



ENVIRONMENTAL

**PERENNIAL FLOW DETERMINATION
POTOMAC TECHNOLOGY PARK
(161 DATA CENTER)
PRINCE WILLIAM COUNTY, VIRGINIA**

TNT PROJECT NO.: 1980

PWC PLAN NUMBER: ASP2022-00014S01

FOR

LAND DESIGN CONSULTANTS, INC.

JANUARY 14, 2021



January 14, 2021

Mr. Josh Marshall
Land Design Consultants, Inc.
4585 Daisy Reid Ave. Suite 201
Woodbridge, VA 22192

TNT Project Number: 1980

Reference: Perennial Flow Determination, Potomac Technology Park (161 Data Center),
Prince William County, Virginia
PWC Plan Number: ASP2022-00014S01
Latitude: 38°37'41" N, Longitude: -77°25'15" W

Dear Mr. Marshall:

TNT Environmental, Inc. (TNT) is pleased to present this Perennial Flow Determination for the above-referenced project in general accordance with TNT Proposal Number 2729-R dated May 21, 2020. The stream assessments conducted by TNT and detailed in this report are based on the Fairfax County "Perennial Stream Field Identification Protocol" (dated May 2003), which is the accepted protocol in Prince William County. This report was developed to identify bodies of water with perennial flow, and subsequently, the presence of a Resource Protection Area (RPA) boundary. Based on the field investigation conducted in June 2020, there perennial streams, including Quantico Creek, located within and adjacent to the study area.

PROJECT SITE DESCRIPTION

The project site is approximately 173.86 acres situated south of Dumfries Road in Prince William County, Virginia (*Appendix I: Figure 1- Project Location Map*). The project site is further identified by physical addresses: 14854, 15008, 15010, 15012, and 15024 Dumfries Road and Prince William County GPINs: 7991-43-1823, 7991-43-3103, 7991-42-7263, 7991-43-4019, and 7991-13-1559. The terrain of the project site consists of mostly unimproved east and west moderate to steep facing slopes. Several drainage features, including Quantico Creek, transects the site (*Appendix I: Figure 2- USGS Topographic Map*). A powerline easement bisects the site.

SECONDARY INFORMATION REVIEW

Secondary information entails the background research and review of recorded data and/or mapping associated with the project site. Resources reviewed include but are not limited to the following:

- U. S. Geological Survey (USGS) Topographic Map, Independent Hill Quadrangle and Joplin Quadrangle (2019)
- U. S. Fish and Wildlife Service (USFWS), National Wetlands Inventory (NWI) Online Mapper, <https://www.fws.gov/wetlands/data/mapper.html>
- Natural Resources Conservation Service (NRCS), Electronic Field Office Technical Guide, Prince William County Soils, <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>
- Available aerial photography and GIS data

The USGS Independent Hill and Joplin quadrangle map show elevations of approximately 390 feet above mean sea level (MSL) in the Northwest portion of the site and approximately 305 feet above MSL in the central portions. As shown on the USGS Map, the project site drains to Quantico Creek, located within the Chesapeake Bay watershed and identified as Hydrologic Unit Code (HUC) 02070010. The NWI map depicts freshwater emergent, freshwater forested/shrub, and riverine wetland features within the project site boundaries.

The soil survey indicates that the site is underlain primarily by Buckhall loam (10C), Delanco fine sandy loam (16A), Elioak loam (19B), Fairfax loam (21B), Glenelg-Buckhall (24C), Hatboro-Codorus (27A), Hoadly loam (29B), Meadowville loam (38B), Neabsco loam (41B, 41C) 0-7, 7-15 percent slopes, Occoquan sandy loam (44D). Delanco fine sandy loam (16A), Elioak loam (19B), Hatboro-Codorus (27A), and Meadowville loam (38B) are classified by the NRCS as hydric.

FIELD INVESTIGATION & METHODOLOGY

The analysis contained in this report uses the results of a perennial flow determination conducted by TNT on June 9, 2020. The assessment utilizes the Fairfax County Perennial Stream Field Identification Protocol (May 2003). The data sheets used in this investigation are enclosed. The protocol is a tiered scoring system that evaluates stream characteristics associated with hydrology, geomorphology, soils, vegetation, and aquatic wildlife to differentiate between perennial and intermittent flow. A score of 25 is typically considered perennial. Scores within 3 points of the perennial thresholds for both evaluations should be reassessed during the low-flow periods of the year when intermittent streams generally dry up.

PRECIPITATION DATA

Precipitation data for the National Oceanic & Atmospheric Administration – Nokesville 4.0 S, VA US Weather Station was reviewed to document recent rainfall events and seasonal precipitation that may have recently influenced the characteristics and flow of the onsite streams. Based on the recorded precipitation at the Nokesville 4.0 S, VA US station, the last rainfalls in relation with the June 9, 2020 assessments occurred on June 6, 2020, for a total of 0.23 inches. The detailed descriptions of site conditions encountered at the data point locations are included below; see the attached datasheets for more detailed information.

FINDINGS

TNT conducted five (5) perennial flow assessments on representative sections of the streams encountered during the reconnaissance. A summary of these determinations is listed in Table 1 below. A map showing the approximate perennial flow determination locations is enclosed. Perennial flow assessments were not conducted on dry ephemeral channels or Quantico Creek, a well-documented perennial stream.

