Spring Water Quality Blitz in Hunting Creek Watershed on 04/03/21

By Ron Klauda and Bob Estes

Introduction

The Mission of the Friends of Hunting Creek (FHC) "…*is to promote the ecological health and resiliency of the watershed's 50 miles of streams and landscape so that landowners, citizens, government agencies, and elected officials together take an active role in protecting and sustaining the natural and cultural resources."* In keeping with this Mission statement, the FHC works to "*expand the scientific understanding of our land and water resources."* One way to achieve this goal is to conduct water quality monitoring throughout the Hunting Creek watershed.

On 3 April 2021, members of the FHC conducted the first Water Quality Blitz at several non-tidal stream sites in the Hunting Creek watershed. Monitoring activity in the Hunting Creek watershed coincided with similar efforts also conducted that day in the Parkers Creek and St. Leonard's Creek watersheds. Water samples collected by FHC volunteers were filtered by Dr. Walter Boynton at the American Chestnut Land Trust office that day and then sent to the Chesapeake Biological Laboratory (CBL) in Solomons, MD for analysis of the key nitrate parameters, NO23. Dr. Lora Harris (CBL) graciously loaned the FHC a YSI 556 Multi-Probe System meter and a Marsh McBirney Flo-Mate 2000 current velocity meter for our use on April 3rd. With this equipment, we were also able to measure water temperature, conductivity, dissolved oxygen, dissolved oxygen saturation, pH, current velocity, and also calculate flow at several stream sites in the Hunting Creek watershed.

Measured Parameters

Nitrite (NO2) and Nitrate (NO3)

Nitrite and nitrate are forms of dissolved nitrogen that occur naturally in soil and water. Nitrate is the primary source of nitrogen for phytoplankton and aquatic plants. Most natural concentrations of nitrite and nitrate in water bodies, generally only a few milligrams per liter (mg/L), are not of concern. But concentrations above 4 mg/L can stimulate algal blooms, often with adverse environmental impacts; while even higher concentrations in drinking water supplies can pose a health hazard to humans. The primary sources of these dissolved nitrogen constituents in surface and groundwater are fertilizers, animal wastes, septic systems, wastewater treatment facilities, and atmospheric deposition of nitrogen compounds.

(NOTE: The CBL NO23 data was received as a spread sheet and contained the data for Parkers Creek, St. Leonards Creek, and Hunting Creek. Only the Hunting Creek data is included in this report. Formatting was changed and the Client Designation and Description columns were added. Columns with repetitive data were eliminated and the data moved to the space before the tabular data.)

NUTRIENT ANALYTICAL SERVICES LABORATORY DATA REPORT

Chesapeake Biological Laboratory

146 Williams Street / P.O. Box 38   Tel: 410-326-7252

http://www.umces.edu/nutrient-analytical-services-laboratory

Jerome M. Frank- Laboratory Manager

The following person accepts responsibility for the contents of this report:

