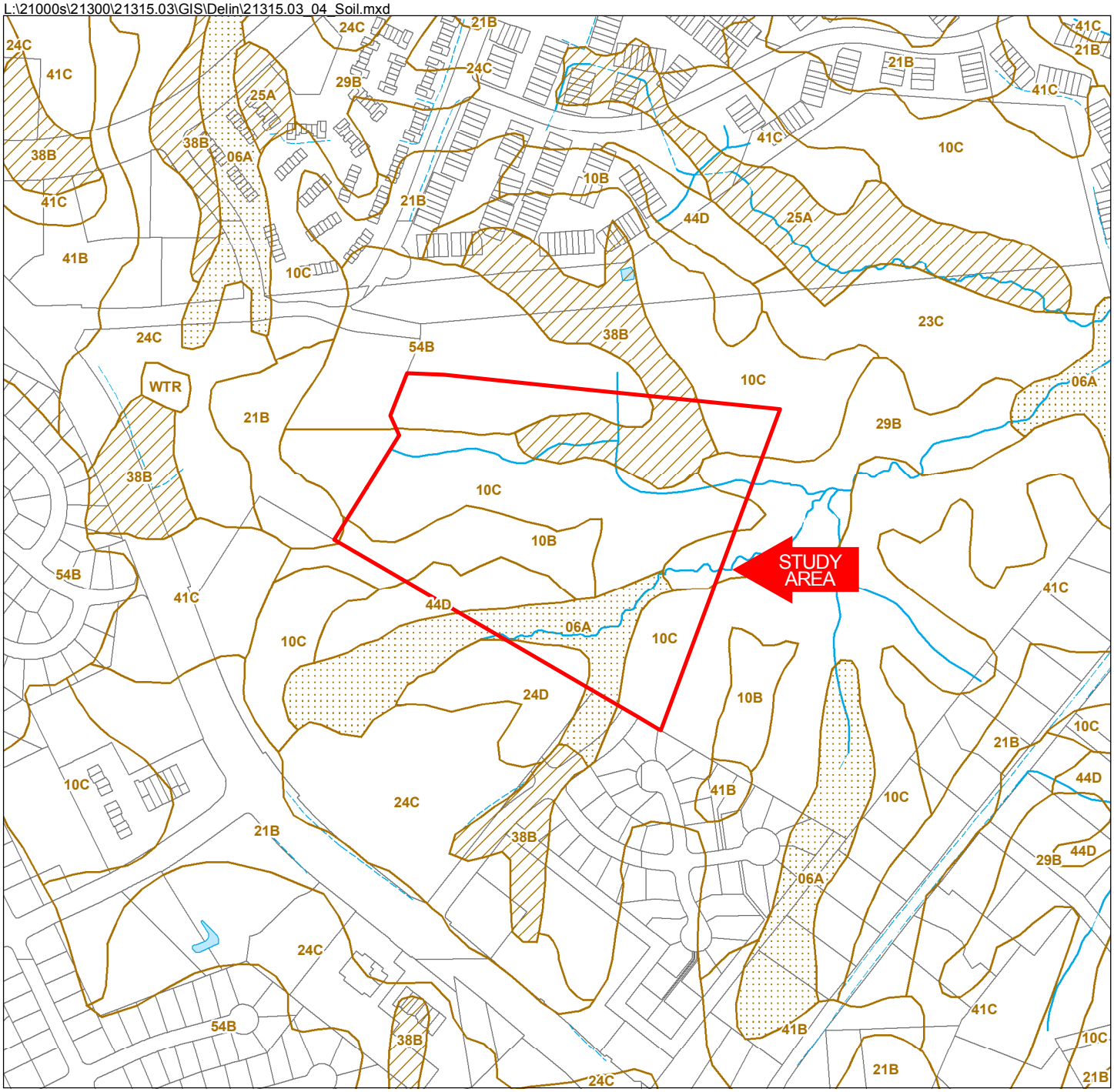

Soils Map
Prince William County Digital Data
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 500'

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County Mapped Wetland
Hydric Soils
Soils with Hydric Inclusions
Non-hydric Soils

Wetland Studies and Solutions, Inc.
a DAVEY company

Exhibit 4

Mapped Soils Report for PW Parkway ES

Project Number: 21315.03

Applicant / Owner: Prince William County Public Schools

County: Prince William, VA

Map Symbol	Map Unit Name	Taxonomy	Drainage Class	Hydric National List	Hydric Local List	Hydric Inclusions
6A	Baile loam, 0-4% slopes	Typic Endoaquults	poorly	YES	YES	NO
10B	Buckhall loam, 2-7% slopes	Typic Hapludults	well	UNRANKED	NO	NO
10C	Buckhall loam, 7-15% slopes	Typic Hapludults	well	NO	NO	NO
24D	Glenelg-Buckhall complex, 15-25% slopes	Typic Hapludults	well	NO	NO	NO
29B	Hoadly loam, 2-7% slopes	Aquic Fragiudults	mod well-smwt poor	NO	NO	NO
38B	Meadowville loam, 0-5% slopes	Typic Hapludults	well-mod well	NO	NO	BAILE
44D	Occoquan sandy loam 7-25%	Ochreptic Hapludults	smwt excess-well	NO	NO	NO
54B	Urban Land-Udorthents, 0-7% slopes	Udorthents	well-mod well	NO	NO	NO

Exhibit 5

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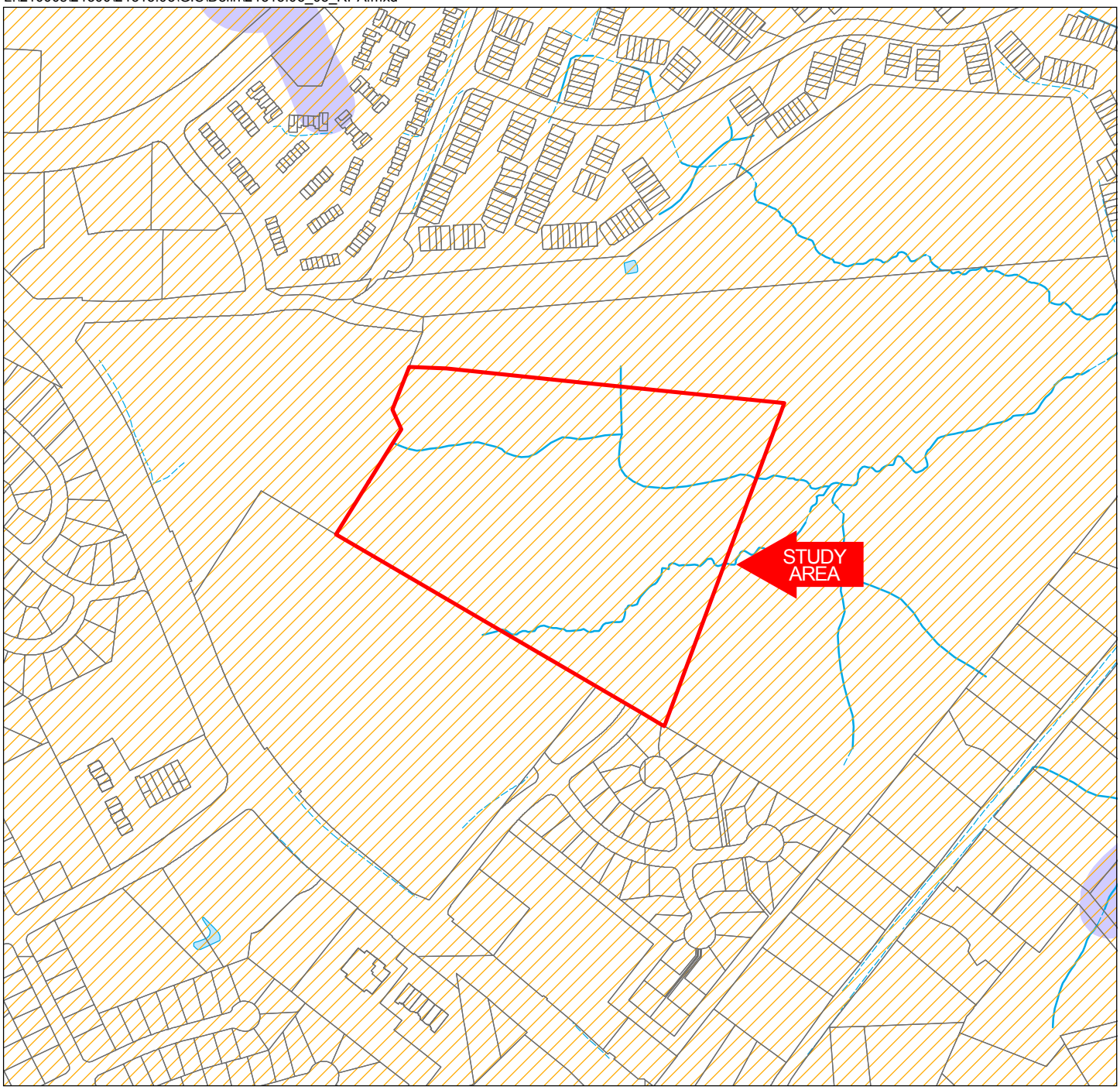

Resource Protection Area (RPA) Map
Prince William County Digital Data
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 500'

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Feet

Rivers, Lakes, Ponds
County Mapped Wetlands
Prince William County Mapped RPA
Intensely Developed Areas (IDA)

Wetland Studies and Solutions, Inc.
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Exhibit 5