Table 1 – Perennial Flow Determination Summary

Data Point	Streamflow/ Hydrology	Geomorphology	Streambed Soils	Vegetation	Benthics/ Vertebrates	Total
PFD-1	7	16	1	1.5	4	29.5
PFD-2	7	10	0	0.5	1.5	20
PFD-3	5	9	0	1	2.5	17.5
PFD-4	2	3	1.5	0	0	6.5
PFD-5	2	1.5	1.5	0	0	4

**Results of Fairfax County Perennial Stream Field Identification Protocol (2003), see attached data sheets for more information. Streamflow points out of a maximum of 10.5, Geomorphology out of 30, Soils out of 4.5, Vegetation out of 10.5, Benthics & Vertebrates out of 7.5 (Total out of 63).*

PFD-1

As detailed in the datasheet for the stream reach at PFD-1, this stream channel averages approximately six feet in width and drains southeast to Quantico Creek in the southern portion of the site. Flowing water was observed during the assessment. Drift lines, sedimentation, and leaf litter was also observed.

This second order stream exhibited a moderate continuous bed and bank, riffle-pool sequence, substrate sorting, sinuosity, and bankfull bench. Redoximorphic features were absent within the stream bank soils and the matrix contained a chroma of 2. Green algae and iron oxidizing bacteria was present. Many common benthic macroinvertebrates and amphibians, including crayfish, aquatic worms, beetles, snails, and tadpoles/toads, were observed throughout this portion of the reach.

Overall, the stream scored 29.5 on the Fairfax County Protocol and should be considered perennial.

PFD-2

As detailed in the datasheet for the stream reach at PFD-2, this stream channel averages approximately three feet in width and drains southwest to Quantico Creek. Flowing water was observed during the assessment. A high groundwater table, drift lines and leaf litter were also observed.

This first order stream exhibited a strong continuous bed and bank, with moderate riffle-pool sequence, substrate sorting, and sinuosity. Redoximorphic features were present within the stream bank soils and the matrix contained a chroma of 4. Green algae was observed, as were some common benthic macroinvertebrates and amphibians, including crayfish, aquatic worms, beetles, snails, and tadpoles/toads.

Overall, the stream scored 20 on the Fairfax County Protocol and should not be considered perennial.

PFD-3

As detailed in the datasheet for the stream reach at PFD-3, this stream channel averages approximately four feet in width and drains south to Quantico Creek. Some flowing water was observed during the assessment as was a high groundwater table, drift lines and leaf litter.

This first order stream exhibited a moderate continuous bed and bank, riffle-pool sequence, substrate sorting. Some sinuosity, bankfull bench and natural levees were also present. Redoximorphic features were absent within the stream bank soils and the matrix contained a chroma of 4. Green algae was observed, as were some common benthic macroinvertebrates and amphibians, including Water boatman, mosquito larvae, aquatic worms, snails, and tadpoles.

Overall, the stream scored 17.5 on the Fairfax County Protocol and should not be considered perennial.

PFD-4

As detailed in the datasheet for the stream reach at PFD-4, this stream channel averages approximately four feet in width and drains south to Quantico Creek. Flowing water was absent during the assessment. Heavy leaf litter was present, with minimal drift lines and sediment deposits.

This first order stream exhibited a weak continuous bed and bank, riffle-pool sequence, and substrate sorting; however, all other geomorphological field indicators were absent. Redoximorphic features were absent within the stream bank soils and the matrix contained a chroma of 4. No benthic macroinvertebrates or amphibians were observed within the reach.

Overall, the stream scored 6.5 on the Fairfax County Protocol and should not be considered perennial.

PFD-5

As detailed in the datasheet for the stream reach at PFD-4, this stream channel averages approximately one foot in width and drains north to Quantico Creek. Some ponded water was present during the assessment, but no apparent flow. Heavy leaf litter was present, with weak drift lines and sediment deposits.

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This first order stream exhibited a weak continuous bed and bank, riffle-pool sequence, and sinuosity while all other geomorphological field indicators were absent. Redoximorphic features were absent within the stream bank soils and the matrix contained a chroma of 4. No benthic macroinvertebrates or amphibians were observed within the reach.

Overall, the stream scored 5 on the Fairfax County Protocol and should not be considered perennial.

CONCLUSIONS

TNT would like to thank you for the opportunity to provide you with this Perennial Flow Determination. We look forward to assisting you further with this project and other environmental concerns you may have. If you have any questions, please feel free to contact us at any time at (703) 466-5123.

Sincerely,

TNT ENVIRONMENTAL, INC.