Name:__Jerome M Frank____Signature:_____JMF________Date:____

NELAC Certification #: 12066

Date of Issue: 6/28/2017

Client: ACLT Parkers Creek

Project ID: Blitz

POC: Boynton

Sample Date 4/3/2021   Received Date 4/5/2021

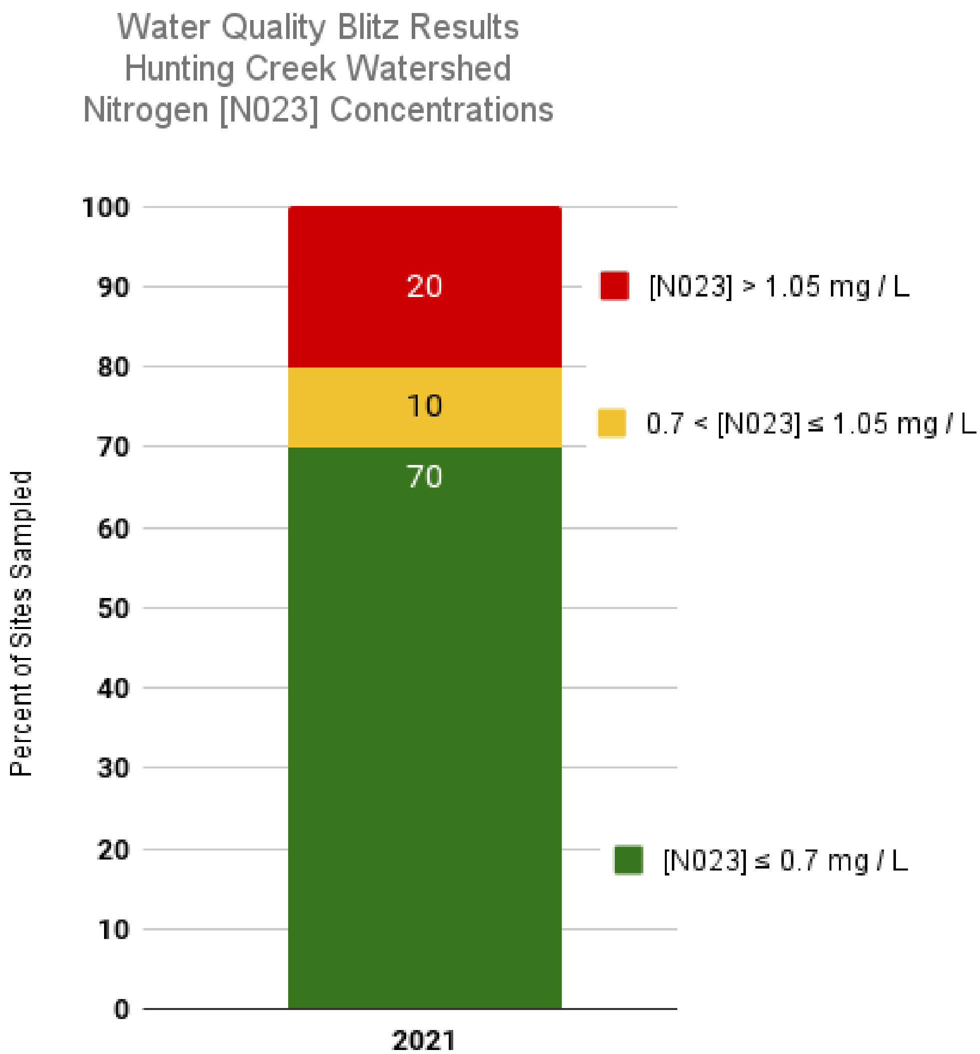
Prep Date 4/19/2021   Analysis Date 4/19/2021

Parameter: NO23   Method ASTM D-7781   Analyst JM

MDL/RL 0.0057/0.028

Sample ID	NASL ID	Result mg N/L	Client Designation and Description
HC1	ACLT HC1	0.444	HUNT-1, Route 2/4 bridge
HC2	ACLT HC2	0.465	HUNT-2 Mill Crk at Stoakley Rd
HC3	ACLT HC3	1.660	HUNT-3 Little Lyons Crk at Hunting Crk Rd
HC4	ACLT HC4	0.542	HUNT-4 UT* Mill Creek, Stoakley Rd
HC5	ACLT HC5	0.419	HUNT-5 Mill Crk, 1440 Foxtail Ln, Hunters Ridge
HC6	ACLT HC6	0.335	HUNT-6 UT* Hunting Crk at Hunting Farms Ln
HC7	ACLT HC7	0.534	HUNT-7 Hunting Crk west of Queensberry
HC8	ACLT HC8	0.538	HUNT-8A Sewell Brch, upstream of Hunting Crk
HC9	ACLT HC9	0.712	HUNT-9 Reits Brch at Walton Rd
HC10	ACLT HC10	1.093	HUNT-10 Fox Pt Crk, upstream of Hunting Crk

*UT = Unnamed Tributary



The relevance of 0.7 mg/L of NO23 is discussed in the Conclusions section item 2.

