

PW Parkway ES

Prince William County, Virginia

WSSI #21315.03

Perennial Flow Determination

Project No:

Plan No:

November 10, 2015

Prepared for:

Prince William County Public Schools

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PERENNIAL FLOW DETERMINATION

PW Parkway ES

WSSI #21315.03

Executive Summary

This technical narrative has been provided to describe the site-specific determination conducted to establish if streams on or within 100 feet of the above-referenced study area have perennial flow. The nature of flow within each stream (*i.e.*, whether the stream is ephemeral, intermittent, or perennial) was determined using two methods: the North Carolina Division of Water Quality method (Effective February 2005) and the Fairfax County Department of Public Works and Environmental Services method (May 2003).

Based on the results of Wetland Studies and Solutions, Inc. (WSSI)'s stream evaluations and the best professional judgment of WSSI's staff, perennial and intermittent streams are present within the study area.

Study Area Description

Exhibit 1 is a vicinity map that shows the approximate boundaries of the PW Parkway ES study area and its general vicinity. The study area 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. The study area consists of maintained recreational fields in the northern portion of the study area, a parking lot in the southern portion of the study area, and a mature, mixed hardwood forest in the remainder of the study area with small paved trails throughout. The study area is slightly sloped with drainage toward the north and the south, in the direction of the unnamed tributaries. The study area topography can be seen in Exhibit 2 and in the background topography on the Perennial Flow Determination Map (Attachment I). The Prince William County Resource Protection Area map is included as Exhibit 3 and the March 2015 natural color imagery from Pictometry® of the study area is included as Exhibit 4.

A waters of the U.S. (including wetlands) delineation and associated stream evaluations were conducted within the study area by Wetland Studies and Solutions, Inc. (WSSI), as described in a report titled "Waters of the U.S. (Including Wetlands) Delineation and Resource Protection Area Evaluation, PW Parkway ES". A Jurisdictional Determination from the U.S. Army Corps of Engineers is pending. Stream locations, as surveyed by WSSI, are depicted on the Perennial Flow Determination Map (Attachment I).

Stream Evaluation Methodology

The Fairfax County Department of Public Works and Environmental Services Perennial Stream Field Identification Protocol" (May 2003; "DPWES method") and the North Carolina "Identification Methods for the Origins of Intermittent and Perennial Streams" (February 28, 2005, Version 3.1; "NCDWQ method") were applied in the field to determine whether the streams within the study area are perennial, intermittent, or ephemeral.

The DPWES method has been adopted as an acceptable protocol for conducting perennial flow determinations according to Prince William County. In addition, the NCDWQ method was used to provide supporting documentation regarding the nature of flow in the streams on the PW Parkway ES study area.

Application of these stream evaluation methods results in numeric scores generated through the qualitative evaluation of the stream's geomorphological, hydrological and biological characteristics, and these scores are used, in combination with the best professional judgment of the evaluator, to determine the stream's flow regime.

Based on the NCDWQ method, streams scoring below 19 are generally considered to be ephemeral, while streams scoring 19 or greater are at least intermittent. Based on the NCDWQ "Policy for the Definition of Perennial Stream Origins", a stream is considered perennial if any of the following criteria are met:

1. Biological indicators such as fish, crayfish (observed in the stream channel), larval salamanders, large, multi-year tadpoles, or clams are present.¹ OR
2. A numerical score of at least 30 is obtained using the most recent version of the NCDWQ stream identification form. OR
3. More than one benthic macroinvertebrate that requires water for its entire life cycle is present as later instar larvae.²

A pilot study conducted by Fairfax County and subsequent guidance from the Virginia Department of Conservation and Recreation (DCR) Chesapeake Bay Local Assistance Department (CBLAD)³ indicate that streams receiving scores of 25 or greater under the Fairfax County method are perennial. According to the Fairfax County protocol's "Overall Score Interpretation", streams containing flow during the dry season (from July through September) in a year of near-normal rainfall or during periods of drought⁴ or streams containing aquatic organisms whose life cycles require residency in flowing water for extended periods (especially one year or greater) may also be considered perennial.

¹ If only crayfish or fingernail clams are present, a numerical score of at least 18 on the geomorphology section of the most recent version of the NCDWQ stream classification form is required.

² Lists of benthic macroinvertebrates that the NCDWQ considers perennial stream indicators are provided in Tables 5 and 6 of the NCDWQ assessment methodology.

³ Source: Virginia Department of Conservation and Recreation, *Determinations of Water Bodies with Perennial Flow, Guidance on the Chesapeake Bay Preservation Area Designation and Management Regulations*, September 2003; revised December 10, 2007 and June 21, 2010.

⁴ Guidance from the Chesapeake Bay Local Assistance Department (CBLAD) recommends the use of the Palmer Drought Severity Index to determine if "non-drought" conditions are present. CBLAD guidance states that "documented observations of no flow when the Palmer Drought Severity Index is wetter than a classification of -2.0 (moderate drought) should be considered definitive confirmation that the stream is not perennial." The Fairfax County Department of Public Works and Environmental Services (PFM 6-1704.4B) recommends the use of the U.S. Drought Monitor to determine the general hydrologic conditions at the time of observation.

Guidance from CBLAD⁵ indicates that all streams that receive assessment scores within three points of the intermittent/perennial threshold scores under either the NCDWQ or Fairfax County methods (30 and 25, respectively) should be re-examined before making an intermittent vs. perennial determination, unless biological indicators of perennial flow listed above are present within the stream. Re-examination may include revisiting the stream during the summer or early fall months when low stream flows would be expected.

Stream evaluation data forms for each evaluated stream reach (identified as “Stream Reach X-#”) are provided in Exhibit 5. Photographs of each stream reach taken at the time of this stream evaluation field work are included in Exhibit 6.

WSSI also reviewed the Palmer Drought Severity Index (Exhibit 7) and U.S. Drought Monitor (Exhibit 8) maps to determine if drought conditions were present at the time of the stream assessment field work. Both the Palmer Drought Severity Index Map and the U.S. Drought Monitor Map indicate that the stream evaluation field work was completed during a period of near normal precipitation.

Stream assessment field work was conducted on October 7 and 8, 2015 by Jessica M. Campo, PWS, CT⁶, and Grace McCroskey. WSSI performed stream evaluations along seven stream reaches on and within 100 feet of the project study area as described below and depicted on Attachment I. One stream in the northwestern portion of the study area was too short to assess but is still discussed in this report.

An Environmental Constraints Analysis was previously performed on a portion of the PW Parkway ES study area as described in the report titled “Milestone – Chinn Park, Environmental Constraints Analysis”, dated August 26, 2015. The results of this study were reviewed before performing the PFD field work on the PW Parkway ES study area. 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 Assessment Findings

Based on the results of WSSI’s stream evaluations and the best professional judgment of WSSI staff, perennial and intermittent streams are present within the study area. Table 1 and the text that follows summarize the stream evaluation scores and stream flow classifications, as well as the rationale used in making the stream flow determinations.

- Stream Reach 1-A (Photos #1 and #2) characterizes the stream flagged with the B/D flagging series in the northern portion of the study area. This 2- to 3-foot wide stream is not depicted on the USGS topographic quadrangle map (Exhibit 2) and had discontinuous flow that was

⁵ Virginia Department of Conservation and Recreation, *Determinations of Water Bodies with Perennial Flow, Guidance on the Chesapeake Bay Preservation Area Designation and Management Regulations*, September 2003; revised December 10, 2007 and June 21, 2010.

⁶ Professional Wetland Scientist #2601, Society of Wetlands Scientists Certification Program, Inc.; Certified Level 1 Taxonomist: All Phyla, Society for Freshwater Science (SFS); ISA Certified Arborist MA-5740A.

approximately 0-2 inches deep (in riffles and in pools) at the time of our field work. An assessment of this reach resulted in scores of 22.25 and 16.5 using the NCDWQ and DPWES methods, respectively. Stream assessment scores, discontinuous baseflow, and weak geomorphology indicate that this stream is intermittent.