Jillian S. Moore, PWS, PWD, ISA-CA

Senior Wetland Scientist

Jillian@TNTenvironmentalinc.com



Avi M. Sareen, PWD, ISA-CA

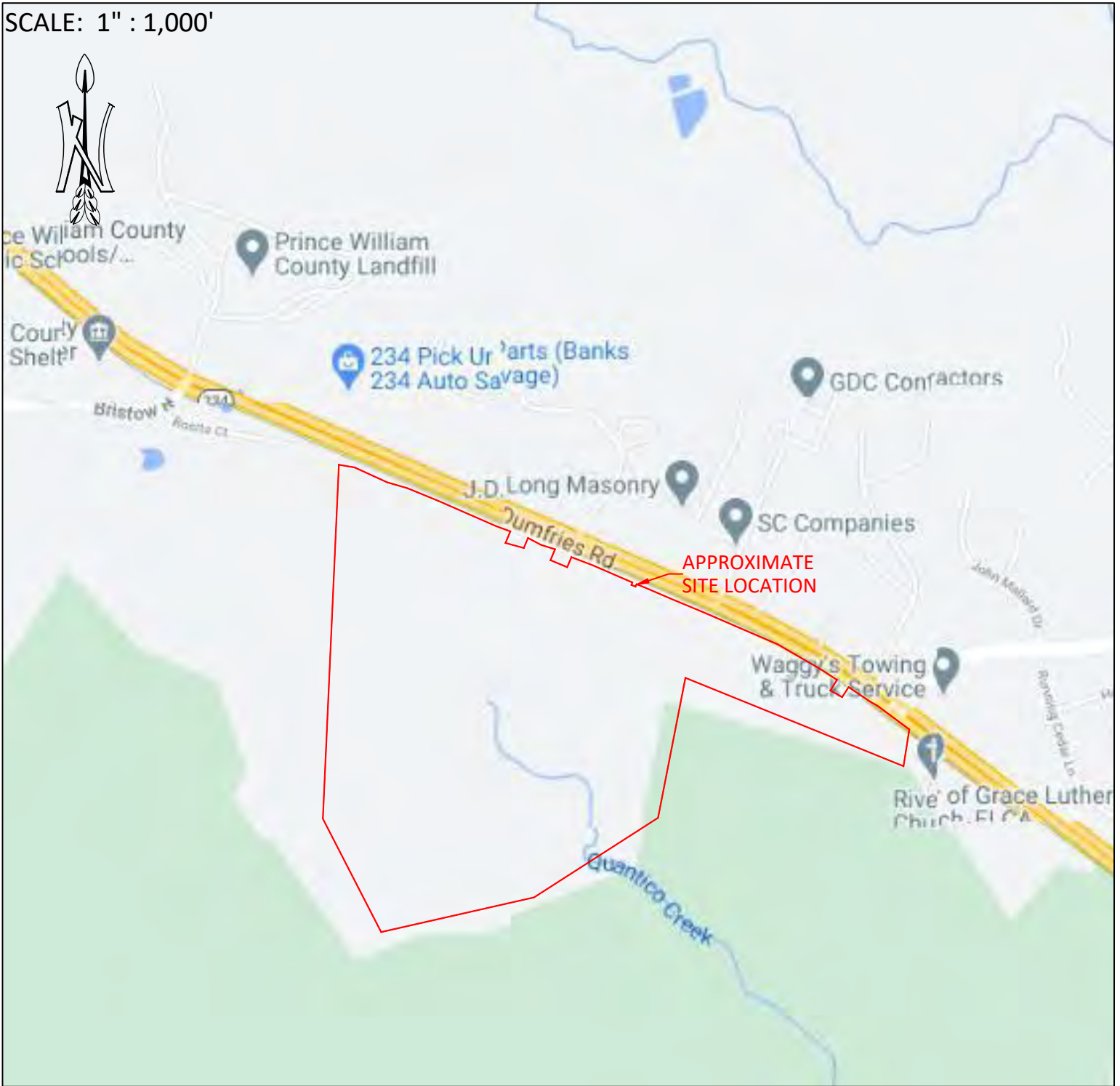
Principal/President

Avi@TNTenvironmentalinc.com

APPENDIX I

**VICINITY MAP &
USGS TOPOGRAPHIC MAP**

SCALE: 1" : 1,000'



PERENNIAL FLOW
DETERMINATION

POTOMAC TECHNOLOGY
PARK (161 DATA CENTER)

PRINCE WILLIAM
COUNTY, VA

JANUARY 2021



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**4455 BROOKFIELD
CORPORATE DRIVE,
SUITE 100**

CHANTILLY, VIRGINIA 20151

FIGURE 1

SITE LOCATION MAP

SOURCE: GOOGLE MAPS

TNT PROJECT NO: 1980

SCALE: 1" : 1,000'



PERENNIAL FLOW
DETERMINATION

POTOMAC TECHNOLOGY
PARK (161 DATA CENTER)

PRINCE WILLIAM
COUNTY, VA

JANUARY 2021



ENVIRONMENTAL

**4455 BROOKFIELD
CORPORATE DRIVE,
SUITE 100
CHANTILLY, VIRGINIA 20151**

FIGURE 2

TOPOGRAPHIC MAP

SOURCE: USGS THE
NATIONAL MAP (2020)

TNT PROJECT NO: 1980

APPENDIX II

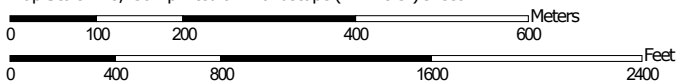
**NATIONAL WETLAND INVENTORY MAP &
NRCS SOILS MAP**

Hydric Rating by Map Unit—Prince William County, Virginia
(161 Data Center)



Soil Map may not be valid at this scale.