Conductivity

Conductivity is a measure of the ability of a water sample to pass an electric current because of dissolved salts and other inorganic chemicals. The higher the concentration of total dissolved materials, the higher the conductivity. Temperature also affects conductivity. Warmer waters typically have higher conductivities. Conductivity measures the concentration of dissolved constituents in microsiemens per centimeter (or µS/cm). Distilled water has been purified of most dissolved ions and therefore has a conductivity between 0.5 and 3 µS/cm. Conductivity levels in water bodies are mainly influenced by geology, size of the water body, amount of human-related contaminants, and bacterial metabolism, in addition to water temperature. Inland freshwaters typically have a conductivity range from about 50 to 500 µS/cm. Conductivity is useful as a general measure of water quality. Generally, human disturbance leads to increased conductivities in affected water bodies. A year-long record of conductivity measurements in a water body can provide a "baseline" of typical conditions. If, in future years, conductivity measurements vary widely from the "baseline" conditions, further investigations would be warranted to find the cause or causes for the measured changes, such as a pollutant discharge into the water body. For example, road salts washed into streams can cause large conductivity spikes that may be harmful to aquatic organisms.

Dissolved Oxygen

Dissolved oxygen (or DO) is the amount of oxygen present in a waterbody (measured in mg/L) and available to the aquatic organisms that live there. Water bodies receive oxygen from the atmosphere and aquatic plants. Flowing water dissolves more oxygen from the atmosphere than ponds or lakes. DO levels are generally higher in cold waters compared to warm waters. All aquatic animals need DO to survive, therefore DO is an important measure of water quality. Aquatic animals have different DO tolerance ranges. Healthy water bodies have DO concentration about 8 mg/L. DO levels below 4 mg/L are of concern. Water bodies with DO levels below 1 mg/L are hypoxic and usually devoid of life.

Dissolved Oxygen Saturation

Dissolved oxygen (DO) saturation is the ratio of measure DO concentration to the maximum amount of oxygen that will dissolve in the water body being monitored at the temperature and pressure that constitute stable equilibrium conditions. DO saturation is expressed as a percentage. Because of the production of oxygen by photosynthetically-active phytoplankton and/or aquatic plants, DO saturation can exceed 100%. Healthy waters should have a DO saturation level between about 80 and 120%.

pH

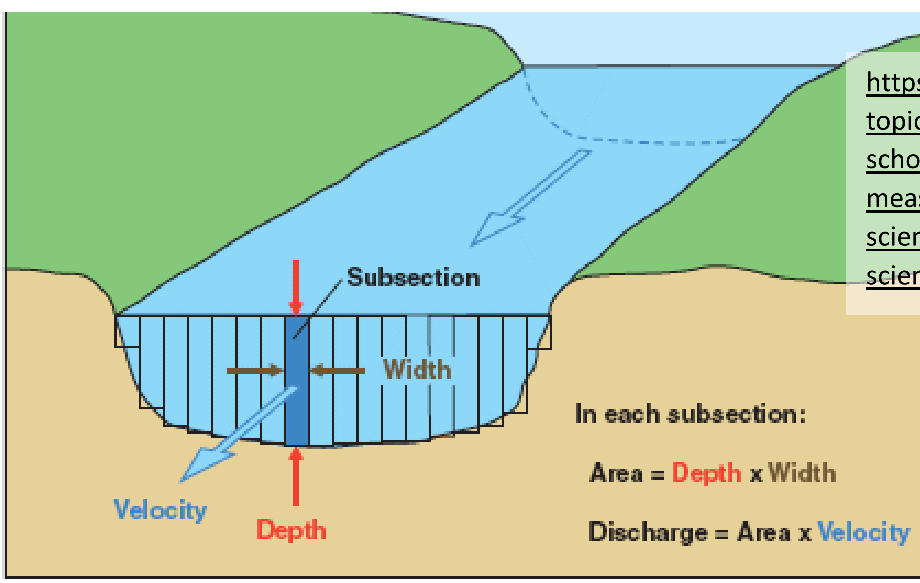
pH is a measure of how acidic or basic a water body is. The pH scale ranges from 0 to 14, with pH = 7 being neutral. pH values less than 7 indicate acidity, whereas pH values greater than 7 indicate basic conditions. Because the pH scale is logarithmic, each number in the scale represents a 10-fold change in the acidity or basicness of the water body. For example, a stream with a pH of 6 is 10 times more acidic than a stream with a pH of 7. pH is a very important measure of water quality. Most freshwater organisms do best when pH is circum-neutral; i.e., between 6.5 and 8.5. Not only does the pH of a water body affect the aquatic organisms that can live there, but a changing pH can indicate the presence of pollutants. pH determines the solubility and biological availability of chemical constituents such as nitrogen, phosphorous, and carbon and heavy metals such as lead, copper, and cadmium.