- Stream Reach 2-A (Photos #3, #4 and #5) characterizes the stream flagged with the A/D flagging series in the northwestern portion of the study area. This 2- to 6-foot wide stream is depicted by topography alone on the USGS topographic quadrangle map (Exhibit 2) and had discontinuous flow that was approximately 0-4 inches deep (in riffles and in pools) at the time of our field work. An assessment of this reach resulted in scores of 23 and 17 using the NCDWQ and DPWES methods, respectively. Stream assessment scores, weak biology, and weak in-channel structure indicate that 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 (Photo #5).
- Stream Reach 3-A (Photos #6, #7, and #8) characterizes the stream upslope of Stream Reach 3-B flagged with the A/B flagging series in the northeastern portion of the study area. This 4- to 5-foot wide stream is depicted by topography alone on the USGS topographic quadrangle map (Exhibit 2) and had discontinuous flow that was approximately 1 inch deep in riffles and 4 inches deep in pools at the time of our site visit. An assessment of this stream reach resulted in scores of 25 and 20 using the NCDWQ and DPWES methods, respectively. Stream assessment scores, weak biology, lack of hydric soils, and observation of discontinuous flow indicate that 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 (Photo #8).
- Stream Reach 3-B (Photos #9 and #10) characterizes the stream downslope of Stream Reach 3-A flagged with the A/B flagging series in the northeastern portion of the study area. The transition to Stream Reach 3-B occurred below a survey-located headcut. This 2- to 4-foot wide stream is depicted by topography alone on the USGS topographic quadrangle map (Exhibit 2) and had flowing water that was approximately 2 inches deep in riffles and 4 inches deep in pools at the time of our site visit. An assessment of this stream reach resulted in scores of 32.75 and 26.5 using the NCDWQ and DPWES methods. Stream assessment scores are above the intermittent/perennial threshold score for both methods. These scores, combined with moderate baseflow, presence of hydric soils, and an improvement in the geomorphology of the stream below the headcut, indicate that flow within this stream is perennial.
- Stream Reach 4-A (Photos #11 and #12) characterizes the stream flagged with the F/G flagging series in the southeastern corner of the study area. This 4- to 6-foot wide stream is depicted as an intermittent stream (*i.e.*, a thin blue line 0.004 inches wide) on the USGS topographic quadrangle map (Exhibit 2), and had flowing water that was approximately 2 inches deep in riffles and 12 inches deep in pools at the time of our site visit. An assessment

of this stream reach resulted in scores of 36 and 28 using the NCDWQ and DPWES methods, respectively. Stream assessment scores are above the intermittent/perennial threshold score for both methods. These scores, combined with moderate baseflow, and presence of a second order or greater order channel, indicate that flow within this stream is perennial.

- Stream Reach 4-B (Photos #13 and #14) characterizes the stream flagged with the I/G flagging series in the southeastern corner of the study area. This 4- to 6- foot wide stream is depicted by topography alone on the USGS topographic quadrangle map ([Exhibit 2](#)) and had flowing water that was approximately 1 inch deep in riffles and 3 inches deep in pools at the time of our site visit. An assessment of this stream reach resulted in scores of 23.5 and 18.5 using the NCDWQ and DPWES methods, respectively. Stream assessment scores below the intermittent/perennial threshold in a first-order channel, combined with the absence of biological indicators of perennial flow, indicate that flow within this stream is intermittent.
- Stream Reach 4-C (Photos #15 and #16) characterizes the stream flagged with the J/K flagging series above its confluence with Stream Reach 4-B, located in the southeastern corner of the study area. This 2- to 3- foot wide stream is depicted as an intermittent stream (*i.e.*, a thin blue line 0.004 inches wide) on the USGS topographic quadrangle map ([Exhibit 2](#)) and had flowing water that was approximately 2 inch deep in riffles and 4 inches deep in pools at the time of our site visit. An assessment of this stream reach resulted in scores of 27 and 22 using the NCDWQ and DPWES methods, respectively. Stream assessment scores below the intermittent/perennial threshold in a first-order channel, combined with the absence of biological indicators of perennial flow, indicate that flow within this stream is intermittent.
- One unassessed stream (Photos #17 and #18) was flagged with the A/D flagging series in the northwestern portion of the study area. This 2-foot wide stream is depicted by topography alone on the USGS topographic quadrangle map ([Exhibit 2](#)) and had flowing water that was approximately 1 to 4 inches deep (in riffles and in pools) at the time of our site visit. This stream 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.

TABLE 1. STREAM EVALUATION SUMMARY

REACH	DATE OF EVALUATION	NCDWQ SCORE	DPWES SCORE	RATIONALE FOR STREAM FLOW DETERMINATION	CLASSIFICATION
1-A	10/7/2015	22.25	16.5	1. Scores are below the I/P threshold scores, 2. Discontinuous baseflow; and 3. Weak geomorphology.	Intermittent
2-A	10/7/2015	23	17	1. Scores are below the I/P threshold scores, 2. Weak biology; 3. Weak in-channel structure; and 4. Discontinuous baseflow.	Intermittent

REACH	DATE OF EVALUATION	NCDWQ SCORE	DPWES SCORE	RATIONALE FOR STREAM FLOW DETERMINATION	CLASSIFICATION
3-A	10/8/2015	25	20	1. Scores are below the I/P threshold scores; 2. Weak biology; 3. Lack of hydric soils; and 3. Observation of discontinuous flow.	Intermittent
3-B	10/8/2015	32.75	26.5	1. Scores above the intermittent/perennial threshold 2. Moderate baseflow; 3. Presence of hydric soils; and 4. Improvement in the geomorphology of the stream below the headcut.	Perennial
4-A	10/8/2015	36	28	1. Scores above the intermittent/perennial threshold 2. Moderate baseflow; and 3. Second order or greater channel.	Perennial
4-B	10/8/2015	23.5	18.5	1. Scores are below the I/P threshold scores; 2. Absence of biological indicators of perennial flow; and 3. First order channel.	Intermittent
4-C	10/8/2015	27	22	1. Scores are below the I/P threshold scores; 2. Absence of biological indicators of perennial flow; and 3. First order channel.	Intermittent

Summary

In WSSI's opinion, perennial and intermittent streams are located within the PW Parkway ES study area. Consequently, Resource Protection Areas are present on the study area, as described in the Preservation Area Site Assessment (PASA) report.

Limitations

This study is based on examination of the geomorphology, biology, hydrology, streambed soils and available reference documents. Field indicators can change with variations in hydrology, weather conditions, time of year, watershed land disturbance and other factors. Therefore, our conclusions may vary significantly from future observation by others. This report assesses the flow regime in streams at the study area at the time of our review and does not address conditions at a given time in the future.

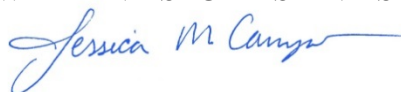
Our review and report have been prepared in accordance with generally accepted guidelines for the evaluation of stream flow regimes. We make no other warranties, either expressed or implied, and our report is not a recommendation to buy, sell or develop the property.

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 United States 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 Resource Protection Area determination since such determinations must be verified by the Prince William County Department of Public Works.

WETLAND STUDIES AND SOLUTIONS, INC.