Map Scale: 1:8,750 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84







MAP LEGEND

Area of Interest (AOI)







 Area of Interest (AOI)

Soils







Soil Rating Polygons

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available


Soil Rating Lines

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available






Soil Rating Points

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Prince William County, Virginia
Survey Area Data: Version 16, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2019—Aug 1, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10C	Buckhall loam, 7 to 15 percent slopes	0	72.0	44.0%
16A	Delanco fine sandy loam, 0 to 4 percent slopes	5	1.2	0.8%
19B	Elioak loam, 2 to 7 percent slopes	3	2.2	1.3%
21B	Fairfax loam, 2 to 7 percent slopes	0	8.1	5.0%
24C	Glenelg-Buckhall complex, 7 to 15 percent slopes	0	15.7	9.6%
27A	Hatboro-Codorus complex, 0 to 2 percent slopes	45	19.6	12.0%
29B	Hoadly loam, 2 to 7 percent slopes	0	4.1	2.5%
38B	Meadowville loam, 0 to 5 percent slopes	3	20.7	12.6%
41B	Neabsco loam, 0 to 7 percent slopes	0	9.8	6.0%
41C	Neabsco loam, 7 to 15 percent slopes	0	7.7	4.7%
44D	Occoquan sandy loam, 7 to 25 percent slopes	0	2.6	1.6%
Totals for Area of Interest			163.8	100.0%

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

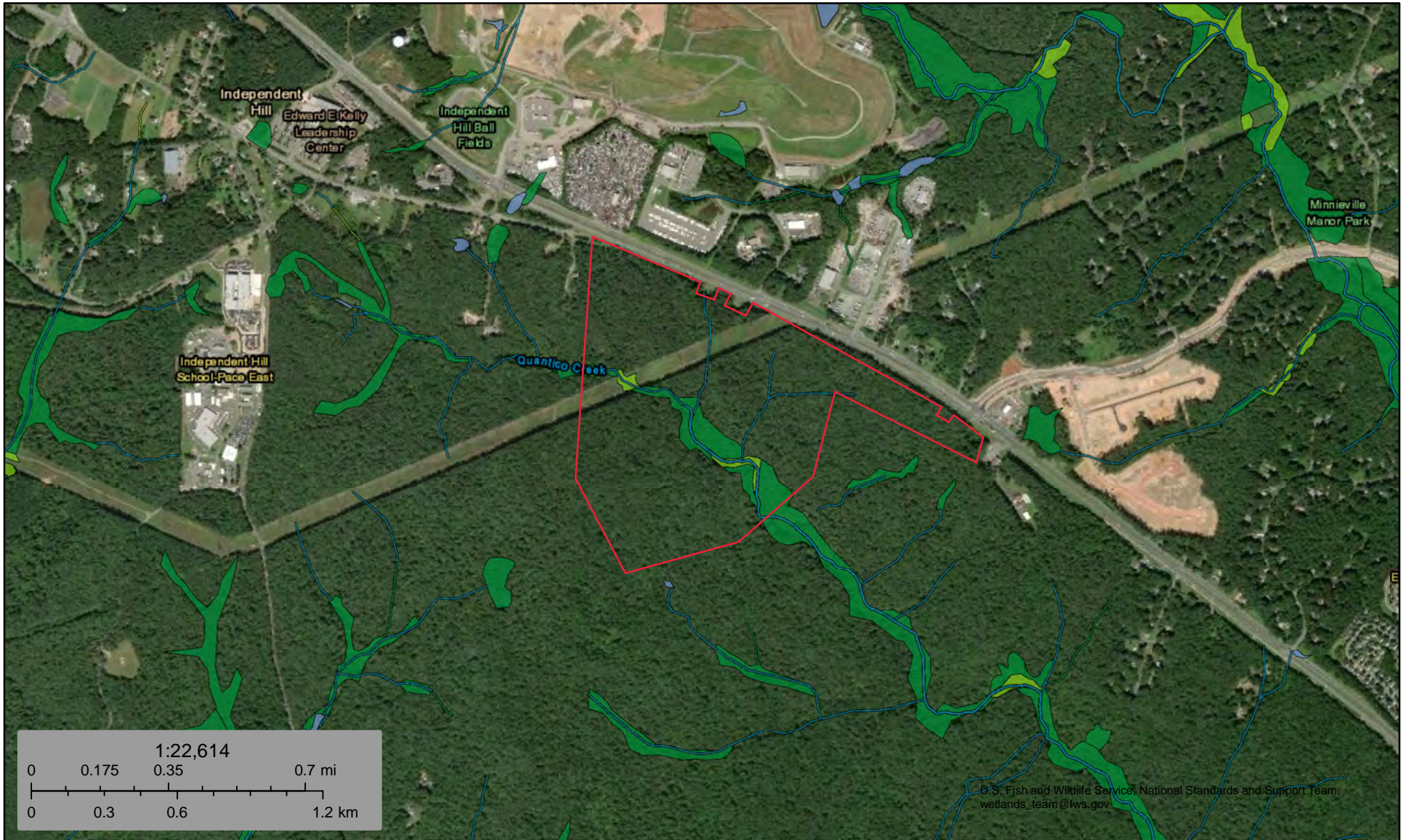
Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified









Tie-break Rule: Lower



U.S. Fish and Wildlife Service, National Standards and Support Team,
wetlands_team@fws.gov

May 26, 2020

Wetlands

- | | | | | | |
|---|--------------------------------|---|-----------------------------------|---|----------|
|  | Estuarine and Marine Deepwater |  | Freshwater Emergent Wetland |  | Lake |
|  | Estuarine and Marine Wetland |  | Freshwater Forested/Shrub Wetland |  | Other |
| | |  | Freshwater Pond |  | Riverine |