Current Velocity

Current velocity is the speed of water flowing past a point in a waterbody and is measured in meters per second or feet per second. Current velocity in a stream is typically greatest in midstream near the surface and slowest along the stream bed and banks due to friction. The current velocity measurements were made at several points along a transect across the width of the stream channel at each site. At each point along the transect where velocity was measured, stream depth was also measured and recorded. When measuring velocity at a given location in a stream section, the current meter is positioned at 0.6 of the stream depth. Current velocity measurements across a stream section along with the subsections associated with each velocity are required to calculate flow (see below).

Flow

Flow is the instantaneous rate of water volume in cubic feet per second (cfs) passing a specific location in a waterbody. Flow is calculated as the product of current velocity (in feet per second) times stream depth (in feet) times stream width (in feet) at that location. If we measure the concentration of a particular parameter (e.g., NO23) and also the flow at a stream site, the load or mass of the parameter passing that location in a specified amount of time can be estimated.



https://www.usgs.gov/special-topic/water-science-school/science/how-streamflow-measured?qt-science_center_objects=0#qt-science_center_objects

Current-meter discharge measurements are made by determining the discharge in each subsection of a channel cross section and summing the subsection discharges to obtain a total discharge.

Friends of Hunting Creek Data (collected insitu)
Sample Date 4/3/2021

Sample ID and Description	Temperature, C	Conductivity, (µS/cm)	Dissolved Oxygen, mg/L	DO Saturation, %	pH	Flow, (cfs)***
HUNT-3 Little Lyons Creek at Hunting Creek Rd	14.0	141	10.19	99.1	6.95	3.44
HUNT-6 UT* Hunting Creek at Hunting Farms Ln	14.0	164	10.59	102.8	7.30	9.38
HUNT-8B Sewell Branch, Cox Rd.	13.0	140	10.78	103.1	6.95	ND**
HUNT-11 UT Mill Creek, 650 Willow Way, Hunters Ridge	14.4	198	10.18	99.9	7.32	1.96
HUNT-12 Mill Creek 650 Willow Way, Hunters Ridge	13.6	209	10.56	101.6	7.39	4.36
HUNT-13 Hunting Creek, upstream Plum Pt. Rd.	14.0	149	11.22	110.1	7.36	ND**