Exhibit 6

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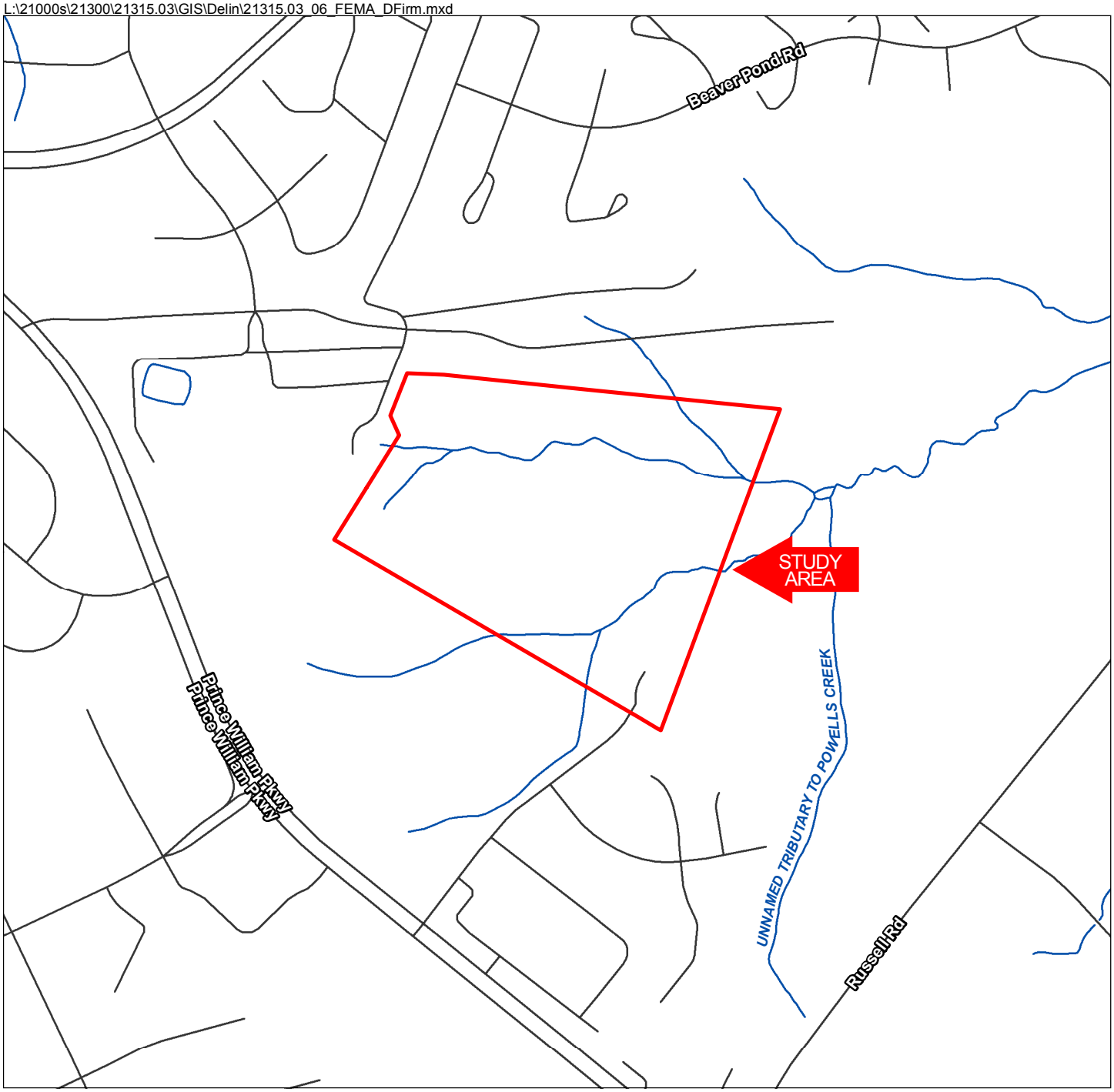

FEMA Digital Flood Insurance Rate Map
Panel 51153C0212D Effective 1/5/1995
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 500'

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Feet

Other Areas
Zone X - Areas determined to be outside the 0.2% annual chance floodplain

Wetland Studies and Solutions, Inc.
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Exhibit 6

Exhibit 7

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Spring 2004 Color Infrared Imagery
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 300'

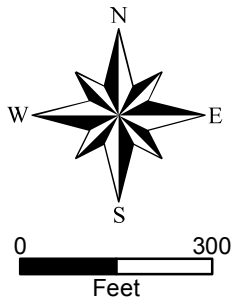

Photo Source: Wetland Studies and Solutions, Inc.

Exhibit 8

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March 2013 Natural Color Imagery
PW Parkway ES
WSSI #21315.03
Original Scale: 1" = 300'

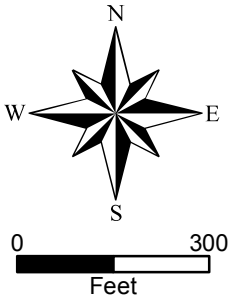

Photo Source: Pictometry®

Exhibit 9

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Week Ending October 3, 2015

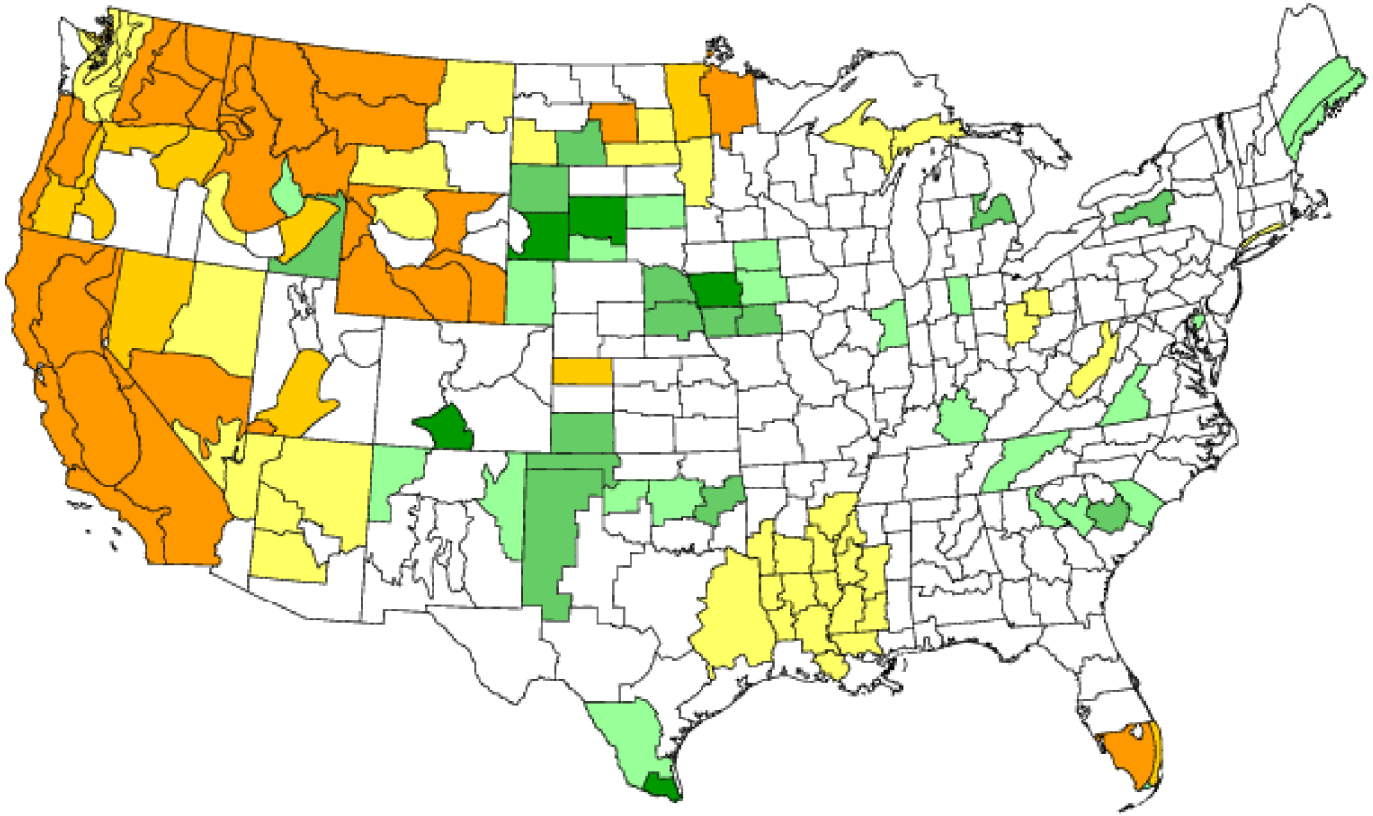

Image source: www.cpc.ncep.noaa.gov

Images Not to Scale

Weekly Drought Value

- -4.0 or less (Extreme Drought)
- -3.0 to -3.9 (Severe Drought)
- -2.0 to -2.9 (Moderate Drought)
- -1.9 to +1.9 (Near Normal)
- +2.0 to +2.9 (Unusual Moist Spell)
- +3.0 to +3.9 (Very Moist Spell)
- +4.0 and above (Extremely Moist)

Drought Severity Index by Division

Long Term Palmer

Climate prediction center, NOAA

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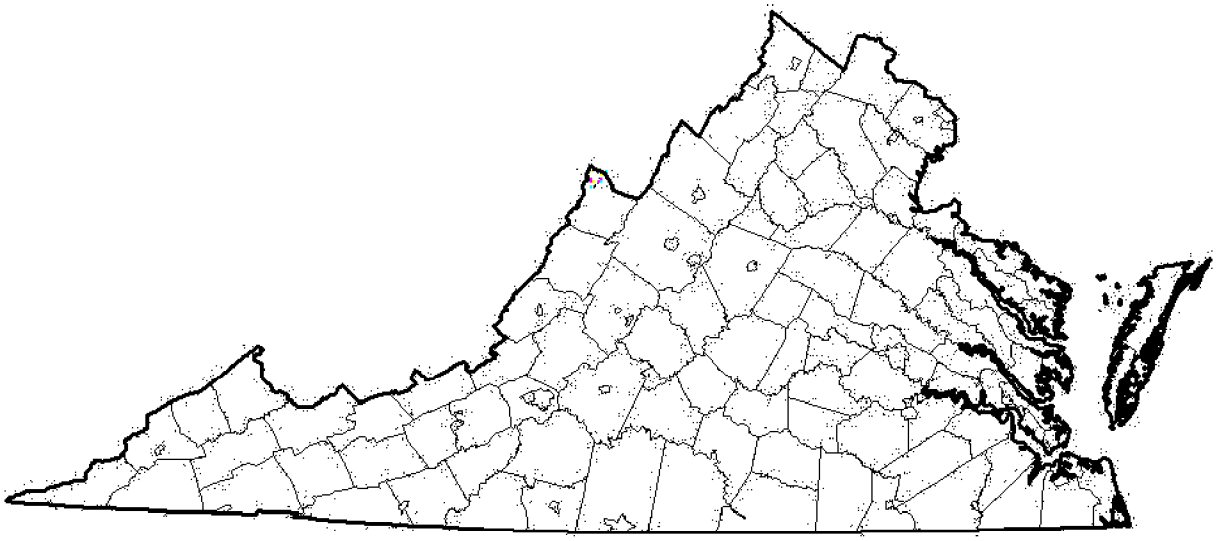
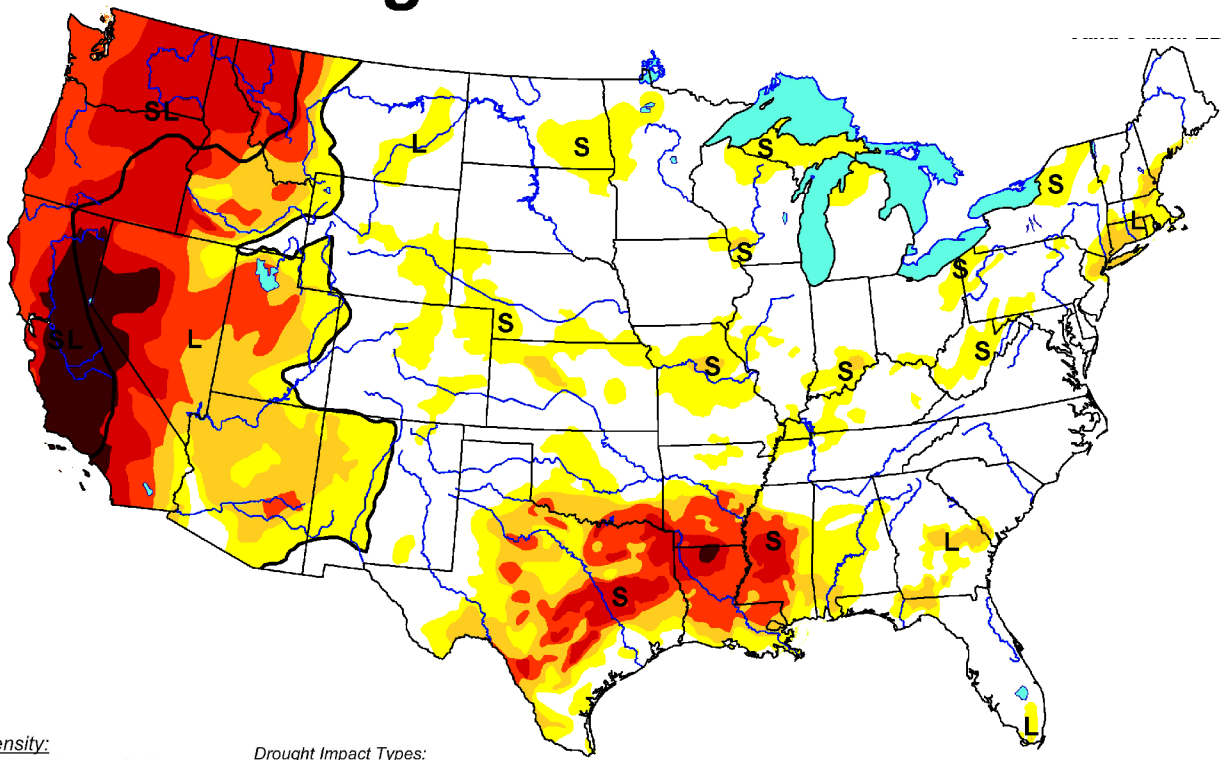
U.S. Drought Monitor
Virginia