Jessica M. Campo, PWS, CT
Project Environmental Scientist



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

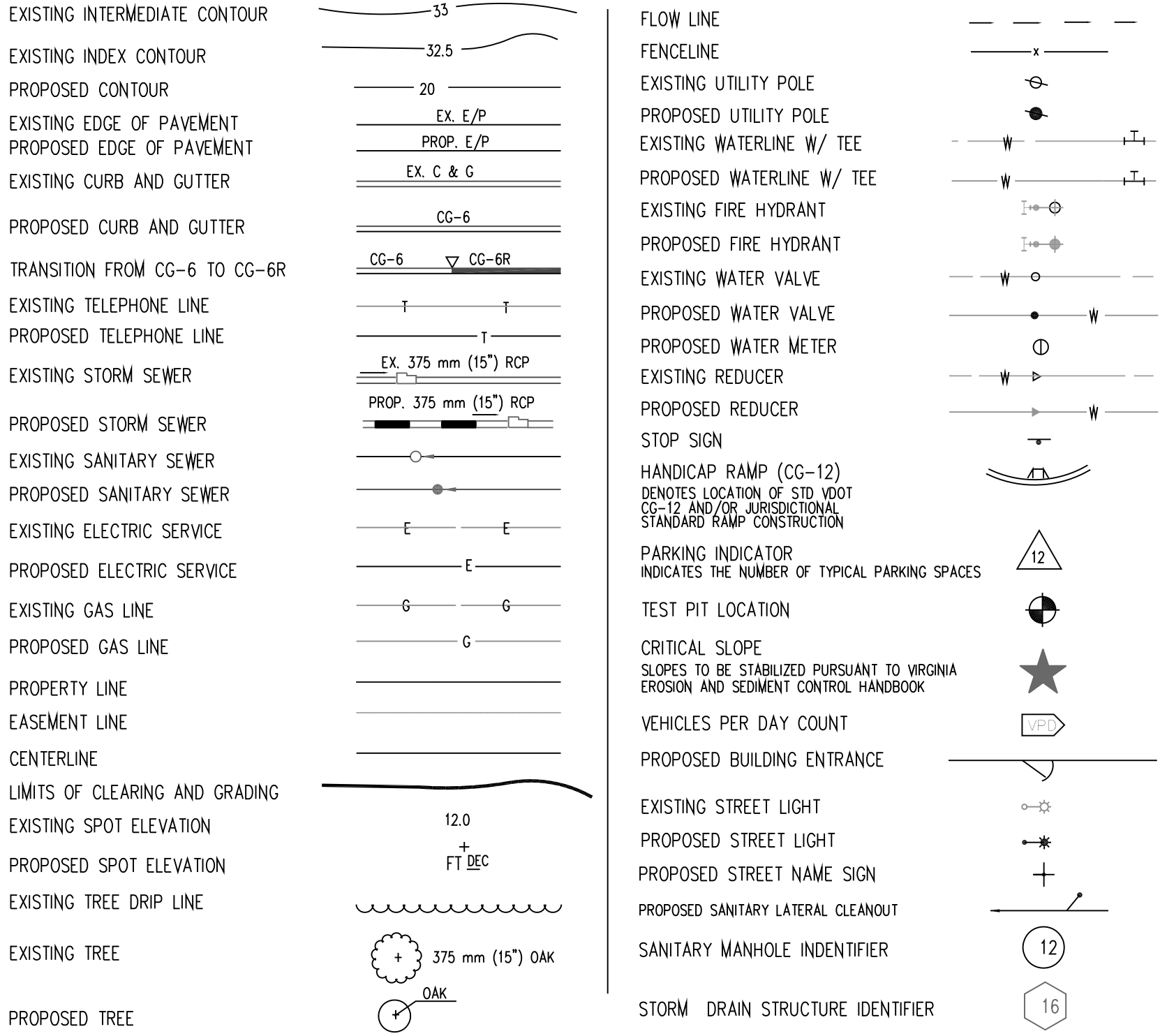
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Attachment I

GENERAL NOTES

1. This site has been addressed by the Prince William County Mapping Office as: 13001 CHINN PARK DRIVE, WOODBRIDGE, VA 22192 (addresses for subdivision lots shall appear on the approved plot for recordation).
2. Addresses assigned are for the layout of individual businesses or dwelling units and are for exterior doors as shown on this plan only. Any deviation in design or layout will require that a revised plan be submitted to the Office of Mapping for re-addressing. It is the responsibility of the developer to inform the County Office of Mapping before a change in layout occurs and to submit complete and accurate information for re-addressing. Prince William County does not assume any responsibility where re-addressing is required even though tenants have already occupied a portion of the building.
3. Methods and materials used in the construction of the improvements herein shall conform to the current County construction standards and specifications and/or current VDOT standards and specifications.
4. The contractor or developer is required to notify the Prince William County Department of Public Works in writing three (3) days prior to the beginning of the construction and specifically request inspection before beginning -- 792-7070.
- A. Installation of approved erosion control devices.
- B. Clearing and Grading.
- C. Subgrade excavation.
- D. Installing storm sewers or culverts.
- E. Setting curb and gutter forms.
- F. Placing curb and gutter.
- G. Placing other concrete.
- H. Placing gravel base.
- I. Placing any bituminous surfacing.
- *J. Installing water mains outside the Service Authority's boundaries.
- *K. Installing sanitary sewer outside the Service Authority's boundaries.
5. Measures to control erosion and siltation, including detention ponds serving as silt basins during construction, must be provided prior to issuance of the site development permit. The approval of these plans in no way relieves the developer or his agent of the responsibilities contained in the Virginia Erosion and Sediment Control Handbook.
6. A permit must be obtained from the Office of the Resident Engineer, Virginia Department of Transportation (VDOT) Prince William County, prior to construction in existing State right-of-way, 366-1900.
7. Approval of this plan does not guarantee issuance of an entrance permit by VDOT when such permit is required under State law.
8. The exact location of all guard rails will be determined by VDOT personnel. "A joint inspection will be held with the Developer, County Representatives, and Representatives, of the Virginia Department of Transportation (VDOT) to determine if and where guard rail and/or paved ditches will be needed. The developer will be responsible for providing guardrail and paved ditches as determined by this joint inspection." Refer to Virginia Department of Transportation (VDOT) Guard Rail and Paved Ditch Specifications.
9. An approved set of plans and all applicable permits must be available at the construction site. Also, a representative of the developer must be available at all times.
10. Warning signs, markers, barricades or flagmen should be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).
11. All unsuitable material shall be removed from the construction limits of the roadway before placing embankment.
12. All pavement sections on the approved plans are based on a minimum CBR value of 10. CBR tests are to be performed by the engineer and submitted to the Prince William County Planning Office for review prior to placement of base material. CBR values less than 10 will require submittal of revised pavement section.
13. All roadside ditches at grades of more than 5% shall be paved with cement concrete to the limits indicated on the plans and as required at the field inspection.
14. All springs shall be capped and piped to the nearest storm sewer manholes or curb inlet. The pipe shall be minimum 150 mm (6") diameter and conform to VDOT standard SB-1.
15. All standard street name signs, traffic control devices, and street lights shall be installed by the developer when the first building unit is occupied.
16. Construction debris shall be containerized in accordance with the Virginia Litter Control Act; no less than one litter receptacle shall be provided at the construction site
17. The contractor shall provide adequate means of cleaning mud from trucks and/or other equipment prior to entering public streets, and it is the contractors responsibility to clean streets, alloy dust, and to take whatever measures are necessary to insure that the streets are maintained in a clean, mud and dust free condition at all times.
18. * Notification shall be given to the appropriate utility Company (Service Authority, Virginia-American Water Company, or Dale Service Corporation) prior to construction of water and/or sanitary sewer lines. Information should also be obtained from the appropriate authority concerning permits, cut sheets, and connections to existing lines.
19. All sanitary sewers and water mains and appurtenances shall be constructed in accordance with the current standards and specifications of Prince William County and/or the Service Authority.
20. The developer and/or contractor shall be responsible to supply all utility companies with copies of plans that have been approved by Prince William County and advising them that all grading shall conform to the approved plans, and further that the utility companies shall be responsible for honoring these plans and the finished grades in the installation of their utility lines.
21. Contractors shall notify operators who maintain underground utility lines in the area of proposed excavating or blasting at least two (2) working days, but not more than ten (10) working days, prior to commencement of excavation or demolition. Names and telephone numbers of the operators underground utility lines in Prince William County appear below. These numbers shall also be used to serve in an emergency condition.
- | | | |
|--|-----------------------------|--|
| * Washington Gas Light Co.
Virginia Power Co.
Northern Virginia Electric Co-op
Columbia Gas of Virginia
Continental Telephone of VA
Colonial Pipeline Co.
Transcontinental Gas Pipe Line Corp. | MISS UTILITY 1-800-257-7777 | Service Authority
335-7900
(After hours-Emergency 335-7990)
Virginia-American Water 491-2136
Dale Service Corporation 494-4161 |
|--|-----------------------------|--|
22. The Service Authority requires that a clean-out be placed within three-tenths (0.3) meters (one foot) of the property line.
23. The location of existing utilities shown in these plans are taken from existing records. It shall be the contractors responsibility to verify the exact horizontal and vertical location of all existing utilities as needed prior to construction. The contractor shall inform the engineer of any conflicts arising from his existing utility verification and the proposed construction.
24. The developer will be responsible for any damage to the existing streets and utilities which occurs as a result of his construction project within or contiguous to the existing right-of-way.
25. All utilities placed under existing streets shall be bored or jacked.
26. When grading is proposed within easements of utilities, letters of permission from all involved companies must be provided to Prince William County Planning Office prior to issuance of grading and/or site development permits.
27. The developer will be responsible for the relocation of any utilities which is required as a result of his project. The relocation should be done prior to construction.
28. Before burning, blasting, transportation or storage of explosives in Prince William County, a permit shall be obtained from the Fire Marshal's Office, 792-6360.
29. Fire and Rescue Services must be notified immediately (792-6810) in the event that unusual items such as tanks, cylinders, unidentified containers, etc. which could contain potentially hazardous materials are discovered or observed. All activities must cease and not be resumed until authorization to proceed is given by the Fire Marshal's Office.
30. Sidewalk underdrains shall be installed per Section 650 of the Design and Construction Standards Manual.
31. All walkways outside of the right-of-way limits will be maintained by the homeowners association.
32. Maintenance of the Storm Drainage or Storm Water Management facilities located therein shall be pursuant to Section 700 of the Prince William County Design and Construction Standards Manual.
33. If units shown on this plan will be occupied in phases, a phasing plan must be approved by the engineering inspection branch prior to the issuance of any occupancy permits. (Detached single family subdivision exempt.)
34. These plans identify the location of all known gravesites. Gravesites shown on this plan will be protected in accordance with state law. In the event gravesites are discovered during construction, the County's Planning Office must be notified immediately (792-6830). All activities must cease and not be resumed until authorization to proceed is given by the County Planning Office.
35. Roof top mechanical equipment, if any, must be enclosed within a wall or similar screening barrier, designed in harmony with the building.
36. Individual sign permits will be required from the Zoning Office for all free standing and facade signs prior to erecting the signs.
37. All buffer areas shall be screened according to the Design and Construction Standards Manual.
38. For proffers statement and proffers analysis, see sheet(s) N/A of _____.
39. For waivers see sheet(s) N/A of _____.
40. Anticipated sewage flows: N/A
41. Anticipated fire flows: N/A
42. Distance to nearest existing school or proposed school site: N/A