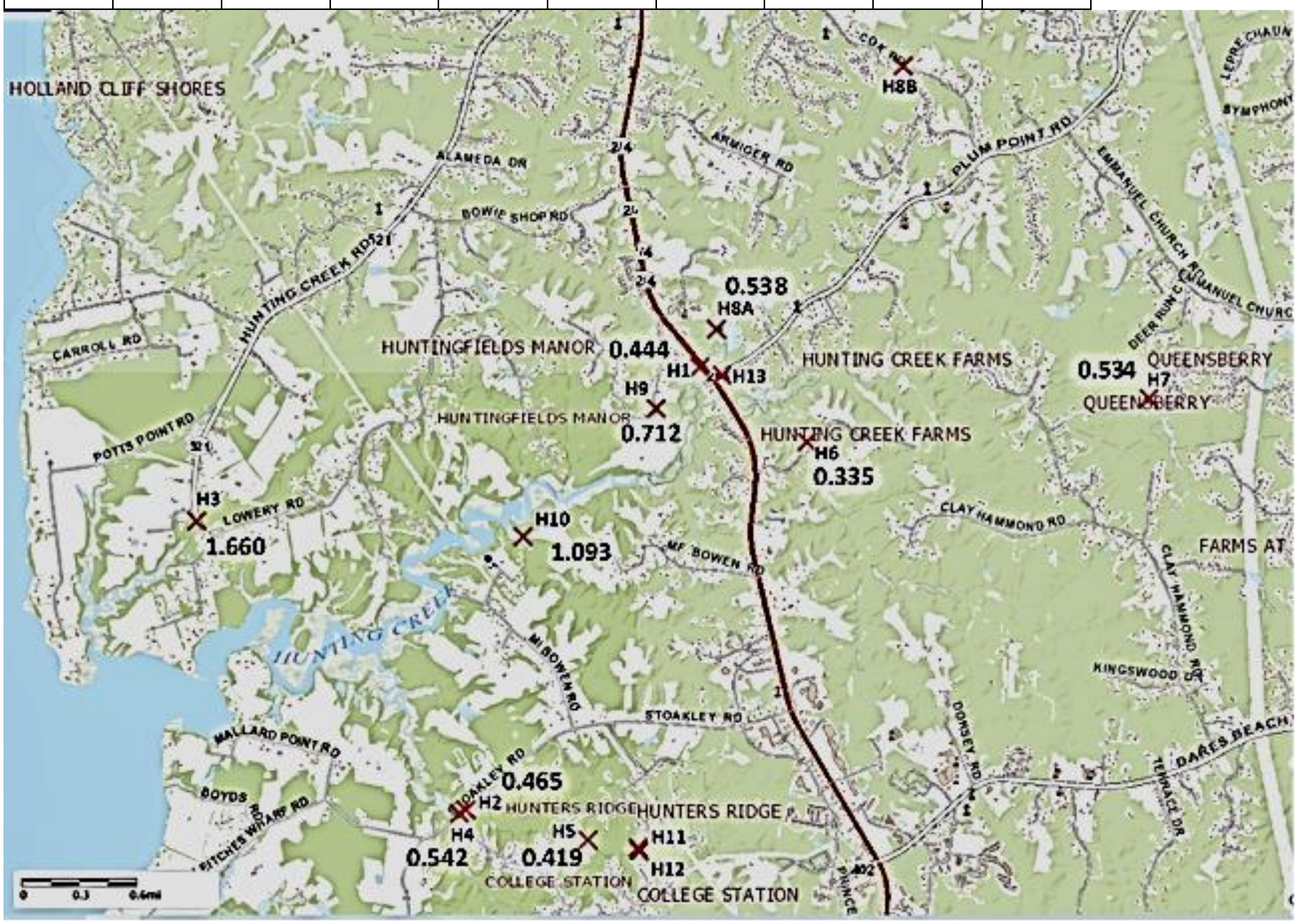
*UT = Unnamed Tributary, **ND = Not Determined, ***see Appendix 2 for Raw Flow data

Test Sites

The locations of the 14 stream sites that were monitored in the watershed on April 3rd are shown below. A more precise location of each test site can be found in the Appendix 1. The NO23 data values are presented on the map near the site numbers. Only sites H1 – 10 have NO23 data. The data is also listed in the table below.

NO23 Results, mg N/L

H1	H2	H3	H4	H5	H6	H7	H8A	H9	H10
0.444	0.465	1.660	0.542	0.419	0.335	0.534	0.538	0.712	1.093



There are two broad categories of locations for the sample sites. The first category is samples taken at a bridge. The description of the site includes the road and the upstream or downstream side of the bridge. An estimated distance from the bridge is included in some descriptions. The second category of sample sites are those not taken close to a bridge and usually are taken with permission of a property owner. These sites include GPS coordinates as recorded by a GPS device or by an application on the camera used for image documentation. It was found that the GPS coordinates from devices did not agree exactly with the coordinates as found on the Calvert County GIS system. The disagreement was usually beyond the circular error cited by the GPS device. Still, the differences were less than 50’ and usually within 30’. If the circle of uncertainty included a significant feature such as a confluence the sample taker provided additional information to guide the positioning of location marks relative to the significant feature. For sites near bridges the sample taker provided relevant location descriptions for the placement of location marks and the coordinates of the marks were taken from the county GIS data. In addition to the global map above, detailed maps of the sites are also supplied in the Appendix 1 such that by combining the detailed maps, GPS coordinates, and photographic data, future testing can replicate previous test sites.

Result Sheets

Monitoring results for each sampled stream site, names of the sample collectors, and photos taken by the collectors at each are presented below. Detailed maps are in the Appendix 1.