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

APPENDIX III

PERENNIAL FLOW DETERMINATION FORMS



STREAM DATA SHEET

PERENNIAL FLOW DETERMINATION

(Adapted from Fairfax County, Virginia's Perennial Stream Field Identification Protocol)

General Information

Project/Site: 161 Data Center Date: 6/9/2020
 Watershed: Lower Potomac- Quantico Creek (HUC 02070011) Time: 11:00 AM
 Field Investigator: TNT Environmental Inc. State: VA
 County: Prince William
 Reach Number: 1

Stream Reach Summary

Approximate Reach Length: 1,782 **IS THIS REACH PERENNIAL?** Yes
 Average Channel Width: 6' Drainage area to the reach: 0.6 sq miles (384 acres)
 Average Channel Depth: 4"
 Average Water Depth: Riffles 1"
 Average Water Depth: Pools 7"
 Data Point Location: Flag G68

Recent Weather Data

Rain Gage: NOKESVILLE 4.0 S, VA US Palmer Drought Index Value: Mid (-1.99 to +1.99)
 Date of Last Rainfall: 6/6/2020
 Rainfall Amount: 0.23"

Representative Photographs



Upstream View of Channel



Downstream View of Channel

Field Indicators

1) Streamflow and Hydrology	Absent	Weak	Moderate	Strong	Score
A) Presence or absence of flowing water and >48 hrs since last rainfall	0	1	2	3	2
B) Presence of high groundwater table or seeps and springs	0	1	2	3	2
C) Leaf litter in streambed	1.5	1	0.5	0	0.5
D) Drift lines	0	0.5	1	1.5	1.5
E) Sediment on debris or plants	0	0.5	1	1.5	1

Total Streamflow and Hydrology Points: 7

Streamflow and Hydrology Notes



Project/Site: 161 Data Center
 Field Investigator: TNT Environmental Inc.
 Date: 6/9/2020
 Time: 11:00 AM

DATA POINT: 1

2) Geomorphology	Absent	Weak	Moderate	Strong	Score
A) Riffle-Pool Sequence	0	1	2	3	2
B) Substrate Sorting (USDA Texture in Streambed)	0	1	2	3	2
C) Natural Levees	0	1	2	3	0
D) Sinuosity	0	1	2	3	2
E) Active or Relic Floodplain	0	1	2	3	1
F) Braided Channel	0	1	2	3	0
G) Recent Alluvial Deposits	0	1	2	3	1
H) Bankfull Bench Present	0	1	2	3	2
I) Continuous Bed and Bank	0	1	2	3	3
J) 2nd Order or Greater Channel Present	Yes = 3	No = 0			3
Total Geomorphology Points:					16

3) Streambed Soils					Score
A) Redoximorphic Features present in sides of channel	Present = 0	Absent = 1.5			0
B) Chroma	Gleyed = 3	1 = 2	2 = 1	>2 = 0	1
Total Streambed Soils Points:					1

4) Vegetation	Absent	Weak	Moderate	Strong	Score
A) Rooted AQUATIC Plants in Streambed	0	1	2	3	0
B) Presence of Periphyton/Green algae	0	1	2	3	1
C) Iron Oxidizing Bacteria/Fungus	0	0.5	1	1.5	0.5
D) Wetland Plants in Streambed (Skip if no plants in streambed)	SAV = 3	OBL = 1.5	FACW = 1	FAC = 0.5	> FAC or None = 0
Total Vegetation Points:					1.5

Geomorphology, Soils and Vegetation Notes

5) Benthic Macroinvertebrates	Absent	Weak	Moderate	Strong	Score
A) Benthic Macroinvertebrates	0	0.5	1	1.5	1.5
B) Bivalves	0	1	2	3	0
C)EPT Taxa	Present = 3	Absent = 0			0
Total Benthic Macroinvertebrate Points:					1.5

6) Vertebrates	Absent	Weak	Moderate	Strong	Score
A) Fish	0	0.5	1	1.5	1
B) Amphibians	0	0.5	1	1.5	1.5
Total Vertebrate Points:					2.5

Benthics/Amphibians Found

Crayfish, aquatic worms, beetles, snails, and tadpoles/toads

TOTAL SCORE: 29.5



STREAM DATA SHEET

PERENNIAL FLOW DETERMINATION

(Adapted from Fairfax County, Virginia's Perennial Stream Field Identification Protocol)

General Information

Project/Site:	<u>161 Data Center</u>	Date:	<u>6/9/2020</u>
Watershed:	<u>Lower Potomac- Quantico Creek (HUC 02070011)</u>	Time:	<u>12:00 PM</u>
Field Investigator:	<u>TNT Environmental Inc.</u>	State:	<u>VA</u>
Reach Number:	<input type="text" value="2"/>	County:	<u>Prince William</u>

Stream Reach Summary

Approximate Reach Length:	<u>801</u>	IS THIS REACH PERENNIAL?	<input type="text" value="No"/>
Average Channel Width:	<u>3'</u>	Drainage area to the reach:	<u>0.07 sq miles (44.8 acres)</u>
Average Channel Depth:	<u>1"</u>		
Average Water Depth: Riffles:	<u>0.5</u>		
Average Water Depth: Pools:	<u>2"</u>		
Data Point Location:	<u>Flag O12</u>		

Recent Weather Data

Rain Gage:	<u>NOKESVILLE 4.0 S, VA US</u>	Palmer Drought Index Value:	<u>Mid (-1.99 to +1.99)</u>
Date of Last Rainfall:	<u>6/6/2020</u>		
Rainfall Amount:	<u>0.23"</u>		