LEGEND



43. Retaining walls to be masonry construction or equal.
44. The County shall maintain drainage, storm water management, and best management practices facilities and systems to ensure that they function properly. The County shall not be responsible for repaving or resurfacing paved areas or maintaining landscaping within easements. The fee title owner shall be responsible for grass mowing with reasonable frequency, if applicable, and for the removal of debris and other matter that has impeded or threatens to impede the free flow of storm water. The fee title owner shall notify the Department of Public Works of any defects with the structures, pipes and fencing within the easement, of any debris or other matter which is beyond the ability of the owner to remove, and of any excessive flooding, sedimentation or soil erosion within the area of easement.
45. All existing and proposed utilities must be located underground in accordance to Section 32-250.71 of the zoning ordinance.
46. There are no historical features or cemeteries known to exist on this site.
47. The approval of these plans shall in no way relieve the developer, the contractor or their agents of any legal responsibility which may be required by the Code of Virginia or any other ordinance enacted by Prince William County.

THE ENGINEER SHALL NOT HAVE CONTROL OVER OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK SHOWN ON THESE PLANS. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S SCHEDULES OR FAILURE TO CARRY OUT THE WORK. THE ENGINEER IS NOT RESPONSIBLE FOR ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS, OR THEIR AGENTS OR EMPLOYEES, OR OF ANY OTHER PERSONS PERFORMING PORTIONS OF THE WORK.

THIS PLAN COMPLIES WITH THE NEW PRINCE WILLIAM COUNTY SERVICE AUTHORITY UTILITY STANDARDS MANUAL, WHICH WENT INTO EFFECT ON JANUARY 1, 1997. ALL UTILITY PERMITS ISSUED AFTER THIS DATE MUST COMPLY WITH THE CONSTRUCTION CRITERIA IN THE NEW MANUAL, INCLUDING ANY REVISIONS WHICH HAVE BEEN ISSUED.

DESIGNATED PLANS EXAMINER CERTIFICATE

1ST SUBMISSION REVIEWED AND RECOMMENDED FOR SUBMISSION

DESIGNATED PLANS EXAMINER REC. NUMBER DATE

2ND SUBMISSION REVIEWED AND RECOMMENDED FOR SUBMISSION

DESIGNATED PLANS EXAMINER REC. NUMBER DATE

PWCSA WATER & SEWER MAIN INSPECTION FEES

WATER MAIN _____ L.M. (L.F.) x \$ _____ = _____

SEWER MAIN _____ L.M. (L.F.) x \$ _____ = _____

TV SEWER MAIN _____ L.M. (L.F.) x \$ _____ = _____

TOTAL = _____

BOND ESTIMATE

ITEM	COUNTY BOND	VDOT BOND
TOTAL CONSTRUCTION COST		
ADMINISTRATIVE COST		
INFLATION COST		
TOTAL PERFORMANCE BOND AMOUNT		

SURVEY AND TOPOGRAPHIC INFORMATION

1. Horizontal and vertical control surveys were performed by PWC DIGITAL DATA in JULY 2014 (Year)
2. All elevations are referenced to the North American Vertical Datum of 1988 (NAVD 88).
3. Source of topographic mapping is PWC DIGITAL DATA dated JULY 2014
4. Boundary survey was performed by PWC DIGITAL DATA dated JULY 2014
5. The application of the professional's seal and signature as required by Section 1.14 of the STATE BOARD OF ARCHITECTS, PROFESSIONAL ENGINEERS, LAND SURVEYORS AND CERTIFIED LANDSCAPE ARCHITECTS RULES AND REGULATIONS shall be evidence that: the boundary data is correct to the best of the land surveyor's knowledge, and complies with the minimum standards and procedures of the said Board; the topographic information is accurate to within one-half of the contour interval, as shown. Application of the seal and signature indicates acceptance of responsibility for the work shown hereon.

SOILS MAP (SCALE: 1" = 500')