October 6, 2015
(Released Thursday, Oct. 8, 2015)
Valid 8 a.m. EDT



U.S. Drought Monitor



Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:
- ~ Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

Images Not to Scale

USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

Exhibit 10

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont Region

Project/Site: PW Parkway ES City/County: Prince William Sampling Date 10/7 /2015

Applicant/Owner: Prince William County Public Schools State: VA Sampling Point: 1

Investigator(s): JMC, GCM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 7-15%

Subregion (LRR or MLRA): LRR P; MLRA136 Lat: 38°40'09" Long: 77°19'44" Datum: NAD 83

Soil Map Unit Name: Buckhall Loam 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:

None of the three wetland parameters are present at this data point which characterizes the upland swale present in the northeastern portion of the study area.

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): >16"
Saturation Present? (includes capillary fringe)	Yes ☐	No ☑	Depth (inches): >16"

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: 1

Tree Stratum (Plot size: 30' Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
50% of total cover: 20% of total cover:		= Total Cover	
Sapling/Shrub Stratum (Plot size: 15' Radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
50% of total cover: 20% of total cover:		= Total Cover	
Herb Stratum (Plot size: 5' Radius)			
1. *Schedonorus pratensis*	80	☑	FACU
2. *Cyperus echinatus*	30	☐	FACU
3. *Trifolium pratense*	30	☐	FACU
4. *Arthraxon hispidus*	20	☐	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 80 20% of total cover: 32	160	= Total Cover	
Woody Vine Stratum (Plot size: 30' Radius)			
1.			
2.			
3.			
4.			
5.			
6.			
50% of total cover: 20% of total cover:		= 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: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	20	x 3 =	60
FACU species	140	x 4 =	560
UPL species	0	x 5 =	0
Column Totals:	160 (A)		620 (B)

Prevalence Index = B/A = 3.88

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.)

Nomenclature and indicators from The National Wetland Plant List: 2014 wetland ratings, with additional updates through June 2015; No trees, shrubs, or woody vines are present at this data point.

SOIL Sampling Point: 1

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
0-1	10YR3/2	100%					Silt Loam	many fine roots
1-3	10YR4/3	60%	7.5YR4/6	30%	C	M	Clay Loam	
			2.5YR7/1	10%	D	M	Clay Loam	
3-18	10YR5/4	55%	7.5YR4/6	40%	C	M	Sandy Clay Loam	
			7.5YR5/1	5%	D	M	Sandy Clay Loam	

[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 Suface (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)
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ 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: PW Parkway ES City/County: Prince William Sampling Date 10/7 /2015

Applicant/Owner: Prince William County Public Schools State: VA Sampling Point: 2

Investigator(s): JMC, GCM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-5%

Subregion (LRR or MLRA): LRR P; MLRA136 Lat: 38°40'09" Long: 77°19'44" Datum: NAD 83

Soil Map Unit Name: Meadowville Loam NWI classification: PFO 1C

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:

All three wetland parameters are present at this data point which characterizes the palustrine forested wetland present in the northern portion of the study area.

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): >16"
Saturation Present? (includes capillary fringe)	Yes ☐	No ☑	Depth (inches): >16"

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: 2

Tree Stratum (Plot size: 30' Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	100	☑	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
50% of total cover: 50 20% of total cover: 20	100	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Acer rubrum*	30	☑	FAC
2. *Alnus serrulata*	15	☑	OBL
3. *Nyssa sylvatica*	5	☐	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
50% of total cover: 25 20% of total cover: 10	50	= Total Cover	
Herb Stratum (Plot size: 5' Radius)			
1. *Cinna arundinacea*	40	☑	FACW
2. *Smilax glauca*	20	☑	FACU
3. *Symphyotrichum lateriflorum*	12	☐	FACW
4. *Persicaria sagittata*	7	☐	OBL
5. *Unknown Forb*	5	☐	NI
6. *Lonicera japonica*	5	☐	FACU
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 44.5 20% of total cover: 17.8	89	= Total Cover	
Woody Vine Stratum (Plot size: 30' Radius)			
1. *Wisteria frutescens*	15	☑	FACW
2. *Lonicera japonica*	5	☑	FACU
3.			
4.			
5.			
6.			
50% of total cover: 10 20% of total cover: 4	20	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.4% (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.)

Nomenclature and indicators from The National Wetland Plant List: 2014 wetland ratings; NI species are not used in the Dominance Test Calculation.

SOIL Sampling Point: 2

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
0-1	10YR2/2	100%					Sandy Loam	
1-3	10YR3/3	90%	10YR5/6	10%	C	M	Sandy Loam	
3-10	10YR6/1	75%	5YR3/4	5%	C	M	Sandy Clay Loam	
			7.5YR4/6	20%	C	M	Sandy Clay Loam	
10-18	2.5Y6/1	85%	5YR4/6	10%	C	M	Sandy Clay Loam	
			10YR5/8	5%	C	M	Sandy Clay Loam	

[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 Suface (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)
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ 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: PW Parkway ES City/County: Prince William Sampling Date 10/8 /2015

Applicant/Owner: Prince William County Public Schools State: VA Sampling Point: 3

Investigator(s): JMC, GCM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 7-15%

Subregion (LRR or MLRA): LRR P; MLRA136 Lat: 38°40'09" Long: 77°19'44" Datum: NAD 83

Soil Map Unit Name: Buckhall Loam 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:

All three wetland parameters are present at this data point which characterizes the palustrine forested wetland present in the northwestern portion of the study area.

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): >16"
Saturation Present? (includes capillary fringe)	Yes ☐	No ☑	Depth (inches): >16"

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: 3

Tree Stratum (Plot size: 30' Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	☑	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
50% of total cover: 20 20% of total cover: 8	40	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Acer rubrum*	10	☑	FAC
2. *Nyssa sylvatica*	5	☑	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
50% of total cover: 7.5 20% of total cover: 3	15	= Total Cover	
Herb Stratum (Plot size: 5' Radius)			
1. *Microstegium vimineum*	20	☑	FAC
2. *Carex sp.*	10	☑	NI
3. *Symphyotrichum lateriflorum*	5	☐	FACW
4. *Cinna arundinacea*	5	☐	FACW
5. *Parthenocissus quinquefolia*	5	☐	FACU
6. *Carex sp.*	5	☐	NI
7. *Smilax glauca*	2	☐	FACU
8.			
9.			
10.			
11.			
12.			
50% of total cover: 26 20% of total cover: 10.4	52	= Total Cover	
Woody Vine Stratum (Plot size: 30' Radius)			
1.			
2.			
3.			
4.			
5.			
6.			
50% of total cover: 20% of total cover:		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (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 ≤3.0¹
- ☐ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators 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.)

Nomenclature and indicators from The National Wetland Plant List: 2014 wetland ratings; NI species are not used in the Dominance Test Calculation; No woody vine species were found at this data point.

SOIL Sampling Point: 3

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR4/3	100%					Silty Clay Loam	
1-2	10YR5/4	95%	10YR5/8	5%	C	M	Silty Clay Loam	
2-5	2.5Y6/2	100%					Sandy Clay Loam	
5-14	5Y5/1	90%	10YR4/6	10%	C	M	Clay Loam	
14-16	2.5Y5/3	97%	2.5Y6/6	3%	C	M	Sandy Loam	

[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 Suface (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)
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ 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: PW Parkway ES City/County: Prince William Sampling Date 10/8 /2015

Applicant/Owner: Prince William County Public Schools State: VA Sampling Point: 4

Investigator(s): JMC, GCM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 7-15%

Subregion (LRR or MLRA): LRR P; MLRA136 Lat: 38°40'09" Long: 77°19'44" Datum: NAD 83

Soil Map Unit Name: Buckhall Loam 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:

Two of the three wetland parameters are present at this data point which characterizes the upland swale present upslope of the palustrine forested wetland in the northwestern portion of the study area.

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): >16"

Saturation Present? Yes ☐ No ☑ Depth (inches): >16"

(includes capillary fringe)

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: 4

Tree Stratum (Plot size: 30' Radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	75	☑	FAC
2. *Liriodendron tulipifera*	25	☑	FACU
3.			
4.			
5.			
6.			
7.			
8.			
50% of total cover: 50 20% of total cover: 20	100	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Acer rubrum*	17	☑	FAC
2. *Nyssa sylvatica*	7	☑	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
50% of total cover: 12 20% of total cover: 4.8	24	= Total Cover	
Herb Stratum (Plot size: 5' Radius)			
1. *Lonicera japonica*	30	☑	FACU
2. *Rubus argutus*	10	☑	FACU
3. *Elaeagnus umbellata*	7	☐	UPL
4. *Rosa multiflora*	7	☐	FACU
5. *Microstegium vimineum*	7	☐	FAC
6. *Parthenocissus quinquefolia*	2	☐	FACU
7. *Chamaecrista nictitans*	1	☐	FACU
8.			
9.			
10.			
11.			
12.			
50% of total cover: 32 20% of total cover: 12.8	64	= Total Cover	
Woody Vine Stratum (Plot size: 30' Radius)			
1.			
2.			
3.			
4.			
5.			
6.			
50% of total cover: 20% of total cover:		= Total Cover	

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	106	x 3 =	318
FACU species	75	x 4 =	300
UPL species	7	x 5 =	35
Column Totals:	188 (A)		653 (B)

Prevalence Index = B/A = 3.47

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.)

Nomenclature and indicators from The National Wetland Plant List: 2014 wetland ratings; NI species are not used in the Dominance Test Calculation. There are no woody vine species present at this data point.