Representative Photographs



Upstream View of Channel



Downstream View of Channel

Field Indicators

1) Streamflow and Hydrology	Absent	Weak	Moderate	Strong	Score
A) Presence or absence of flowing water and >48 hrs since last rainfall	0	1	2	3	2
B) Presence of high groundwater table or seeps and springs	0	1	2	3	2
C) Leaf litter in streambed	1.5	1	0.5	0	0.5
D) Drift lines	0	0.5	1	1.5	1.5
E) Sediment on debris or plants	0	0.5	1	1.5	1

Total Streamflow and Hydrology Points: 7

Streamflow and Hydrology Notes



Project/Site: 161 Data Center
 Field Investigator: TNT Environmental Inc.
 Date: 6/9/2020
 Time: 12:00 PM

DATA POINT: 2

2) Geomorphology	Absent	Weak	Moderate	Strong	Score
A) Riffle-Pool Sequence	0	1	2	3	2
B) Substrate Sorting (USDA Texture in Streambed)	0	1	2	3	2
C) Natural Levees	0	1	2	3	0
D) Sinuosity	0	1	2	3	2
E) Active or Relic Floodplain	0	1	2	3	0
F) Braided Channel	0	1	2	3	0
G) Recent Alluvial Deposits	0	1	2	3	0
H) Bankfull Bench Present	0	1	2	3	1
I) Continuous Bed and Bank	0	1	2	3	3
J) 2nd Order or Greater Channel Present	Yes = 3	No = 0			0
Total Geomorphology Points:					10

3) Streambed Soils					Score
A) Redoximorphic Features present in sides of channel	Present = 0	Absent = 1.5			0
B) Chroma	Gleyed = 3	1 = 2	2 = 1	>2 = 0	0
Total Streambed Soils Points:					0

4) Vegetation	Absent	Weak	Moderate	Strong	Score
A) Rooted AQUATIC Plants in Streambed	0	1	2	3	0
B) Presence of Periphyton/Green algae	0	1	2	3	1
C) Iron Oxidizing Bacteria/Fungus	0	0.5	1	1.5	0
D) Wetland Plants in Streambed (Skip if no plants in streambed)	SAV = 3	OBL = 1.5	FACW = 1	FAC = 0.5	> FAC or None = 0
Total Vegetation Points:					1

Geomorphology, Soils and Vegetation Notes

5) Benthic Macroinvertebrates	Absent	Weak	Moderate	Strong	Score
A) Benthic Macroinvertebrates	0	0.5	1	1.5	0.5
B) Bivalves	0	1	2	3	0
C)EPT Taxa	Present = 3	Absent = 0			0
Total Benthic Macroinvertebrate Points:					0.5

6) Vertebrates	Absent	Weak	Moderate	Strong	Score
A) Fish	0	0.5	1	1.5	0
B) Amphibians	0	0.5	1	1.5	1.5
Total Vertebrate Points:					1.5

Benthics/Amphibians Found

Crayfish, aquatic worms, beetles, snails, and tadpoles/toads

TOTAL SCORE: 20



STREAM DATA SHEET

PERENNIAL FLOW DETERMINATION

(Adapted from Fairfax County, Virginia's Perennial Stream Field Identification Protocol)

General Information

Project/Site: 161 Data Center Date: 6/9/2020
 Watershed: Lower Potomac- Quantico Creek (HUC 02070011) Time: 2:00 PM
 Field Investigator: TNT Environmental Inc. State: VA
 County: Prince William
 Reach Number: 3

Stream Reach Summary

Approximate Reach Length: 581 **IS THIS REACH PERENNIAL?** No
 Average Channel Width: 4' Drainage area to the reach: 0.06 sq miles (38.4 acres)
 Average Channel Depth: 2"
 Average Water Depth: Riffles: 0.5"
 Average Water Depth: Pools: 3"
 Data Point Location: Flag VA9

Recent Weather Data

Rain Gage: NOKESVILLE 4.0 S, VA US Palmer Drought Index Value: Mid (-1.99 to +1.99)
 Date of Last Rainfall: 6/6/2020
 Rainfall Amount: 0.23"

Representative Photographs



Upstream View of Channel



Downstream View of Channel

Field Indicators

1) Streamflow and Hydrology	Absent	Weak	Moderate	Strong	Score
A) Presence or absence of flowing water and >48 hrs since last rainfall	0	1	2	3	1
B) Presence of high groundwater table or seeps and springs	0	1	2	3	1
C) Leaf litter in streambed	1.5	1	0.5	0	0.5
D) Drift lines	0	0.5	1	1.5	1.5
E) Sediment on debris or plants	0	0.5	1	1.5	1

Total Streamflow and Hydrology Points: 5

Streamflow and Hydrology Notes

Minor flow to the water, mainly standing pools.