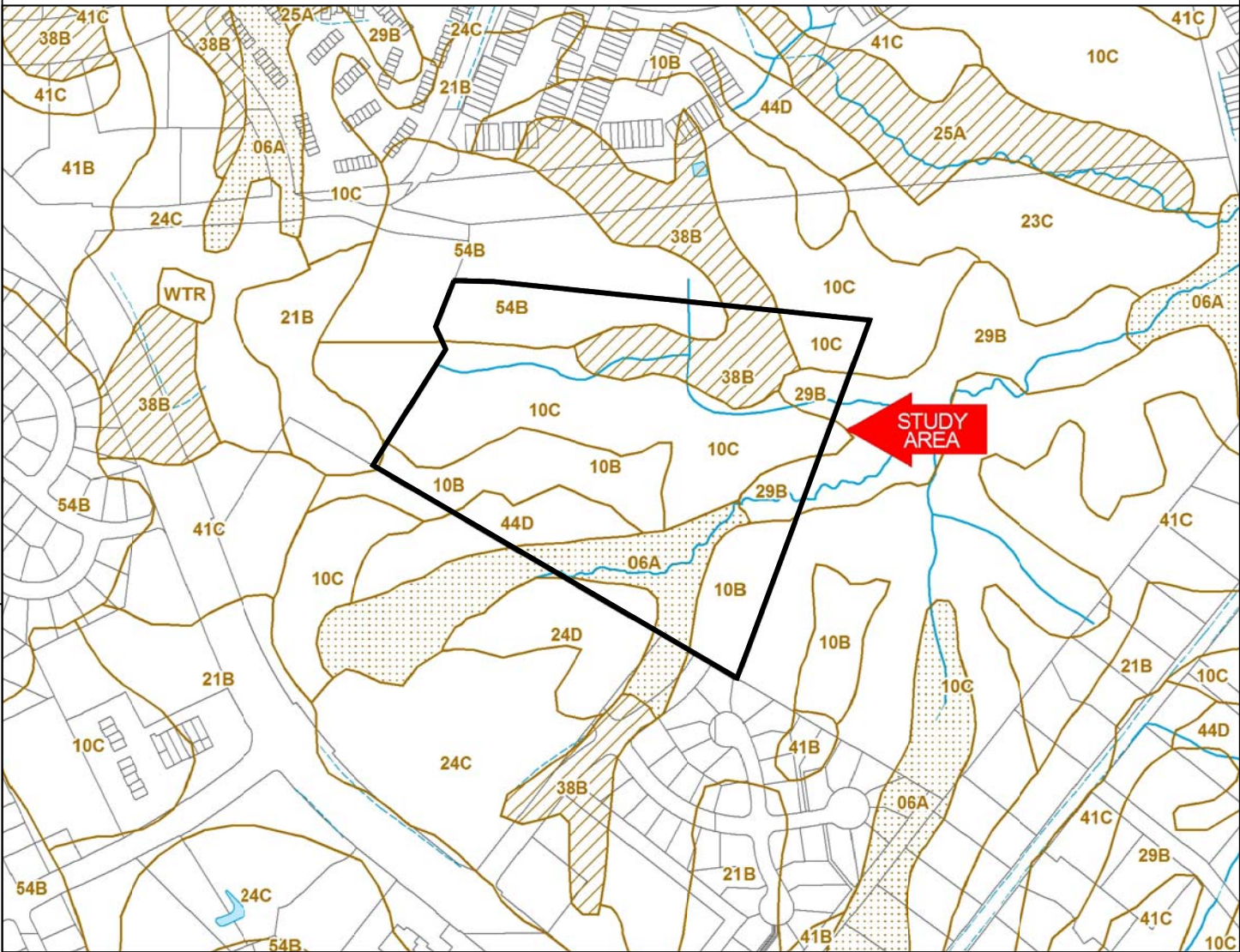
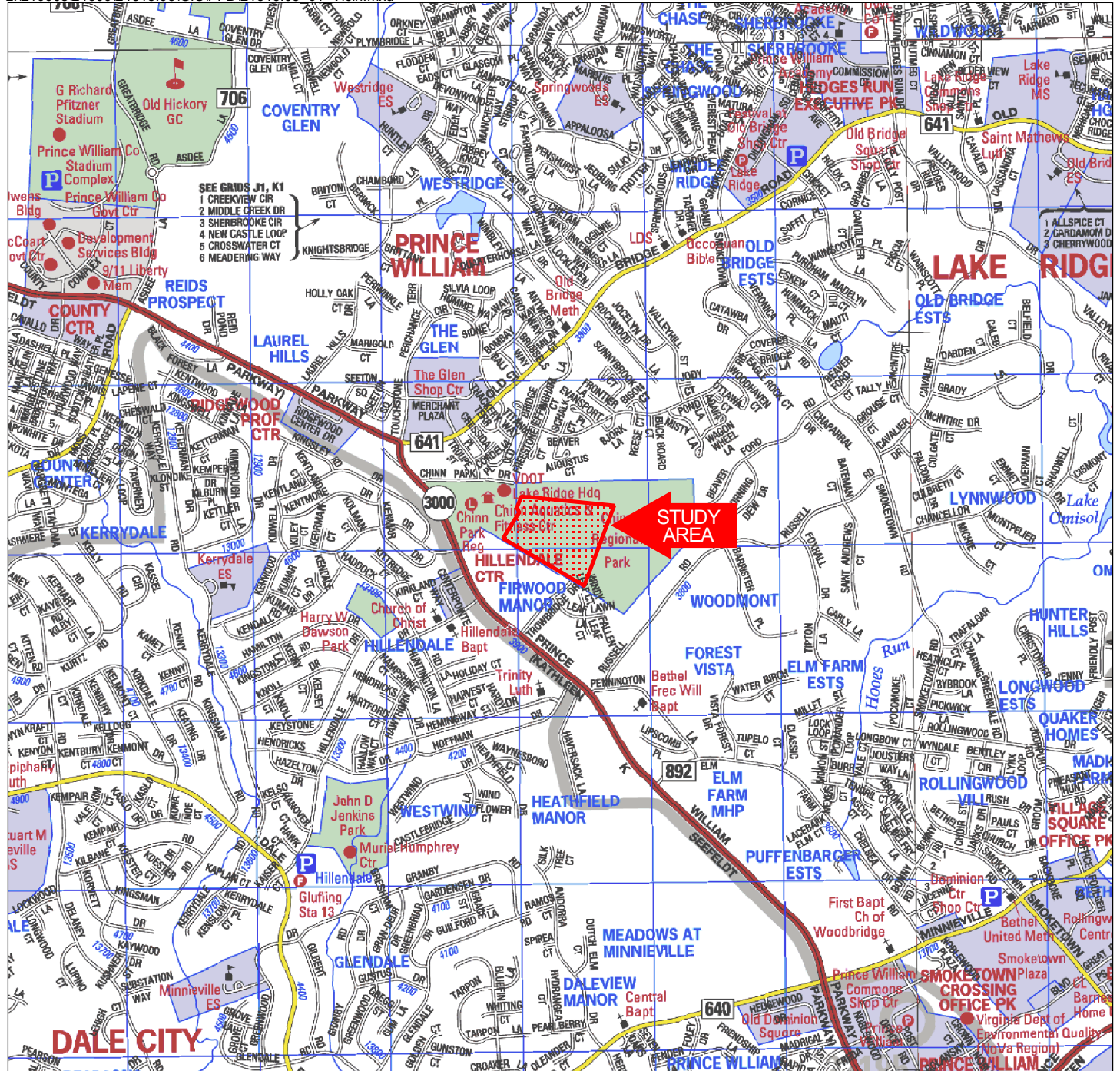


Exhibit 1



Copyright ADC The Map People
Permitted Use Number 20711184

Vicinity Map
PW Parkway ES
WSSI #21513.03
Original Scale: 1" = 2000'