SOIL Sampling Point: 4

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
0-5	10YR3/3	100%					Silty Clay Loam	
5-8	10YR4/3	60%	7.5YR5/6	40%	C	M	Clay Loam	
8-12	10YR5/3	100%					Sandy Clay Loam	
12-18	2.5Y6/3	95%	10YR5/6	5%	C	M	Sandy Loam	

[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 Suface (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)
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ☐ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ 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:

Exhibit 11

WSSI Stream Evaluation Form

WSSI Project No:	21315.03	Date(s):	10/7/2015
Project Name:	PW Parkway ES	County:	Prince William County
Applicant/Owner:	Prince William County Public Schools	State:	Virginia
Investigator(s):	JMC, GCM		

Geography:

Latitude:	38°40'09"N	USGS Quad:	Occoquan, VA 1994
Longitude:	77°19'44"	Watershed:	Occoquan River

Precipitation Analysis:

Location:	Washington National
Year:	Nov 2014-Oct 2015
Source:	National Weather Service

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Average:*	3.03	3.05	3.21	2.63	3.60	2.77	3.82	3.13	3.66	3.44	3.79	0.62	36.75
Recent:	2.64	3.50	3.73	1.68	4.04	3.41	1.92	11.94	5.01	1.16	2.15	1.93	43.11
Above (Below)	(0.39)	0.45	0.52	(0.95)	0.44	0.64	(1.90)	8.81	1.35	(2.28)	(1.64)	1.31	6.36

List of Reaches:

Reach ID	Field Location	Drainage Area of Assessed Reach	Name of Stream
1-A	B84-B93	±9 acres	Unnamed Trib to Occoquan River
2-A	A44-A66; D32-D35	±26 acres	Unnamed Trib to Occoquan River

* - The average precipitation for the first six days of October was calculated by multiplying the average precipitation per day for October by the number of days in October prior to the stream evaluation field work.

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	B84-B93
WSSI Project No:	21315.03	Stream Reach ID:	1-A
Evaluator:	JMC, GCM	Date:	10/7/15

The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Indentification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (September 1, 2010) and the Fairfax County DPWES Perennial Stream Field Identification Protocol (May 2003) .Letters and numbers following each indicator refer to the original form and question number from which each indicator was derived. ("F" = Fairfax County DPWES stream assessment form; "NC" = NCDWQ Stream Identific Form)

Field Indicators:

I. Geomorphology	Absent	Weak	Moderate	Strong	Score
1. Continuity of channel bed and bank (NC-A.1/F-II.9)	0	1	2	3	2
*(**NOTE**: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0)*					
2. Sinuosity of channel along thalweg (NC-A.2/F-II.4)	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence (NC-A.3/F-II.1)	0	1	2	3	1
4. Particle size of stream substrate (NC-A.4/F-II.2)	0	1	2	3	1
5. Active/relict floodplain (NC-A.5/F-II.5)	0	1	2	3	1
6. Depositional bars or benches (NC-A.6/F-II.8)	0	1	2	3	1
7. Recent alluvial deposits (NC-A.7/F-II.7)	0	1	2	3	2
8. Headcuts (NC-A.8)	0	1	2	3	0
9. Grade control (NC-A.9)	0	0.5	1	1.5	0
10. Natural valley (NC-A.10)	0	0.5	1	1.5	0.5
11. Second or greater order channel (As Indicated On Topo Map **And/Or** In Field) (NC-A.11/F-II.10)	***No*** =0		***Yes*** =3		0
12. Natural Levees (F-II.3)	0	1	2	3	0
13. Braided Channel (F-II.6)	0	1	2	3	0
NCDWQ GEOMORPHOLOGY INDICATOR POINTS:					9.5
FAIRFAX GEOMORPHOLOGY INDICATOR POINTS:					9

II. Hydrology and Streamflow	Absent	Weak	Moderate	Strong	Score
1. Presence of Baseflow (NC-B.12/F-I.2)	0	1	2	3	1
2. Iron oxidizing bacteria (NC-B.13)	0	1	2	3	0
3. Leaf litter (NC-B.14/F-I.3)	1.5	1	0.5	0	1
4. Sediment on plants or debris (NC-B.15/F-I.5)	0	0.5	1	1.5	0.5
5. Organic debris lines or piles (NC-B.16/F-I.4)	0	0.5	1	1.5	0.5
6. Soil-based evidence of high water table? (NC-B.17)	***No*** =0		***Yes*** =3		3
7. Flowing Water in Channel AND >48 Hrs. Since Last Known Rain? (F-I.1)	0	1	2	3	1
Date/Amount of Last Rainfall: 10/3/15 0.19"			Water Depth: 0-2", discont.		
(NOTE: If Ditch Indicated In #1 Above Skip This Step)					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					6
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					4

III. Streambed Soils					Score
1) Redoximorphic Features Present In *Streambed** (F-III.1)		Present = 0	Absent = 1.5		0
2) Chroma Of *Streambed** (F-III.2)	Gleyed = 3	Chroma 1 = 2	Chroma 2 = 1	Chroma >2 = 0	2
TOTAL FAIRFAX STREAMBED SOILS POINTS:					2

*NOTE: The Fairfax County Field Identification Protocol (May 2003) defines the procedure for assessing streambed soils, however the Fairfax County stream assessment form uses the phrase "sides of channel or head cut". Therefore, on this form, the phrase "s of channel or headcut" has been replaced with the term *Streambed*".

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	B84-B93
WSSI Site:	21315.03	Stream Reach ID:	1-A
Evaluator:	JMC, GCM	Date:	10/7/15

IV. Biology		**Absent**	**Weak**	**Moderate**	**Strong**	**Score**
1. Fibrous roots in streambed (NC-C.18)		3	2	1	0	2
2. Rooted upland plants in streambed (NC-C.19)		3	2	1	0	3
3. Macrobenthos	(NC-C.20)	0	1	2	3	0
(note diversity and abundance)	(F-V.1)	0	0.5	1	1.5	0
4. Aquatic Mollusks (NC-C.21/F-V.2)		0	1	2	3	0
5. Fish (NC-C.22/F-VI.1)		0	0.5	1	1.5	0
6. Crayfish (NC-C.23)		0	0.5	1	1.5	0.5
7. Amphibians (NC-C.24/F-VI.2)		0	0.5	1	1.5	0.5
8. Algae	(NC-C.25)	0	0.5	1	1.5	0
	(F-IV.2)	0	1	2	3	0
9. Wetland plants in streambed	(F-IV.4)	SAV = 3; OBL = 1.5; FACW = 1; FAC = 0.5; Other = 0				1
	(NC-C.26)	OBL = 1.5; FACW = 0.75; Other = 0				0.75
10. Iron Oxidizing Bacteria/Fungus (F-IV.3)		0	0.5	1	1.5	0
11. Rooted AQUATIC Plants in Streambed (F-IV.1)		0	1	2	3	0
12. EPT taxa (F-V.3)		Present = 3		Absent = 0		0
					NCDWQ BIOLOGY INDICATOR POINTS:	6.75
					FAIRFAX BIOLOGY INDICATOR POINTS:	1.5

Vegetation Comments: *Plantago major* (broadleaf plantain), *Dichanthelium clandestinum* (deertounge), *Echinochloa crus-galli* (barnyardgrass), and *Symphyotrichum lateriflorum* (calico aster) are found in this stream reach.

Benthics/Amphibians Found: No benthics were found. Once unknown frog and one crayfish burrow were observed along this stream reach.

TOTAL NCDWQ POINTS = 22.25

(Based on NCDWQ methodology and field trials, the stream is at least intermittent if greater than or equal to 19 points or perennial if greater than or equal to 30 points.)

TOTAL FAIRFAX COUNTY POINTS = 16.5

(Based on a Fairfax County pilot survey, the stream is perennial if greater than or equal to 25 points.)

Decision: Stream assessment scores below the intermittent/perennial threshold, combined with weak geomorphology and weak baseflow, indicate that flow within this stream is intermittent.

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	A44-A66; D32-D35
WSSI Project No:	21315.03	Stream Reach ID:	2-A
Evaluator:	JMC, GCM	Date:	10/7/15

The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Indentification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (September 1, 2010) and the Fairfax County DPWES Perennial Stream Field Identification Protocol (May 2003) .Letters and numbers following each indicator refer to the original form and question number from which each indicator was derived. ("F" = Fairfax County DPWES stream assessment form; "NC" = NCDWQ Stream Identific Form)

Field Indicators:

I. Geomorphology	Absent	Weak	Moderate	Strong	Score
1. Continuity of channel bed and bank (NC-A.1/F-II.9)	0	1	2	3	3
*(**NOTE**: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0)*					
2. Sinuosity of channel along thalweg (NC-A.2/F-II.4)	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence (NC-A.3/F-II.1)	0	1	2	3	1
4. Particle size of stream substrate (NC-A.4/F-II.2)	0	1	2	3	1
5. Active/relict floodplain (NC-A.5/F-II.5)	0	1	2	3	1
6. Depositional bars or benches (NC-A.6/F-II.8)	0	1	2	3	2
7. Recent alluvial deposits (NC-A.7/F-II.7)	0	1	2	3	0
8. Headcuts (NC-A.8)	0	1	2	3	0
9. Grade control (NC-A.9)	0	0.5	1	1.5	0.5
10. Natural valley (NC-A.10)	0	0.5	1	1.5	0.5
11. Second or greater order channel (As Indicated On Topo Map **And/Or** In Field) (NC-A.11/F-II.10)	***No*** =0			***Yes*** =3	0
12. Natural Levees (F-II.3)	0	1	2	3	0
13. Braided Channel (F-II.6)	0	1	2	3	0
			NCDWQ GEOMORPHOLOGY INDICATOR POINTS:		11
			FAIRFAX GEOMORPHOLOGY INDICATOR POINTS:		10

II. Hydrology and Streamflow	Absent	Weak	Moderate	Strong	Score
1. Presence of Baseflow (NC-B.12/F-I.2)	0	1	2	3	2
2. Iron oxidizing bacteria (NC-B.13)	0	1	2	3	0
3. Leaf litter (NC-B.14/F-I.3)	1.5	1	0.5	0	1
4. Sediment on plants or debris (NC-B.15/F-I.5)	0	0.5	1	1.5	0
5. Organic debris lines or piles (NC-B.16/F-I.4)	0	0.5	1	1.5	1
6. Soil-based evidence of high water table? (NC-B.17)	***No*** =0			***Yes*** =3	3
7. Flowing Water in Channel AND >48 Hrs. Since Last Known Rain? (F-I.1)	0	1	2	3	1
Date/Amount of Last Rainfall: 10/3/15 0.19"			Water Depth: 0-4", discont.		
(NOTE: If Ditch Indicated In #1 Above Skip This Step)					
			NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:		7
			FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:		5

III. Streambed Soils					Score
1) Redoximorphic Features Present In *Streambed** (F-III.1)			Present = 0	Absent = 1.5	0
2) Chroma Of *Streambed** (F-III.2)	Gleyed = 3	Chroma 1 = 2	Chroma 2 = 1	Chroma >2 = 0	2
				TOTAL FAIRFAX STREAMBED SOILS POINTS:	2

*NOTE: The Fairfax County Field Identification Protocol (May 2003) defines the procedure for assessing streambed soils, however the Fairfax County stream assessment form uses the phrase "sides of channel or head cut". Therefore, on this form, the phrase "s of channel or headcut" has been replaced with the term *Streambed*".