HUNT-1 (Hunting Creek at Route 2/4 bridge; 38.58497, -76.60701): Bob Estes. Becky Hunter

Detailed Map A1

$NO23$ = 0.444 mg/L

HUNT-1 looking upstream, 3 April 2021

HUNT-1 looking downstream, 3 April 2021

HUNT-2 (Mill Creek at Stoakley Rd. bridge, 38.550892 -76.630039): Ron Klauda, Evan Klauda

Detailed Map: A2

NO23 = 0.465 mg/L

HUNT-2 looking upstream, 3 April 2021

HUNT-2 looking downstream, 3 April 2021

HUNT-3   (Little Lyons Creek at Hunting Creek Rd. bridge, 38.573129 -76.656298): Frank McPhillips, Erin McPhillips, Hali Kilbourne, Nelleke Schijf, Ron Klauda

Detailed Map A3

NO23 = 1.660 mg/L Stream Cross Section Area = 7.30 ft^2

Temperature = 14.0 C	DO Saturation = 99.1%
Conductivity = 141 microsiemens/cm (µS/cm)	pH = 6.95
Dissolved Oxygen = 10.19 mg/L	Flow = 3.44 cubic feet/second (cfs)


HUNT-3 looking upstream, 3 April 2021


HUNT-3 looking downstream, 3 April 2021

HUNT-4 (UT Mill Creek just upstream from Stoakley Rd. bridge, 38.550599 -76.630630): Ron Klauda, Evan Klauda

Detailed Map A2

NO23 = 0.542 mg/L

HUNT-4 looking upstream, 3 April 2021

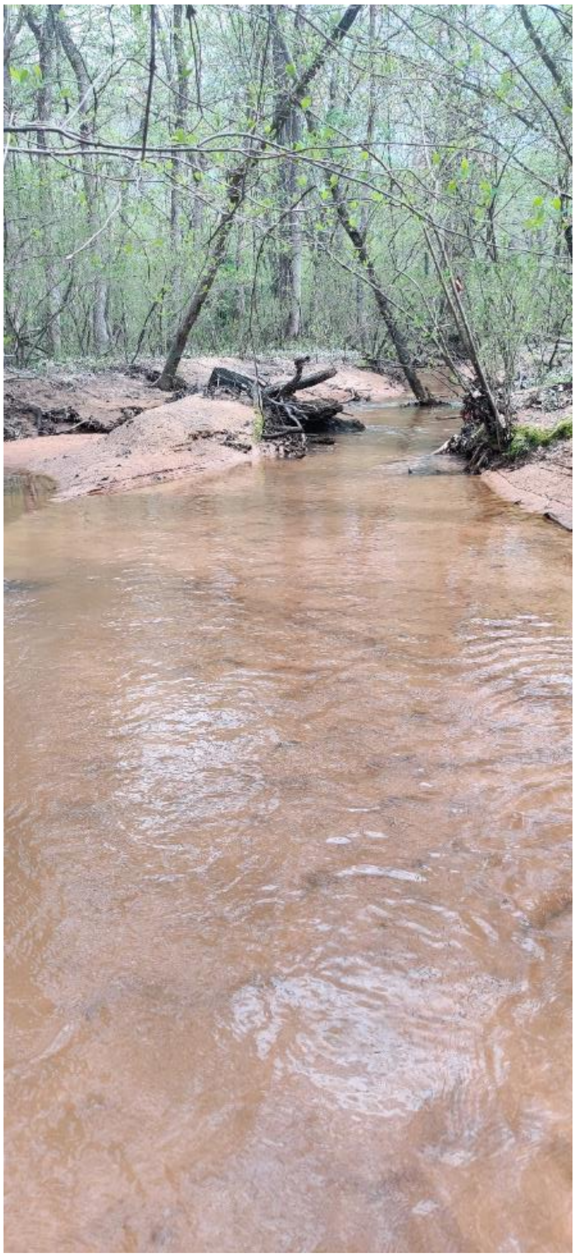
HUNT-4 looking downstream, 3 April 2021

HUNT-5 (Mill Creek behind 1440 Foxtail Lane, Hunters Ridge, 38.54854, -76.61815): Kyle Greene, Benson Greene, Calvin Greene

This site is not near a bridge or other landmark. Accessed via property of Kyle Greene, 1440 FOXTAIL LN