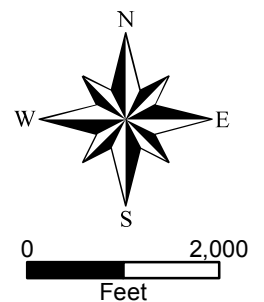
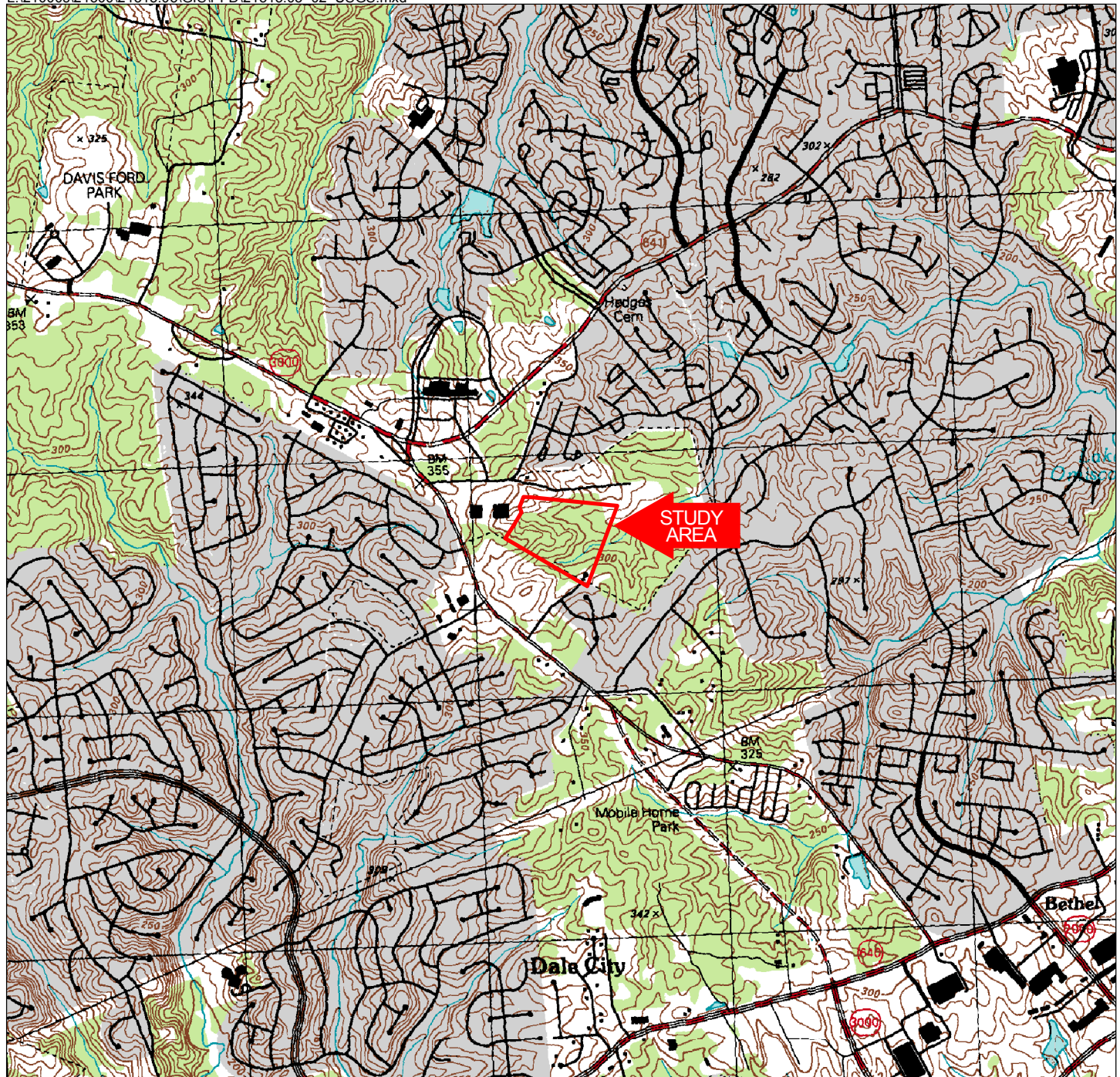


Exhibit 2



**USGS Quad Map
Occoquan, VA 1994
PW Parkway ES
WSSI #21513.03**

Original Scale: 1" = 2000'

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

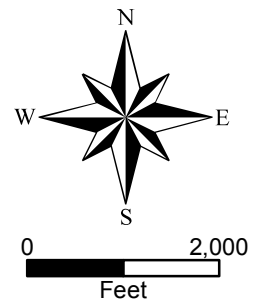
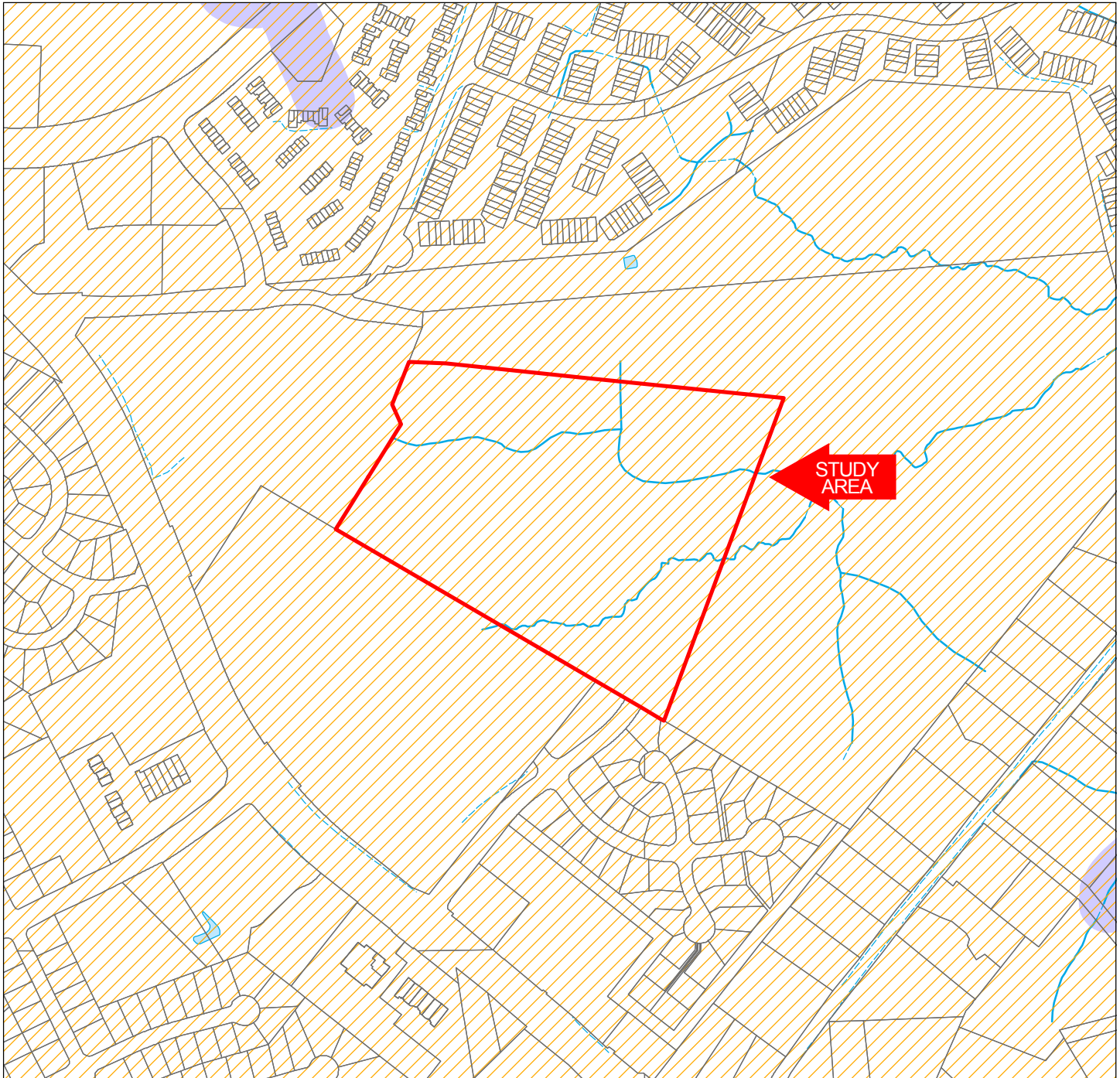






Exhibit 3



**Resource Protection Area (RPA) Map
Prince William County Digital Data
PW Parkway ES
WSSI #21513.03
Original Scale: 1" = 500'**

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

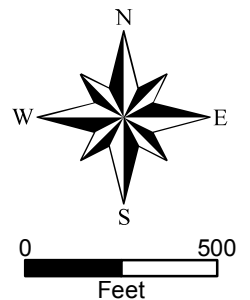


Exhibit 4



March 2015 Natural Color Imagery
PW Parkway ES
WSSI #21513.03
Original Scale: 1" = 300'

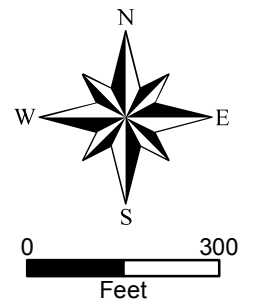


Photo Source: Pictometry®

Exhibit 5

WSSI Stream Evaluation Form

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

Date(s): 10/7/2015
County: Prince William County
State: Virginia

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 Identification 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 Identification 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
<i>(NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0)</i>					
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)	<i>No</i> =0		<i>Yes</i> =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)	<i>No</i> =0		<i>Yes</i> =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.					
<i>(NOTE: If Ditch Indicated In #1 Above Skip This Step)</i>					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					6
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					4