Project/Site: 161 Data Center
 Field Investigator: TNT Environmental Inc.
 Date: 6/9/2020
 Time: 2:00 PM

DATA POINT: 3

2) Geomorphology	Absent	Weak	Moderate	Strong	Score
A) Riffle-Pool Sequence	0	1	2	3	2
B) Substrate Sorting (USDA Texture in Streambed)	0	1	2	3	2
C) Natural Levees	0	1	2	3	1
D) Sinuosity	0	1	2	3	1
E) Active or Relic Floodplain	0	1	2	3	0
F) Braided Channel	0	1	2	3	0
G) Recent Alluvial Deposits	0	1	2	3	0
H) Bankfull Bench Present	0	1	2	3	1
I) Continuous Bed and Bank	0	1	2	3	2
J) 2nd Order or Greater Channel Present	Yes = 3	No = 0			0
Total Geomorphology Points:					9

3) Streambed Soils					Score
A) Redoximorphic Features present in sides of channel	Present = 0	Absent = 1.5			0
B) Chroma	Gleyed = 3	1 = 2	2 = 1	>2 = 0	0
Total Streambed Soils Points:					0

4) Vegetation	Absent	Weak	Moderate	Strong	Score
A) Rooted AQUATIC Plants in Streambed	0	1	2	3	0
B) Presence of Periphyton/Green algae	0	1	2	3	1
C) Iron Oxidizing Bacteria/Fungus	0	0.5	1	1.5	0
D) Wetland Plants in Streambed (Skip if no plants in streambed)	SAV = 3	OBL = 1.5	FACW = 1	FAC = 0.5	> FAC or None = 0
Total Vegetation Points:					1

Geomorphology, Soils and Vegetation Notes

5) Benthic Macroinvertebrates	Absent	Weak	Moderate	Strong	Score
A) Benthic Macroinvertebrates	0	0.5	1	1.5	1
B) Bivalves	0	1	2	3	0
C)EPT Taxa	Present = 3	Absent = 0			0
Total Benthic Macroinvertebrate Points:					1

6) Vertebrates	Absent	Weak	Moderate	Strong	Score
A) Fish	0	0.5	1	1.5	0
B) Amphibians	0	0.5	1	1.5	1.5
Total Vertebrate Points:					1.5

Benthics/Amphibians Found

Water boatman, mosquito larvae, aquatic worms, snails, tadpoles

TOTAL SCORE: 17.5



STREAM DATA SHEET

PERENNIAL FLOW DETERMINATION

(Adapted from Fairfax County, Virginia's Perennial Stream Field Identification Protocol)

General Information

Project/Site:	<u>161 Data Center</u>	Date:	<u>6/9/2020</u>
Watershed:	<u>Lower Potomac- Quantico Creek (HUC 02070011)</u>	Time:	<u>10:30 AM</u>
Field Investigator:	<u>TNT Environmental Inc.</u>	State:	<u>VA</u>
Reach Number:	<input type="text" value="4"/>	County:	<u>Prince William</u>

Stream Reach Summary

Approximate Reach Length:	<u>401</u>	IS THIS REACH PERENNIAL?	<input type="text" value="No"/>
Average Channel Width:	<u>4'</u>	Drainage area to the reach:	<u>0.04 sq miles (25.6 acres)</u>
Average Channel Depth:	<u>0.5"</u>		
Average Water Depth: Riffles:	<u>1"</u>		
Average Water Depth: Pools:	<u>1"</u>		
Data Point Location:	<u>Flag ZA 10</u>		

Recent Weather Data

Rain Gage:	<u>NOKESVILLE 4.0 S, VA US</u>	Palmer Drought Index Value:	<u>Mid (-1.99 to +1.99)</u>
Date of Last Rainfall:	<u>6/6/2020</u>		
Rainfall Amount:	<u>0.23"</u>		

Representative Photographs



Upstream View of Channel



Downstream View of Channel

Field Indicators

1) Streamflow and Hydrology	Absent	Weak	Moderate	Strong	Score
A) Presence or absence of flowing water and >48 hrs since last rainfall	0	1	2	3	0
B) Presence of high groundwater table or seeps and springs	0	1	2	3	1
C) Leaf litter in streambed	1.5	1	0.5	0	0
D) Drift lines	0	0.5	1	1.5	0.5
E) Sediment on debris or plants	0	0.5	1	1.5	0.5

Total Streamflow and Hydrology Points: 2

Streamflow and Hydrology Notes



Project/Site: 161 Data Center
 Field Investigator: TNT Environmental Inc.
 Date: 6/9/2020
 Time: 10:30 AM

DATA POINT: 4

2) Geomorphology	Absent	Weak	Moderate	Strong	Score
A) Riffle-Pool Sequence	0	1	2	3	1
B) Substrate Sorting (USDA Texture in Streambed)	0	0.5	1	3	0.5
C) Natural Levees	0	1	2	3	0
D) Sinuosity	0	1	2	3	0
E) Active or Relic Floodplain	0	1	2	3	0
F) Braided Channel	0	1	2	3	0
G) Recent Alluvial Deposits	0	1	2	3	0
H) Bankfull Bench Present	0	0.5	1	3	0.5
I) Continuous Bed and Bank	0	1	2	3	1
J) 2nd Order or Greater Channel Present	Yes = 3	No = 0			0
Total Geomorphology Points:					3

3) Streambed Soils					Score
A) Redoximorphic Features present in sides of channel	Present = 0	Absent = 1.5			1.5
B) Chroma	Gleyed = 3	1 = 2	2 = 1	>2 = 0	0
Total Streambed Soils Points:					1.5