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	A44-A66; D32-D35
WSSI Site:	21315.03	Stream Reach ID:	2-A
Evaluator:	JMC, GCM	Date:	10/7/15

IV. Biology		**Absent**	**Weak**	**Moderate**	**Strong**	**Score**
1. Fibrous roots in streambed (NC-C.18)		3	2	1	0	2
2. Rooted upland plants in streambed (NC-C.19)		3	2	1	0	3
3. Macrobenthos	(NC-C.20)	0	1	2	3	0
(note diversity and abundance)	(F-V.1)	0	0.5	1	1.5	0
4. Aquatic Mollusks (NC-C.21/F-V.2)		0	1	2	3	0
5. Fish (NC-C.22/F-VI.1)		0	0.5	1	1.5	0
6. Crayfish (NC-C.23)		0	0.5	1	1.5	0
7. Amphibians (NC-C.24/F-VI.2)		0	0.5	1	1.5	0
8. Algae	(NC-C.25)	0	0.5	1	1.5	
	(F-IV.2)	0	1	2	3	0
9. Wetland plants in streambed	(F-IV.4)	SAV = 3; OBL = 1.5; FACW = 1; FAC = 0.5; Other = 0				0
	(NC-C.26)	OBL = 1.5; FACW = 0.75; Other = 0				0
10. Iron Oxidizing Bacteria/Fungus (F-IV.3)		0	0.5	1	1.5	0
11. Rooted AQUATIC Plants in Streambed (F-IV.1)		0	1	2	3	0
12. EPT taxa (F-V.3)		Present = 3		Absent = 0		0
					NCDWQ BIOLOGY INDICATOR POINTS:	5
					FAIRFAX BIOLOGY INDICATOR POINTS:	0

Vegetation Comments: No vegetation was found in this stream reach.

Benthics/Amphibians Found: No benthics were found in this stream reach. One unknown frog was found in the adjacent wetland.

TOTAL NCDWQ POINTS = 23

(Based on NCDWQ methodology and field trials, the stream is at least intermittent if greater than or equal to 19 points or perennial if greater than or equal to 30 points.)

TOTAL FAIRFAX COUNTY POINTS = 17

(Based on a Fairfax County pilot survey, the stream is perennial if greater than or equal to 25 points.)

Decision: Stream assessment scores below the intermittent/perennial threshold, combined with weak biology and weak in-channel structure, indicate that flow within this stream is intermittent. In addition, this stream reach was previously assessed during the ECA field work performed in August 2015. During this study, the stream was observed to be dry during a non-drought period thus concluding that this stream is intermittent.

WSSI Stream Evaluation Form

WSSI Project No:	21315.03	Date(s):	10/8/2015
Project Name:	PW Parkway ES	County:	Prince William County
Applicant/Owner:	Prince William County Public Schools	State:	Virginia
Investigator(s):	JMC, GCM		

Geography:

Latitude:	38°40'09"N	USGS Quad:	Occoquan, VA 1994
Longitude:	77°19'44"	Watershed:	Occoquan River

Precipitation Analysis:

Location: Washington National
Year: Nov 2014-Oct 2015
Source: National Weather Service

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Average:*	3.03	3.05	3.21	2.63	3.60	2.77	3.82	3.13	3.66	3.44	3.79	0.73	36.86
Recent:	2.66	3.26	3.26	1.76	3.92	2.46	2.46	7.44	4.89	1.09	2.33	1.93	37.46
Above (Below)	(0.37)	0.21	0.05	(0.87)	0.32	(0.31)	(1.36)	4.31	1.23	(2.35)	(1.46)	1.20	0.60

List of Reaches:

Reach ID	Field Location	Drainage Area of Assessed Reach	Name of Stream
3-A	B48-B72	± 31 acres	Unnamed Trib to Occoquan River
3-B	B1-B48	± 35 acres	Unnamed Trib to Occoquan River
4-A	F1-F67	± 55 acres	Unnamed Trib to Occoquan River
4-B	G65-G90	± 28 acres	Unnamed Trib to Occoquan River
4-C	J1-J38	± 18 acres	Unnamed Trib to Occoquan River

* - The average precipitation for the first seven days of October was calculated by multiplying the average precipitation per day for October by the number of days in October prior to the stream evaluation field work.

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	B48-B72
WSSI Project No:	21315.03	Stream Reach ID:	3-A
Evaluator:	JMC, GCM	Date:	10/8/15

The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Indentification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (September 1, 2010) and the Fairfax County DPWES Perennial Stream Field Identification Protocol (May 2003) .Letters and numbers following each indicator refer to the original form and question number from which each indicator was derived. ("F" = Fairfax County DPWES stream assessment form; "NC" = NCDWQ Stream Identific Form)

Field Indicators:

I. Geomorphology	Absent	Weak	Moderate	Strong	Score
1. Continuity of channel bed and bank (NC-A.1/F-II.9)	0	1	2	3	3
*(**NOTE**: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0)*					
2. Sinuosity of channel along thalweg (NC-A.2/F-II.4)	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence (NC-A.3/F-II.1)	0	1	2	3	1
4. Particle size of stream substrate (NC-A.4/F-II.2)	0	1	2	3	1
5. Active/relict floodplain (NC-A.5/F-II.5)	0	1	2	3	0
6. Depositional bars or benches (NC-A.6/F-II.8)	0	1	2	3	1
7. Recent alluvial deposits (NC-A.7/F-II.7)	0	1	2	3	1
8. Headcuts (NC-A.8)	0	1	2	3	1
9. Grade control (NC-A.9)	0	0.5	1	1.5	0.5
10. Natural valley (NC-A.10)	0	0.5	1	1.5	0.5
11. Second or greater order channel (As Indicated On Topo Map **And/Or** In Field) (NC-A.11/F-II.10)	***No*** =0		***Yes*** =3		3
12. Natural Levees (F-II.3)	0	1	2	3	0
13. Braided Channel (F-II.6)	0	1	2	3	0
NCDWQ GEOMORPHOLOGY INDICATOR POINTS:					13
FAIRFAX GEOMORPHOLOGY INDICATOR POINTS:					11

II. Hydrology and Streamflow	Absent	Weak	Moderate	Strong	Score
1. Presence of Baseflow (NC-B.12/F-I.2)	0	1	2	3	2
2. Iron oxidizing bacteria (NC-B.13)	0	1	2	3	0
3. Leaf litter (NC-B.14/F-I.3)	1.5	1	0.5	0	1.5
4. Sediment on plants or debris (NC-B.15/F-I.5)	0	0.5	1	1.5	1
5. Organic debris lines or piles (NC-B.16/F-I.4)	0	0.5	1	1.5	1
6. Soil-based evidence of high water table? (NC-B.17)	***No*** =0		***Yes*** =3		0
7. Flowing Water in Channel AND >48 Hrs. Since Last Known Rain? (F-I.1)	0	1	2	3	2
Date/Amount of Last Rainfall: 10/3/15 0.19"			Water Depth: 1-4", discont.		
(NOTE: If Ditch Indicated In #1 Above Skip This Step)					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					5.5
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					7.5

III. Streambed Soils					Score
1) Redoximorphic Features Present In *Streambed** (F-III.1)		Present = 0	Absent = 1.5		1.5
2) Chroma Of *Streambed** (F-III.2)	Gleyed = 3	Chroma 1 = 2	Chroma 2 = 1	Chroma >2 = 0	0
TOTAL FAIRFAX STREAMBED SOILS POINTS:					1.5

*NOTE: The Fairfax County Field Identification Protocol (May 2003) defines the procedure for assessing streambed soils, however the Fairfax County stream assessment form uses the phrase "sides of channel or head cut". Therefore, on this form, the phrase "s of channel or headcut" has been replaced with the term *Streambed*".

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	B48-B72
WSSI Site:	21315.03	Stream Reach ID:	3-A
Evaluator:	JMC, GCM	Date:	10/8/15

IV. Biology		**Absent**	**Weak**	**Moderate**	**Strong**	**Score**
1. Fibrous roots in streambed (NC-C.18)		3	2	1	0	3
2. Rooted upland plants in streambed (NC-C.19)		3	2	1	0	3
3. Macrobenthos	(NC-C.20)	0	1	2	3	0
(note diversity and abundance)	(F-V.1)	0	0.5	1	1.5	0
4. Aquatic Mollusks (NC-C.21/F-V.2)		0	1	2	3	0
5. Fish (NC-C.22/F-VI.1)		0	0.5	1	1.5	0
6. Crayfish (NC-C.23)		0	0.5	1	1.5	0.5
7. Amphibians (NC-C.24/F-VI.2)		0	0.5	1	1.5	0
8. Algae	(NC-C.25)	0	0.5	1	1.5	0
	(F-IV.2)	0	1	2	3	0
9. Wetland plants in streambed	(F-IV.4)	SAV = 3; OBL = 1.5; FACW = 1; FAC = 0.5; Other = 0				0
	(NC-C.26)	OBL = 1.5; FACW = 0.75; Other = 0				0
10. Iron Oxidizing Bacteria/Fungus (F-IV.3)		0	0.5	1	1.5	0
11. Rooted AQUATIC Plants in Streambed (F-IV.1)		0	1	2	3	0
12. EPT taxa (F-V.3)		Present = 3		Absent = 0		0
					NCDWQ BIOLOGY INDICATOR POINTS:	6.5
					FAIRFAX BIOLOGY INDICATOR POINTS:	0

Vegetation Comments: No vegetation was found in this stream reach.

Benthics/Amphibians Found: No benthics were found in this stream reach. Unknown frogs were present in the stream.

TOTAL NCDWQ POINTS = 25

(Based on NCDWQ methodology and field trials, the stream is at least intermittent if greater than or equal to 19 points or perennial if greater than or equal to 30 points.)

TOTAL FAIRFAX COUNTY POINTS = 20

(Based on a Fairfax County pilot survey, the stream is perennial if greater than or equal to 25 points.)

Decision: Stream assessment scores below the intermittent/perennial threshold, combined with weak biology and discontinuous flow, indicate that flow within this stream is intermittent. In addition, this stream reach was previously assessed during the ECA field work performed in August 2015. During this study, the stream was observed to be dry during a non-drought period thus concluding that this stream is intermittent.