III. Streambed Soils					Score
1) Redoximorphic Features Present In <i>Streambed</i> * (F-III.1)		Present = 0 Absent = 1.5			0
2) Chroma Of <i>Streambed</i> * (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 "sides 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 WSSI Project No: 21315.03 Evaluator: JMC, GCM	Field Location: A44-A66; D32-D35 Stream Reach ID: 2-A Date: 10/7/15
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The WSSI Stream Evaluation Data Form is based on the NCDWQ Methodology for Identification 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 Identification 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
<i>(NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0)</i>					
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)	<i>No</i> = 0		<i>Yes</i> = 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)	<i>No</i> = 0		<i>Yes</i> = 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.					
<i>(NOTE: If Ditch Indicated In #1 Above Skip This Step)</i>					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					7
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					5

III. Streambed Soils					Score
1) Redoximorphic Features Present In <i>Streambed</i> * (F-III.1)		Present = 0 Absent = 1.5			0
2) Chroma Of <i>Streambed</i> * (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 "sides 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. Macroenthos (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	
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
Project Name: PW Parkway ES
Applicant/Owner: Prince William County Public Schools
Investigator(s): JMC, GCM

Date(s): 10/8/2015
County: Prince William County
State: Virginia

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 Identification 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 Identification 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
<i>(NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0)</i>					
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)	<i>No</i> = 0		<i>Yes</i> = 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)	<i>No</i> = 0		<i>Yes</i> = 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.					
<i>(NOTE: If Ditch Indicated In #1 Above Skip This Step)</i>					
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 <i>Streambed</i> * (F-III.1)		Present = 0 Absent = 1.5			1.5
2) Chroma Of <i>Streambed</i> * (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 "sides of channel or headcut" has been replaced with the term *Streambed*.

WSSI STREAM EVALUATION DATA FORM

Project Name: PW Parkway ES WSSI Site: 21315.03 Evaluator: JMC, GCM	Field Location: B48-B72 Stream Reach ID: 3-A Date: 10/8/15
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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. Macroenthos (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, lack of hydric soils, and discontinuous flow, indicate that flow within this stream is intermittent. In addition, this stream reach was previously assessed during 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 Identification 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 Identification 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
<i>(NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0)</i>					
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)	<i>No</i> =0		<i>Yes</i> =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)	<i>No</i> =0		<i>Yes</i> =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"
<i>(NOTE: If Ditch Indicated In #1 Above Skip This Step)</i>					
NCDWQ HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					8
FAIRFAX HYDROLOGY AND STREAMFLOW INDICATOR POINTS:					7

III. Streambed Soils					Score
1) Redoximorphic Features Present In <i>Streambed</i> * (F-III.1)	Present = 0 Absent = 1.5				0
2) Chroma Of <i>Streambed</i> * (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 "side of channel or headcut" has been replaced with the term '*Streambed*'.

WSSI STREAM EVALUATION DATA FORM

Project Name: PW Parkway ES
WSSI Site: 21315.03
Evaluator: JMC, GCM

Field Location: B1-B48
Stream Reach ID: 3-B
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) (note diversity and abundance)		0	1	2	3	0
	(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, presence of hydric soils, and an improvement in the geomorphology of the stream below the headcut that determined the transition from Stream Reach 3-A, 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 Identification 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 Identification 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
<i>(NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0)</i>					
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)	<i>No</i> =0		<i>Yes</i> =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)	<i>No</i> =0		<i>Yes</i> =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"
<i>(NOTE: If Ditch Indicated In #1 Above Skip This Step)</i>					
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 <i>Streambed</i> * (F-III.1)		Present = 0 Absent = 1.5			0
2) Chroma Of <i>Streambed</i> * (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 "sides of channel or headcut" has been replaced with the term *Streambed*.

WSSI STREAM EVALUATION DATA FORM

Project Name: PW Parkway ES WSSI Site: 21315.03 Evaluator: JMC, GCM	Field Location: F1-F67 Stream Reach ID: 4-A Date: 10/8/15
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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. Macroenthos (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 Identification 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 Identification 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
<i>(NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0)</i>					
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)	<i>No</i> = 0		<i>Yes</i> = 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)	<i>No</i> = 0		<i>Yes</i> = 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"
<i>(NOTE: If Ditch Indicated In #1 Above Skip This Step)</i>					
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 <i>Streambed</i> * (F-III.1)		Present = 0 Absent = 1.5			0
2) Chroma Of <i>Streambed</i> * (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 "sides 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. Macroenthos (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 in a first-order channel, combined with the absence of biological indicators of perennial flow, 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 Identification 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 Identification 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
<i>(NOTE: If Bed & Bank Caused By Ditching And WITHOUT Sinuosity Then Score=0)</i>					
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)	<i>No</i> =0		<i>Yes</i> =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)	<i>No</i> =0		<i>Yes</i> =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"
<i>(NOTE: If Ditch Indicated In #1 Above Skip This Step)</i>					
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 <i>Streambed</i> * (F-III.1)		Present = 0 Absent = 1.5			1.5
2) Chroma Of <i>Streambed</i> * (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 "sides of channel or headcut" has been replaced with the term *Streambed*.

WSSI STREAM EVALUATION DATA FORM

Project Name: PW Parkway ES
WSSI Site: 21315.03
Evaluator: JMC, GCM

Field Location: J1-J38
Stream Reach ID: 4-C
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. Macroenthos (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 in a first-order channel, combined with the absence of biological indicators of perennial flow, indicate that flow within this stream is intermittent.

Exhibit 6

**EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03**



1. 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.



2. 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**



3. 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.



4. 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**



5. Looking east (downstream) at Stream Reach 2-A, which exhibited discontinuous flow during the August 19, 2015 field work for the Milestone – Chinn Park Environmental Constraints Analysis.



6. 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, lack of hydric soils, and discontinuous flow, indicate that flow within this stream is intermittent.

**EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03**



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



8. Looking south (downstream) at Stream Reach 3-A, which exhibited discontinuous flow during the August 4, 2015 field work for the Milestone – Chinn Park Environmental Constraints Analysis.

**EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03**



9. 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, presence of hydric soils, and an improvement in the geomorphology of the stream below the headcut that served as the break from Stream Reach 3-A, indicate that flow within this stream is perennial.



10. 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**



11. 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.



12. 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**



13. 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 in a first-order channel, combined with the absence of biological indicators of perennial flow, indicate that flow within this stream is intermittent.



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

**EXHIBIT 6
STUDY AREA PHOTOGRAPHS
PW PARKWAY ES
WSSI #21315.03**



15. 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 in a first-order channel, combined with the absence of biological indicators of perennial flow, indicate that flow within this stream is intermittent.