Detailed Map A4

NO23 = 0.419 mg/L



HUNT-5 looking upstream, 3 April 2021

HUNT-5 looking downstream, 3 April 2021

HUNT-6 (UT Hunting Creek at Hunting Farms Lane bridge, 38.579145 -76.596554):
Ron Klauda, Hali Kilbourne, Nelleke Schijf

Detailed Map A5

NO_{23} = 0.335 mg/L Stream Cross Section Area = 6.82 ft^2

Temperature = 14.0 C	DO Saturation = 102.8%
Conductivity = 164 µS/cm	pH = 7.30
Dissolved Oxygen = 10.59 mg/L	Flow = 9.38 cfs

HUNT-6 looking upstream, 3 April 2021

HUNT-6 looking downstream. 3 April 2021

HUNT-7 (upper Hunting Creek west of Queensberry; 38.58236, -76.56302):
Bob Estes, Becky Hunter

This site is not near a bridge or other landmark. Accessed via property of Kyle Pellegrino, 2756 QUEENSBERRY DR

Detailed Map A6

NO23 = 0.534 mg/L

HUNT-7 looking upstream, 3 April 2021

HUNT-7 looking downstream, 3 April 2021

HUNT-8A (Sewell Branch just upstream from confluence with Hunting Creek, 38.58779 -76.60520): Bob Estes, Becky Hunter

This site is not near a bridge or other landmark. Accessed via Hawit family property, 2427 Solomons Island Rd.

Detailed Map A7

$NO23$ = 0.538 mg/L

HUNT-8a looking upstream, 3 April 2021

HUNT-8a looking downstream, 3 April 2021

HUNT-8b (Sewell Branch at Cox Rd. bridge, 38.607864 -76.586875):
Hali Kilbourne, Ron Klauda, Nelleke Schijf

Detailed Map A8

Temperature = 13.0 C	DO Saturation = 103.1%
Conductivity = 140 µS/cm	pH = 6.95
Dissolved Oxygen = 10.78 mg/L	Flow = Not Determined

HUNT-8b looking upstream, 3 April 2021

HUNT-8b looking downstream, 3 April 2021

HUNT-9 (Reits Branch at Walton Rd. bridge, 38.581751 -76.611328):
Frank McPhillips, Erin McPhillips

Detailed Map A9

NO23 = 0.712 mg/L

HUNT-9 looking upstream, 3 April 2021

HUNT-9 looking downstream, 3 April 2021

HUNT-10 (Fox Point Creek upstream from confluence with Hunting Creek, 38.57192, -76.62436): Bob Estes

Detailed Map A10

This site is not near a bridge or other landmark. Accessed via kayak and waders. Note that at the time the sample was taken it was low tide and water was flowing in a manner typical of a small stream. High tides do reach this point. Points further upstream require a land entrance over private property.

NO23 = 1.093 mg/L

_HUNT-10 looking upstream, 3 April 2021

HUNT-10 looking downstream, 3 April 2021

HUNT-11 (UT Mill Creek behind 650 Willow Way, Hunters Ridge, 38.547895 -76.613193): Hali Kilbourne, Ron Klauda, Nelleke Schijf

Detailed Map A4

Stream Cross Section Area = 1.73 ft^2

Temperature = 14.4 C	DO Saturation = 99.9%
Conductivity = 198 µS/cm	pH = 7.32
Dissolved Oxygen = 10.18 mg/L	Flow = 1.96 cfs

HUNT-11 looking upstream, 3 April 2021

HUNT-12 (Mill Creek behind 650 Willow Way, Hunters Ridge, 38.547643 -76.613125): Hali Kilbourne, Ron Klauda, Nelleke Schijf

Detailed Map A4

Stream Cross Section Area = 4.04 ft^2

Temperature = 13.6 C	DO Saturation = 101.6%
Conductivity = 209 µS/cm	pH = 7.39
Dissolved Oxygen = 10.56 mg/L	Flow = 4.36 cfs

HUNT-11 (foreground) and HUNT-12 (background), 3 April 2021

HUNT-13 (Hunting Creek just upstream from Plum Pt. Rd. bridge, 38.584290 -76.604860): Hali Kilbourne, Ron Klauda, Nelleke Schijf