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	B1-B48
WSSI Project No:	21315.03	Stream Reach ID:	3-B
Evaluator:	JMC, GCM	Date:	10/8/15

The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Indentification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (September 1, 2010) and the Fairfax County DPWES Perennial Stream Field Identification Protocol (May 2003) .Letters and numbers following each indicator refer to the original form and question number from which each indicator was derived. ("F" = Fairfax County DPWES stream assessment form; "NC" = NCDWQ Stream Identific Form)

Field Indicators:

I. Geomorphology	Absent	Weak	Moderate	Strong	Score
1. Continuity of channel bed and bank (NC-A.1/F-II.9)	0	1	2	3	3
*(**NOTE**: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0)*					
2. Sinuosity of channel along thalweg (NC-A.2/F-II.4)	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence (NC-A.3/F-II.1)	0	1	2	3	2
4. Particle size of stream substrate (NC-A.4/F-II.2)	0	1	2	3	2
5. Active/relict floodplain (NC-A.5/F-II.5)	0	1	2	3	2
6. Depositional bars or benches (NC-A.6/F-II.8)	0	1	2	3	1
7. Recent alluvial deposits (NC-A.7/F-II.7)	0	1	2	3	1
8. Headcuts (NC-A.8)	0	1	2	3	1
9. Grade control (NC-A.9)	0	0.5	1	1.5	0.5
10. Natural valley (NC-A.10)	0	0.5	1	1.5	0.5
11. Second or greater order channel (As Indicated On Topo Map **And/Or** In Field) (NC-A.11/F-II.10)	***No*** =0		***Yes*** =3		3
12. Natural Levees (F-II.3)	0	1	2	3	0
13. Braided Channel (F-II.6)	0	1	2	3	0
NCDWQ GEOMORPHOLOGY INDICATOR POINTS:					18
FAIRFAX GEOMORPHOLOGY INDICATOR POINTS:					16

II. Hydrology and Streamflow	Absent	Weak	Moderate	Strong	Score
1. Presence of Baseflow (NC-B.12/F-I.2)	0	1	2	3	2
2. Iron oxidizing bacteria (NC-B.13)	0	1	2	3	0
3. Leaf litter (NC-B.14/F-I.3)	1.5	1	0.5	0	1.5
4. Sediment on plants or debris (NC-B.15/F-I.5)	0	0.5	1	1.5	0.5
5. Organic debris lines or piles (NC-B.16/F-I.4)	0	0.5	1	1.5	1
6. Soil-based evidence of high water table? (NC-B.17)	***No*** =0		***Yes*** =3		3
7. Flowing Water in Channel AND >48 Hrs. Since Last Known Rain? (F-I.1)	0	1	2	3	2
Date/Amount of Last Rainfall: 10/3/15 0.19"			Water Depth:	2-4"	
(NOTE: If Ditch Indicated In #1 Above Skip This Step)					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					8
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					7

III. Streambed Soils					Score
1) Redoximorphic Features Present In *Streambed** (F-III.1)		Present = 0	Absent = 1.5		0
2) Chroma Of *Streambed** (F-III.2)	Gleyed = 3	Chroma 1 = 2	Chroma 2 = 1	Chroma >2 = 0	2
TOTAL FAIRFAX STREAMBED SOILS POINTS:					2

*NOTE: The Fairfax County Field Identification Protocol (May 2003) defines the procedure for assessing streambed soils, however the Fairfax County stream assessment form uses the phrase "sides of channel or head cut". Therefore, on this form, the phrase "s of channel or headcut" has been replaced with the term *Streambed*".

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	B1-B48
WSSI Site:	21315.03	Stream Reach ID:	3-B
Evaluator:	JMC, GCM	Date:	10/8/15

IV. Biology		**Absent**	**Weak**	**Moderate**	**Strong**	**Score**
1. Fibrous roots in streambed (NC-C.18)		3	2	1	0	3
2. Rooted upland plants in streambed (NC-C.19)		3	2	1	0	2
3. Macrobenthos	(NC-C.20)	0	1	2	3	0
(note diversity and abundance)	(F-V.1)	0	0.5	1	1.5	0
4. Aquatic Mollusks (NC-C.21/F-V.2)		0	1	2	3	0
5. Fish (NC-C.22/F-VI.1)		0	0.5	1	1.5	0
6. Crayfish (NC-C.23)		0	0.5	1	1.5	0.5
7. Amphibians (NC-C.24/F-VI.2)		0	0.5	1	1.5	0.5
8. Algae	(NC-C.25)	0	0.5	1	1.5	0
	(F-IV.2)	0	1	2	3	0
9. Wetland plants in streambed	(F-IV.4)	SAV = 3; OBL = 1.5; FACW = 1; FAC = 0.5; Other = 0				1
	(NC-C.26)	OBL = 1.5; FACW = 0.75; Other = 0				0.75
10. Iron Oxidizing Bacteria/Fungus (F-IV.3)		0	0.5	1	1.5	0
11. Rooted AQUATIC Plants in Streambed (F-IV.1)		0	1	2	3	0
12. EPT taxa (F-V.3)		Present = 3		Absent = 0		0
					NCDWQ BIOLOGY INDICATOR POINTS:	6.75
					FAIRFAX BIOLOGY INDICATOR POINTS:	1.5

Vegetation Comments: *Juncus effusus* (common rush) and *Microstegium vimineum* (Japanese stiltgrass) were found within this stream reach.

Benthics/Amphibians Found: One unknown frog and one crayfish burrow were found within this stream reach. No benthics were found within this stream reach.

TOTAL NCDWQ POINTS = 32.75

(Based on NCDWQ methodology and field trials, the stream is at least intermittent if greater than or equal to 19 points or perennial if greater than or equal to 30 points.)

TOTAL FAIRFAX COUNTY POINTS = 26.5

(Based on a Fairfax County pilot survey, the stream is perennial if greater than or equal to 25 points.)

Decision: Stream assessment scores above the intermittent/perennial threshold, combined with moderate baseflow and a second order or greater order channel, indicate that flow within this stream is perennial.

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	F1-F67
WSSI Project No:	21315.03	Stream Reach ID:	4-A
Evaluator:	JMC, GCM	Date:	10/8/15

The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Indentification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (September 1, 2010) and the Fairfax County DPWES Perennial Stream Field Identification Protocol (May 2003) .Letters and numbers following each indicator refer to the original form and question number from which each indicator was derived. ("F" = Fairfax County DPWES stream assessment form; "NC" = NCDWQ Stream Identific Form)

Field Indicators:

I. Geomorphology	Absent	Weak	Moderate	Strong	Score
1. Continuity of channel bed and bank (NC-A.1/F-II.9)	0	1	2	3	3
*(**NOTE**: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0)*					
2. Sinuosity of channel along thalweg (NC-A.2/F-II.4)	0	1	2	3	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence (NC-A.3/F-II.1)	0	1	2	3	3
4. Particle size of stream substrate (NC-A.4/F-II.2)	0	1	2	3	3
5. Active/relict floodplain (NC-A.5/F-II.5)	0	1	2	3	2
6. Depositional bars or benches (NC-A.6/F-II.8)	0	1	2	3	1
7. Recent alluvial deposits (NC-A.7/F-II.7)	0	1	2	3	1
8. Headcuts (NC-A.8)	0	1	2	3	0
9. Grade control (NC-A.9)	0	0.5	1	1.5	0
10. Natural valley (NC-A.10)	0	0.5	1	1.5	1
11. Second or greater order channel (As Indicated On Topo Map **And/Or** In Field) (NC-A.11/F-II.10)	***No*** =0		***Yes*** =3		3
12. Natural Levees (F-II.3)	0	1	2	3	0
13. Braided Channel (F-II.6)	0	1	2	3	0
			NCDWQ GEOMORPHOLOGY INDICATOR POINTS:		20
			FAIRFAX GEOMORPHOLOGY INDICATOR POINTS:		19

II. Hydrology and Streamflow	Absent	Weak	Moderate	Strong	Score
1. Presence of Baseflow (NC-B.12/F-I.2)	0	1	2	3	3
2. Iron oxidizing bacteria (NC-B.13)	0	1	2	3	0
3. Leaf litter (NC-B.14/F-I.3)	1.5	1	0.5	0	1.5
4. Sediment on plants or debris (NC-B.15/F-I.5)	0	0.5	1	1.5	1
5. Organic debris lines or piles (NC-B.16/F-I.4)	0	0.5	1	1.5	1
6. Soil-based evidence of high water table? (NC-B.17)	***No*** =0		***Yes*** =3		3
7. Flowing Water in Channel AND >48 Hrs. Since Last Known Rain? (F-I.1)	0	1	2	3	1
Date/Amount of Last Rainfall: 10/3/15 0.19"			Water Depth:	2-12"	
(NOTE: If Ditch Indicated In #1 Above Skip This Step)					
			NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:		9.5
			FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:		7.5

III. Streambed Soils					Score
1) Redoximorphic Features Present In *Streambed** (F-III.1)			Present = 0	Absent = 1.5	0
2) Chroma Of *Streambed** (F-III.2)	Gleyed = 3	Chroma 1 = 2	Chroma 2 = 1	Chroma >2 = 0	1
				TOTAL FAIRFAX STREAMBED SOILS POINTS:	1

*NOTE: The Fairfax County Field Identification Protocol (May 2003) defines the procedure for assessing streambed soils, however the Fairfax County stream assessment form uses the phrase "sides of channel or head cut". Therefore, on this form, the phrase "s of channel or headcut" has been replaced with the term *Streambed*".

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	F1-F67
WSSI Site:	21315.03	Stream Reach ID:	4-A
Evaluator:	JMC, GCM	Date:	10/8/15

IV. Biology		**Absent**	**Weak**	**Moderate**	**Strong**	**Score**
1. Fibrous roots in streambed (NC-C.18)		3	2	1	0	3
2. Rooted upland plants in streambed (NC-C.19)		3	2	1	0	3
3. Macrobenthos	(NC-C.20)	0	1	2	3	0
(note diversity and abundance)	(F-V.1)	0	0.5	1	1.5	0
4. Aquatic Mollusks (NC-C.21/F-V.2)		0	1	2	3	0
5. Fish (NC-C.22/F-VI.1)		0	0.5	1	1.5	0
6. Crayfish (NC-C.23)		0	0.5	1	1.5	0
7. Amphibians (NC-C.24/F-VI.2)		0	0.5	1	1.5	0.5
8. Algae	(NC-C.25)	0	0.5	1	1.5	0
	(F-IV.2)	0	1	2	3	0
9. Wetland plants in streambed	(F-IV.4)	SAV = 3; OBL = 1.5; FACW = 1; FAC = 0.5; Other = 0				0
	(NC-C.26)	OBL = 1.5; FACW = 0.75; Other = 0				0
10. Iron Oxidizing Bacteria/Fungus (F-IV.3)		0	0.5	1	1.5	0
11. Rooted AQUATIC Plants in Streambed (F-IV.1)		0	1	2	3	0
12. EPT taxa (F-V.3)		Present = 3		Absent = 0		0
					NCDWQ BIOLOGY INDICATOR POINTS:	6.5
					FAIRFAX BIOLOGY INDICATOR POINTS:	0.5

Vegetation Comments: No vegetation was found within this stream reach.

Benthics/Amphibians Found: Unknown frogs were present within this stream reach. No benthics were found.

TOTAL NCDWQ POINTS = 36

(Based on NCDWQ methodology and field trials, the stream is at least intermittent if greater than or equal to 19 points or perennial if greater than or equal to 30 points.)

TOTAL FAIRFAX COUNTY POINTS = 28

(Based on a Fairfax County pilot survey, the stream is perennial if greater than or equal to 25 points.)

Decision: Stream assessment scores above the intermittent/perennial threshold, combined with strong baseflow and a second order or greater order channel, indicate that flow within this stream is perennial.