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

Exhibit 7

Week Ending October 3, 2015

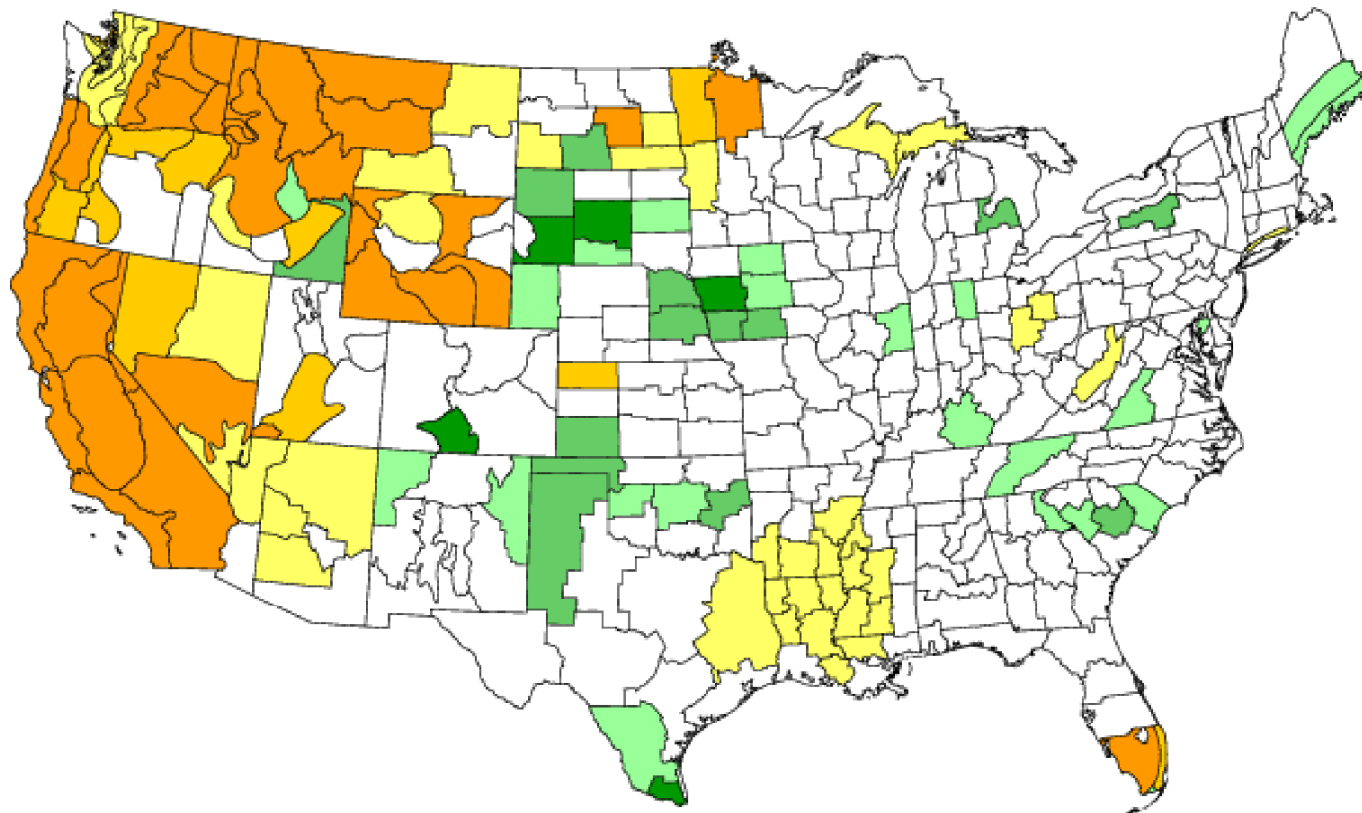


Image source: www.cpc.ncep.noaa.gov

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

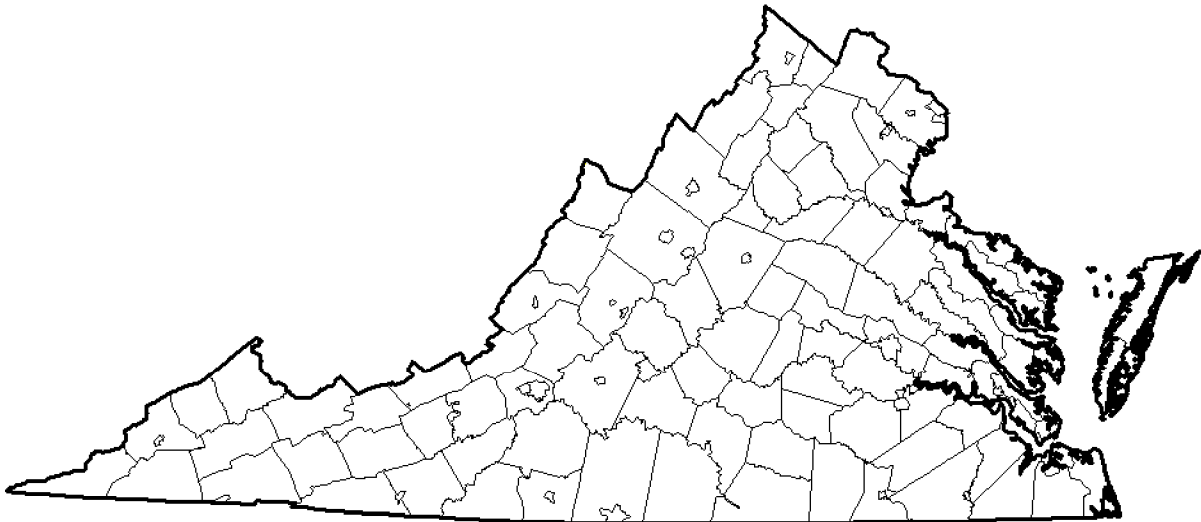
Climate prediction center, NOAA



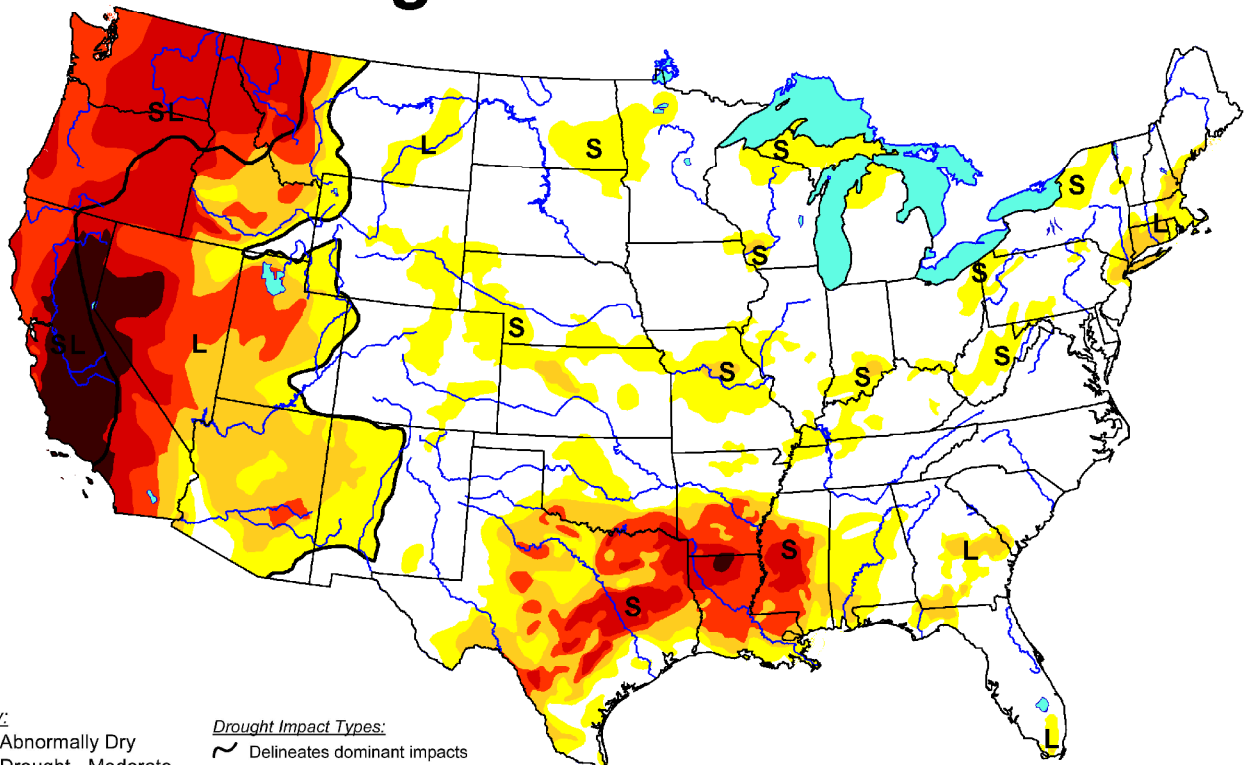
Exhibit 8

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



<http://droughtmonitor.unl.edu/>