4) Vegetation	Absent	Weak	Moderate	Strong	Score
A) Rooted AQUATIC Plants in Streambed	0	1	2	3	0
B) Presence of Periphyton/Green algae	0	1	2	3	0
C) Iron Oxidizing Bacteria/Fungus	0	0.5	1	1.5	0
D) Wetland Plants in Streambed (Skip if no plants in streambed)	SAV = 3	OBL = 1.5	FACW = 1	FAC = 0.5	> FAC or None = 0
Total Vegetation Points:					0

Geomorphology, Soils and Vegetation Notes

5) Benthic Macroinvertebrates	Absent	Weak	Moderate	Strong	Score
A) Benthic Macroinvertebrates	0	0.5	1	1.5	0
B) Bivalves	0	1	2	3	0
C)EPT Taxa	Present = 3	Absent = 0			0
Total Benthic Macroinvertebrate Points:					0

6) Vertebrates	Absent	Weak	Moderate	Strong	Score
A) Fish	0	0.5	1	1.5	0
B) Amphibians	0	0.5	1	1.5	0
Total Vertebrate Points:					0

Benthics/Amphibians Found

TOTAL SCORE: 6.5



STREAM DATA SHEET

PERENNIAL FLOW DETERMINATION

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General Information

Project/Site:	<u>161 Data Center</u>	Date:	<u>6/9/2020</u>
Watershed:	<u>Lower Potomac- Quantico Creek (HUC 02070011)</u>	Time:	<u>3:00 PM</u>
Field Investigator:	<u>TNT Environmental Inc.</u>	State:	<u>VA</u>
Reach Number:	<u>5</u>	County:	<u>Prince William</u>

Stream Reach Summary

Approximate Reach Length:	<u>203</u>	IS THIS REACH PERENNIAL?	<u>No</u>
Average Channel Width:	<u>1'</u>	Drainage area to the reach:	<u>0.04 sq miles (25.6 acres)</u>
Average Channel Depth:	<u>0.2"</u>		
Average Water Depth: Riffles:	<u>0"</u>		
Average Water Depth: Pools:	<u>0.5"</u>		
Data Point Location:	<u>Flag C2</u>		

Recent Weather Data

Rain Gage:	<u>NOKESVILLE 4.0 S, VA US</u>	Palmer Drought Index Value:	<u>Mid (-1.99 to +1.99)</u>
Date of Last Rainfall:	<u>6/6/2020</u>		
Rainfall Amount:	<u>0.23"</u>		

Representative Photographs



Upstream View of Channel



Downstream View of Channel

Field Indicators

1) Streamflow and Hydrology	Absent	Weak	Moderate	Strong	Score
A) Presence or absence of flowing water and >48 hrs since last rainfall	0	1	2	3	0
B) Presence of high groundwater table or seeps and springs	0	1	2	3	1
C) Leaf litter in streambed	1.5	1	0.5	0	0
D) Drift lines	0	0.5	1	1.5	0.5
E) Sediment on debris or plants	0	0.5	1	1.5	0.5

Total Streamflow and Hydrology Points: 2

Streamflow and Hydrology Notes

Some occasional ponding, but no active flow



Project/Site: 161 Data Center
 Field Investigator: TNT Environmental Inc.
 Date: 6/9/2020
 Time: 3:00 PM

DATA POINT: 5

2) Geomorphology	Absent	Weak	Moderate	Strong	Score	
A) Riffle-Pool Sequence	0	0.5	1	2	3	0.5
B) Substrate Sorting (USDA Texture in Streambed)	0		1	2	3	0
C) Natural Levees	0		1	2	3	0
D) Sinuosity	0	0.5	1	2	3	0.5
E) Active or Relic Floodplain	0		1	2	3	0
F) Braided Channel	0		1	2	3	0
G) Recent Alluvial Deposits	0		1	2	3	0
H) Bankfull Bench Present	0		1	2	3	0
I) Continuous Bed and Bank	0	0.5	1	2	3	0.5
J) 2nd Order or Greater Channel Present	Yes = 3	No = 0				0
Total Geomorphology Points:					1.5	

3) Streambed Soils						Score
A) Redoximorphic Features present in sides of channel	Present = 0	Absent = 1.5				1.5
B) Chroma	Gleyed = 3	1 = 2	2 = 1	>2 = 0		0
Total Streambed Soils Points:					1.5	

4) Vegetation	Absent	Weak	Moderate	Strong	Score	
A) Rooted AQUATIC Plants in Streambed	0	1	2	3	0	
B) Presence of Periphyton/Green algae	0	1	2	3	0	
C) Iron Oxidizing Bacteria/Fungus	0	0.5	1	1.5	0	
D) Wetland Plants in Streambed (Skip if no plants in streambed)	SAV = 3	OBL = 1.5	FACW = 1	FAC = 0.5	> FAC or None = 0	0
Total Vegetation Points:					0	

Geomorphology, Soils and Vegetation Notes

5) Benthic Macroinvertebrates	Absent	Weak	Moderate	Strong	Score
A) Benthic Macroinvertebrates	0	0.5	1	1.5	0
B) Bivalves	0	1	2	3	0
C)EPT Taxa	Present = 3	Absent = 0			0
Total Benthic Macroinvertebrate Points:					0

6) Vertebrates	Absent	Weak	Moderate	Strong	Score
A) Fish	0	0.5	1	1.5	0
B) Amphibians	0	0.5	1	1.5	0
Total Vertebrate Points:					0

Benthics/Amphibians Found

TOTAL SCORE: 5

APPENDIX IV

**PERENNIAL FLOW DETERMINATION
MAP**