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	G65-G90
WSSI Project No:	21315.03	Stream Reach ID:	4-B
Evaluator:	JMC, GCM	Date:	10/8/15

The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Indentification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (September 1, 2010) and the Fairfax County DPWES Perennial Stream Field Identification Protocol (May 2003) .Letters and numbers following each indicator refer to the original form and question number from which each indicator was derived. ("F" = Fairfax County DPWES stream assessment form; "NC" = NCDWQ Stream Identific Form)

Field Indicators:

I. Geomorphology	Absent	Weak	Moderate	Strong	Score
1. Continuity of channel bed and bank (NC-A.1/F-II.9)	0	1	2	3	3
*(**NOTE**: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0)*					
2. Sinuosity of channel along thalweg (NC-A.2/F-II.4)	0	1	2	3	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence (NC-A.3/F-II.1)	0	1	2	3	1
4. Particle size of stream substrate (NC-A.4/F-II.2)	0	1	2	3	2
5. Active/relict floodplain (NC-A.5/F-II.5)	0	1	2	3	2
6. Depositional bars or benches (NC-A.6/F-II.8)	0	1	2	3	0
7. Recent alluvial deposits (NC-A.7/F-II.7)	0	1	2	3	0
8. Headcuts (NC-A.8)	0	1	2	3	0
9. Grade control (NC-A.9)	0	0.5	1	1.5	0.5
10. Natural valley (NC-A.10)	0	0.5	1	1.5	0.5
11. Second or greater order channel (As Indicated On Topo Map **And/Or** In Field) (NC-A.11/F-II.10)	***No*** =0		***Yes*** =3		0
12. Natural Levees (F-II.3)	0	1	2	3	0
13. Braided Channel (F-II.6)	0	1	2	3	0
NCDWQ GEOMORPHOLOGY INDICATOR POINTS:					12
FAIRFAX GEOMORPHOLOGY INDICATOR POINTS:					11

II. Hydrology and Streamflow	Absent	Weak	Moderate	Strong	Score
1. Presence of Baseflow (NC-B.12/F-I.2)	0	1	2	3	2
2. Iron oxidizing bacteria (NC-B.13)	0	1	2	3	0
3. Leaf litter (NC-B.14/F-I.3)	1.5	1	0.5	0	1
4. Sediment on plants or debris (NC-B.15/F-I.5)	0	0.5	1	1.5	0
5. Organic debris lines or piles (NC-B.16/F-I.4)	0	0.5	1	1.5	0.5
6. Soil-based evidence of high water table? (NC-B.17)	***No*** =0		***Yes*** =3		3
7. Flowing Water in Channel AND >48 Hrs. Since Last Known Rain? (F-I.1)	0	1	2	3	2
Date/Amount of Last Rainfall: 10/3/15 0.19"			Water Depth:	1-3"	
(NOTE: If Ditch Indicated In #1 Above Skip This Step)					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					6.5
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					5.5

III. Streambed Soils					Score
1) Redoximorphic Features Present In *Streambed** (F-III.1)		Present = 0	Absent = 1.5		0
2) Chroma Of *Streambed** (F-III.2)	Gleyed = 3	Chroma 1 = 2	Chroma 2 = 1	Chroma >2 = 0	2
TOTAL FAIRFAX STREAMBED SOILS POINTS:					2

*NOTE: The Fairfax County Field Identification Protocol (May 2003) defines the procedure for assessing streambed soils, however the Fairfax County stream assessment form uses the phrase "sides of channel or head cut". Therefore, on this form, the phrase "s of channel or headcut" has been replaced with the term *Streambed*".

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	G65-G90
WSSI Site:	21315.03	Stream Reach ID:	4-B
Evaluator:	JMC, GCM	Date:	10/8/15

IV. Biology		**Absent**	**Weak**	**Moderate**	**Strong**	**Score**
1. Fibrous roots in streambed (NC-C.18)		3	2	1	0	2
2. Rooted upland plants in streambed (NC-C.19)		3	2	1	0	3
3. Macrobenthos	(NC-C.20)	0	1	2	3	0
(note diversity and abundance)	(F-V.1)	0	0.5	1	1.5	0
4. Aquatic Mollusks (NC-C.21/F-V.2)		0	1	2	3	0
5. Fish (NC-C.22/F-VI.1)		0	0.5	1	1.5	0
6. Crayfish (NC-C.23)		0	0.5	1	1.5	0
7. Amphibians (NC-C.24/F-VI.2)		0	0.5	1	1.5	0
8. Algae	(NC-C.25)	0	0.5	1	1.5	0
	(F-IV.2)	0	1	2	3	0
9. Wetland plants in streambed	(F-IV.4)	SAV = 3; OBL = 1.5; FACW = 1; FAC = 0.5; Other = 0				0
	(NC-C.26)	OBL = 1.5; FACW = 0.75; Other = 0				0
10. Iron Oxidizing Bacteria/Fungus (F-IV.3)		0	0.5	1	1.5	0
11. Rooted AQUATIC Plants in Streambed (F-IV.1)		0	1	2	3	0
12. EPT taxa (F-V.3)		Present = 3		Absent = 0		0
					NCDWQ BIOLOGY INDICATOR POINTS:	5
					FAIRFAX BIOLOGY INDICATOR POINTS:	0

Vegetation Comments: No vegetation found within this stream reach.

Benthics/Amphibians Found: No benthics or amphibians found within this stream reach.

TOTAL NCDWQ POINTS = 23.5

(Based on NCDWQ methodology and field trials, the stream is at least intermittent if greater than or equal to 19 points or perennial if greater than or equal to 30 points.)

TOTAL FAIRFAX COUNTY POINTS = 18.5

(Based on a Fairfax County pilot survey, the stream is perennial if greater than or equal to 25 points.)

Decision: Stream assessment scores below the intermittent/perennial threshold, combined with the absence of biological indicators of perennial flow and moderate presence of baseflow, indicate that flow within this stream is intermittent.

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	J1-J38
WSSI Project No:	21315.03	Stream Reach ID:	4-C
Evaluator:	JMC, GCM	Date:	10/8/15

The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Indentification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (September 1, 2010) and the Fairfax County DPWES Perennial Stream Field Identification Protocol (May 2003) .Letters and numbers following each indicator refer to the original form and question number from which each indicator was derived. ("F" = Fairfax County DPWES stream assessment form; "NC" = NCDWQ Stream Identific Form)

Field Indicators:

I. Geomorphology	Absent	Weak	Moderate	Strong	Score
1. Continuity of channel bed and bank (NC-A.1/F-II.9)	0	1	2	3	3
*(**NOTE**: If Bed & Bank Caused By Ditching And **WITHOUT** Sinuosity Then Score=0)*					
2. Sinuosity of channel along thalweg (NC-A.2/F-II.4)	0	1	2	3	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence (NC-A.3/F-II.1)	0	1	2	3	2
4. Particle size of stream substrate (NC-A.4/F-II.2)	0	1	2	3	2
5. Active/relict floodplain (NC-A.5/F-II.5)	0	1	2	3	2
6. Depositional bars or benches (NC-A.6/F-II.8)	0	1	2	3	2
7. Recent alluvial deposits (NC-A.7/F-II.7)	0	1	2	3	0
8. Headcuts (NC-A.8)	0	1	2	3	0
9. Grade control (NC-A.9)	0	0.5	1	1.5	0
10. Natural valley (NC-A.10)	0	0.5	1	1.5	0.5
11. Second or greater order channel (As Indicated On Topo Map **And/Or** In Field) (NC-A.11/F-II.10)	***No*** =0		***Yes*** =3		0
12. Natural Levees (F-II.3)	0	1	2	3	0
13. Braided Channel (F-II.6)	0	1	2	3	0
NCDWQ GEOMORPHOLOGY INDICATOR POINTS:					14.5
FAIRFAX GEOMORPHOLOGY INDICATOR POINTS:					14

II. Hydrology and Streamflow	Absent	Weak	Moderate	Strong	Score
1. Presence of Baseflow (NC-B.12/F-I.2)	0	1	2	3	2
2. Iron oxidizing bacteria (NC-B.13)	0	1	2	3	0
3. Leaf litter (NC-B.14/F-I.3)	1.5	1	0.5	0	1
4. Sediment on plants or debris (NC-B.15/F-I.5)	0	0.5	1	1.5	0
5. Organic debris lines or piles (NC-B.16/F-I.4)	0	0.5	1	1.5	0.5
6. Soil-based evidence of high water table? (NC-B.17)	***No*** =0		***Yes*** =3		3
7. Flowing Water in Channel AND >48 Hrs. Since Last Known Rain? (F-I.1)	0	1	2	3	2
Date/Amount of Last Rainfall: 10/3/15 0.19"			Water Depth:	2-4"	
(NOTE: If Ditch Indicated In #1 Above Skip This Step)					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					6.5
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					5.5

III. Streambed Soils					Score
1) Redoximorphic Features Present In *Streambed** (F-III.1)		Present = 0	Absent = 1.5		1.5
2) Chroma Of *Streambed** (F-III.2)	Gleyed = 3	Chroma 1 = 2	Chroma 2 = 1	Chroma >2 = 0	1
TOTAL FAIRFAX STREAMBED SOILS POINTS:					2.5

*NOTE: The Fairfax County Field Identification Protocol (May 2003) defines the procedure for assessing streambed soils, however the Fairfax County stream assessment form uses the phrase "sides of channel or head cut". Therefore, on this form, the phrase "s of channel or headcut" has been replaced with the term *Streambed*".

WSSI STREAM EVALUATION DATA FORM

Project Name:	PW Parkway ES	Field Location:	J1-J38
WSSI Site:	21315.03	Stream Reach ID:	4-C
Evaluator:	JMC, GCM	Date:	10/8/15

IV. Biology		**Absent**	**Weak**	**Moderate**	**Strong**	**Score**
1. Fibrous roots in streambed (NC-C.18)		3	2	1	0	3
2. Rooted upland plants in streambed (NC-C.19)		3	2	1	0	3
3. Macrobenthos	(NC-C.20)	0	1	2	3	0
(note diversity and abundance)	(F-V.1)	0	0.5	1	1.5	0
4. Aquatic Mollusks (NC-C.21/F-V.2)		0	1	2	3	0
5. Fish (NC-C.22/F-VI.1)		0	0.5	1	1.5	0
6. Crayfish (NC-C.23)		0	0.5	1	1.5	0
7. Amphibians (NC-C.24/F-VI.2)		0	0.5	1	1.5	0
8. Algae	(NC-C.25)	0	0.5	1	1.5	0
	(F-IV.2)	0	1	2	3	0
9. Wetland plants in streambed	(F-IV.4)	SAV = 3; OBL = 1.5; FACW = 1; FAC = 0.5; Other = 0				0
	(NC-C.26)	OBL = 1.5; FACW = 0.75; Other = 0				0
10. Iron Oxidizing Bacteria/Fungus (F-IV.3)		0	0.5	1	1.5	0
11. Rooted AQUATIC Plants in Streambed (F-IV.1)		0	1	2	3	0
12. EPT taxa (F-V.3)		Present = 3		Absent = 0		0
					NCDWQ BIOLOGY INDICATOR POINTS:	6
					FAIRFAX BIOLOGY INDICATOR POINTS:	0

Vegetation Comments: No vegetation was found within this stream reach.

Benthics/Amphibians Found: No benthics or amphibians were found within this stream reach.

TOTAL NCDWQ POINTS = 27

(Based on NCDWQ methodology and field trials, the stream is at least intermittent if greater than or equal to 19 points or perennial if greater than or equal to 30 points.)

TOTAL FAIRFAX COUNTY POINTS = 22

(Based on a Fairfax County pilot survey, the stream is perennial if greater than or equal to 25 points.)

Decision: Stream assessment scores below the intermittent/perennial threshold, combined with the absence of biological indicators of perennial flow, moderate presence of baseflow, and a first order channel, indicate that flow within this stream is intermittent.

Exhibit 12

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

1. **Looking northeast at the palustrine forested wetland adjacent to Stream Reach 3-B present in the northeastern portion of the study area.**

2. **Looking north at Data Point 1 which characterizes the upland swale present in the northeastern portion of the study area.**

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

3. **Looking west (upstream) at Stream Reach 3-B, a perennial stream present in the northeastern portion of the study area. This stream scored 32.75 and 26.5 on the NCDWQ and DPWES methods, respectively. Stream assessment scores above the intermittent/perennial threshold, combined with moderate baseflow and a second order or greater order channel, indicate that flow within this stream is perennial.**

4. **Looking southeast (downstream) at Stream Reach 3-B, which flows in an eastern direction in the northeastern portion of the study area.**

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

5. **Looking northwest (upstream) at Stream Reach 3-A, an intermittent stream present in the northwestern portion of the study area. This stream scored 25 and 20 on the NCDWQ and DPWES methods, respectively. Stream assessment scores below the intermittent/perennial threshold, combined with weak biology and discontinuous flow, indicate that flow within this stream is intermittent.**

6. **Looking southeast (downstream) at Stream Reach 3-A, which flows eastward in the northeastern portion of the study area.**

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

7. Looking northwest at the palustrine emergent wetland adjacent to Stream Reach 2-A present in the northern portion of the study area.

8. Looking southeast at the maintained recreational fields present in the northern portion of the study area.

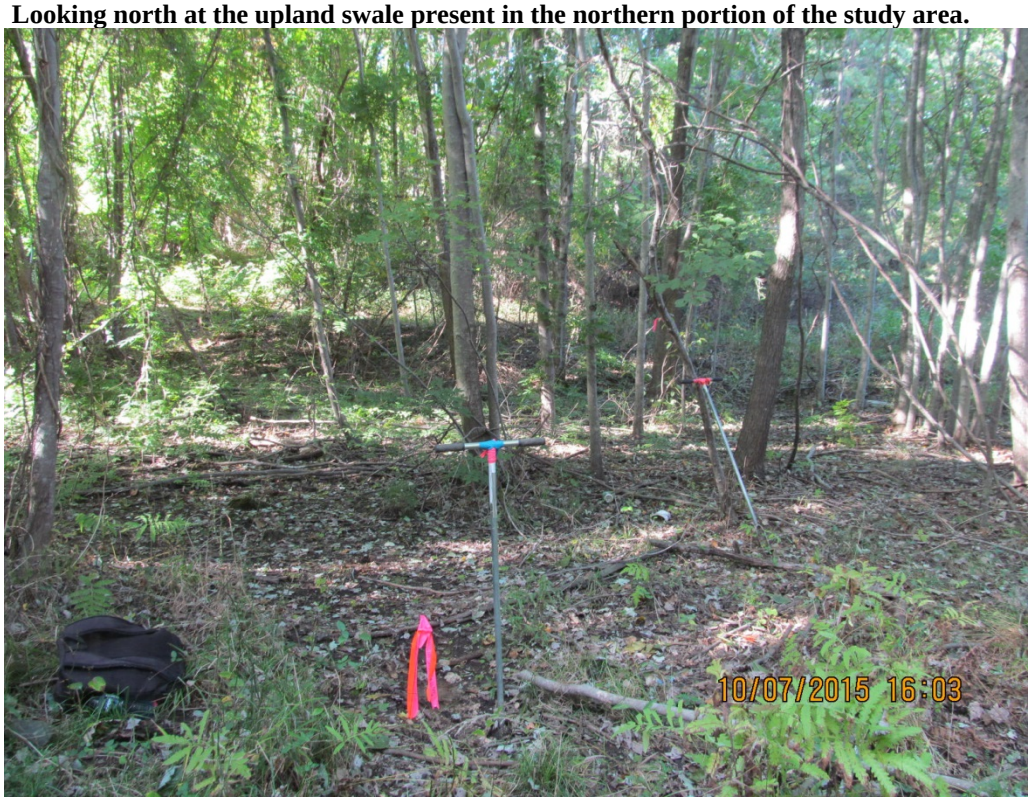
EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

9. Looking north (upstream) at Stream Reach 1-A, an intermittent stream present in the northern portion of the study area. This stream scored 22.25 and 16.5 on the NCDWQ and DPWES methods, respectively. Stream assessment scores below the intermittent/perennial threshold, combined with weak geomorphology and weak baseflow, indicate that flow within this stream is intermittent.

10. Looking south (downstream) at Stream Reach 1-A, which flows southward onto the northern study area boundary.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

11. Looking north at the upland swale present in the northern portion of the study area.



12. Looking northwest at Data Point 2 which characterizes the palustrine forested wetland present in the northern portion of the study area.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

13. Looking southwest (upstream) at Stream Reach 2-A, an intermittent stream present in the northwestern portion of the study area. This stream scored 23 and 17 on the NCDWQ and DPWES methods, respectively. Stream assessment scores below the intermittent/perennial threshold, combined with weak biology and weak in-channel structure, indicate that flow within this stream is intermittent.

14. Looking southeast (downstream) at Stream Reach 2-A, which flows eastward in the northwestern portion of the study area.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

15. Looking southwest at the culvert present along Stream Reach 2-A present in the northwestern portion of the study area.

16. Looking north at the upland swale present in the northwestern portion of the study area.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

17. Looking west (upstream) at the intermittent tributary present in the northwestern portion of the study area. This stream was too short to assess but because it has a continuous ordinary high water mark, has hydric soils, and is upstream of Stream Reach 2-A, an assessed intermittent tributary, this stream reach is considered intermittent.

18. Looking east (downstream) at the intermittent tributary present in the northwestern portion of the study area.

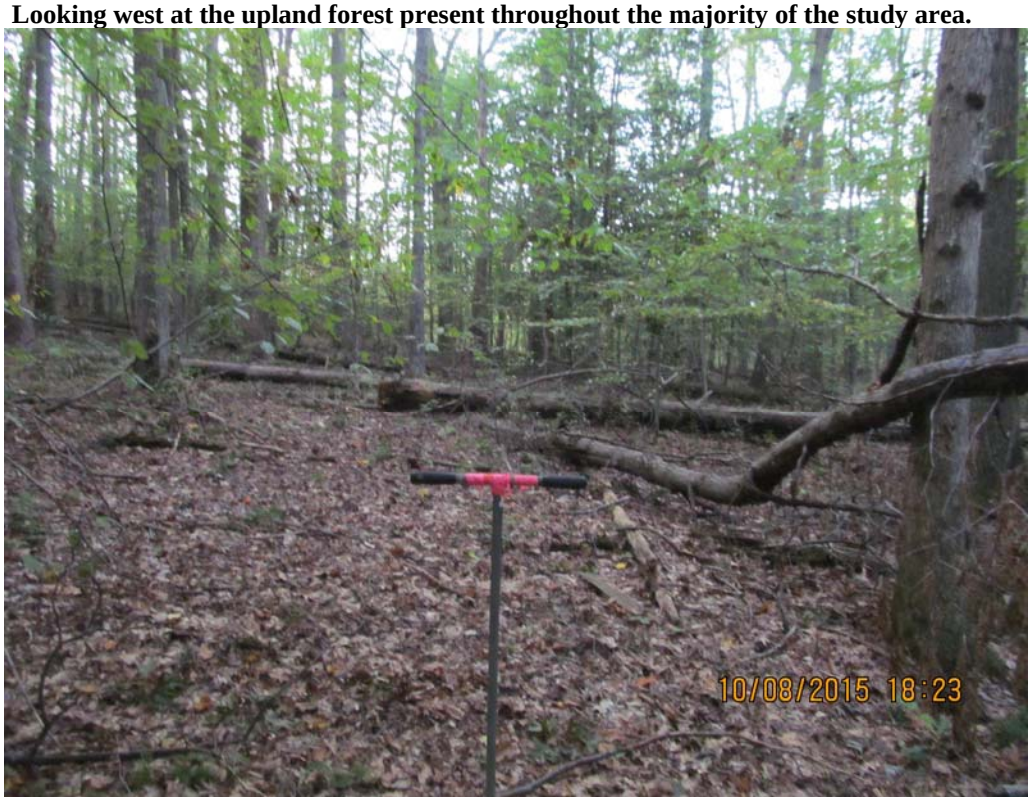
EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

19. Looking northeast at Data Point 3 which characterizes the palustrine forested wetland present in the northwestern portion of the study area.

20. Looking west at Data Point 4 which characterizes the upland swale present upslope of the palustrine forested wetland in the northwestern portion of the study area.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

21. Looking west at the upland forest present throughout the majority of the study area.



22. Looking northeast at the upland forest present throughout the majority of the study area.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

23. Looking southwest (upstream) at Stream Reach 4-A, a perennial stream present in the southeastern portion of the study area. This stream scored 36 and 28 on the NCDWQ and DPWES methods, respectively. Stream assessment scores above the intermittent/perennial threshold, combined with strong baseflow and a second order or greater order channel, indicate that flow within this stream is perennial.

24. Looking northeast (downstream) at Stream Reach 4-A, which flows in a northeastern direction through the southeastern portion of the study area.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

25. Looking northeast at the palustrine forested wetland present in the southeastern portion of the study area.

26. Looking southeast at the non-jurisdictional upland swale present in the southeastern portion of the study area.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

27. Looking southwest at the parking lot and maintained lawns present in the southeastern portion of the study area. No WOUS are present in this area.

28. Looking south (upstream) at Stream Reach 4-B, an intermittent stream present in the southeastern portion of the study area. This stream scored 23.5 and 18.5 on the NCDWQ and DPWES methods, respectively. Stream assessment scores below the intermittent/perennial threshold, combined with the absence of biological indicators of perennial flow and moderate presence of baseflow, indicate that flow within this stream is intermittent.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

29. Looking northeast (downstream) at Stream Reach 4-B, which flows in a northern direction through the southeastern portion of the study area.

30. Looking northwest (upstream) at Stream Reach 4-C, an intermittent stream present in the southeastern portion of the study area. This stream scored 27 and 22 on the NCDWQ and DPWES methods, respectively. Stream assessment scores below the intermittent/perennial threshold, combined with the absence of biological indicators of perennial flow, moderate presence of baseflow, and a first order channel, indicate that this stream is intermittent.

EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03

31. Looking southeast (downstream) at Stream Reach 4-C, which flows in an eastern direction through the southeastern portion of the study area.