Detailed Map: A1

Temperature = 14.0 C	DO Saturation = 110.1%
Conductivity = 149 µS/cm	pH = 7.36
Dissolved Oxygen = 11.22 mg/L	Flow = Not Determined

HUNT-13 looking downstream from Plum Pt. Rd. bridge, 3 April 2021

✓

Conclusions

1. The spring 2021 Water Quality Blitz conducted on April 3rd yielded measurements of nitrogen (expressed as NO23) at 10 non-tidal stream sites spread across the Hunting Creek watershed. Nitrogen concentrations ranged from 0.335 mg/L at HUNT-6 (unnamed tributary) to 1.660 mg/L at HUNT-3 (Little Lyons Creek). The average concentration was 0.674 mg/L and the median concentration was 0.536 mg/L.

2. Are any of these nitrogen concentrations of concern? We can address this question with the help of Calvert County's nitrogen standard of 0.7 mg/L that is based on U.S. EPA's recommended Section 304(a) ambient nutrient criteria for rivers and streams in their Nutrient Ecoregion IX (Southeastern Temperate Forested Plains and Hills). Section 304(a) criteria are intended to provide for the protection of aquatic life and recreation. The criteria are empirically derived and represent reference conditions in rivers and streams that are minimally impacted by human activities, as described in the EPA report. (https://www.epa.gov/sites/production/files/documents/rivers9.pdf)

3. The good news is that 7 of the 10 non-tidal stream sites sampled on 4-3-21 in the Hunting Creek watershed had NO23 concentrations below the 0.7 mg/L nitrogen standard.

4. The less good news is that 3 of the 10 sites had NO23 concentrations that were above the nitrogen standard. However, at 0.712 mg/L, the HUNT-9 site (Reits Branch) was only slightly above the 0.7 mg/L standard. Of more concern is that the HUNT-10 site in Fox Point Creek (1.093 mg/L) exceeded the standard by 56%. The NO23 concentration at HUNT-3 site in Little Lyons Creek (1.660 mg/L) was more than twice as high as the nitrogen standard, exceeding it by 137%. It should be noted that the HUNT-10 site was freely flowing out into toward Hunting Creek. A subsequent excursion up Fox Point creek during a higher tide revealed that the test point was not beyond the reach of the high tide. A site further upstream of the test site was identified as well beyond the high tide. This site will be used for future tests subject to land owner permission. The location of the future site is shown in Appendix 1 figure A10.

5. Based on this single sampling event, the HUNT-10 and HUNT-3 sites could be "hot spots" for nitrogen in the Hunting Creek watershed. Additional monitoring in these two streams is needed to confirm these suspicions.

6. The Blitz also yielded measurements of temperature, conductivity, dissolved oxygen, dissolved oxygen saturation, and pH at two of the 10 non-tidal stream sites that were sampled for nitrogen, plus at four additional sites. Measured values for these water quality parameters are typical of Coastal Plain Maryland streams and do not raise any 'red flags' of concern.

7. Current velocity was measured at HUNT-3, HUNT-6, HUNT-11, and HUNT-12, permitting us to calculate flow at these four sites. Flows ranged from 1.66 cfs at HUNT-11 to 8.92 cfs at HUNT-6.

Looking Ahead

Future water quality monitoring in the Hunting Creek watershed should include (a) resampling all 2021 stream sites on some meaningful and doable frequency, (b) sampling additional stream sites, (c) measuring current velocity at all sampled sites so flows can be calculated and nitrogen loads can be estimated, and (d) ranking the tributaries with respect to their water volume contributions to the mainstem Hunting Creek.

Acknowledgements

The Friends of Hunting Creek express our gratitude to Dr. Faris Hawit for granting us permission to access HUNT-8a from his family's property, to Bruce and Patty Bradley for their permission to access HUNT-6 from their property, to Kyle Pellegrino for his permission to access HUNT-7 via his property, and to John and Linda Williams for granting us permission to access HUNT-11 and HUNT-12 from their property. Thanks also to Nate Novotny for his help to Bob Estes in finding access points to collect a water sample at HUNT-7 and to Barb Estes for her support.

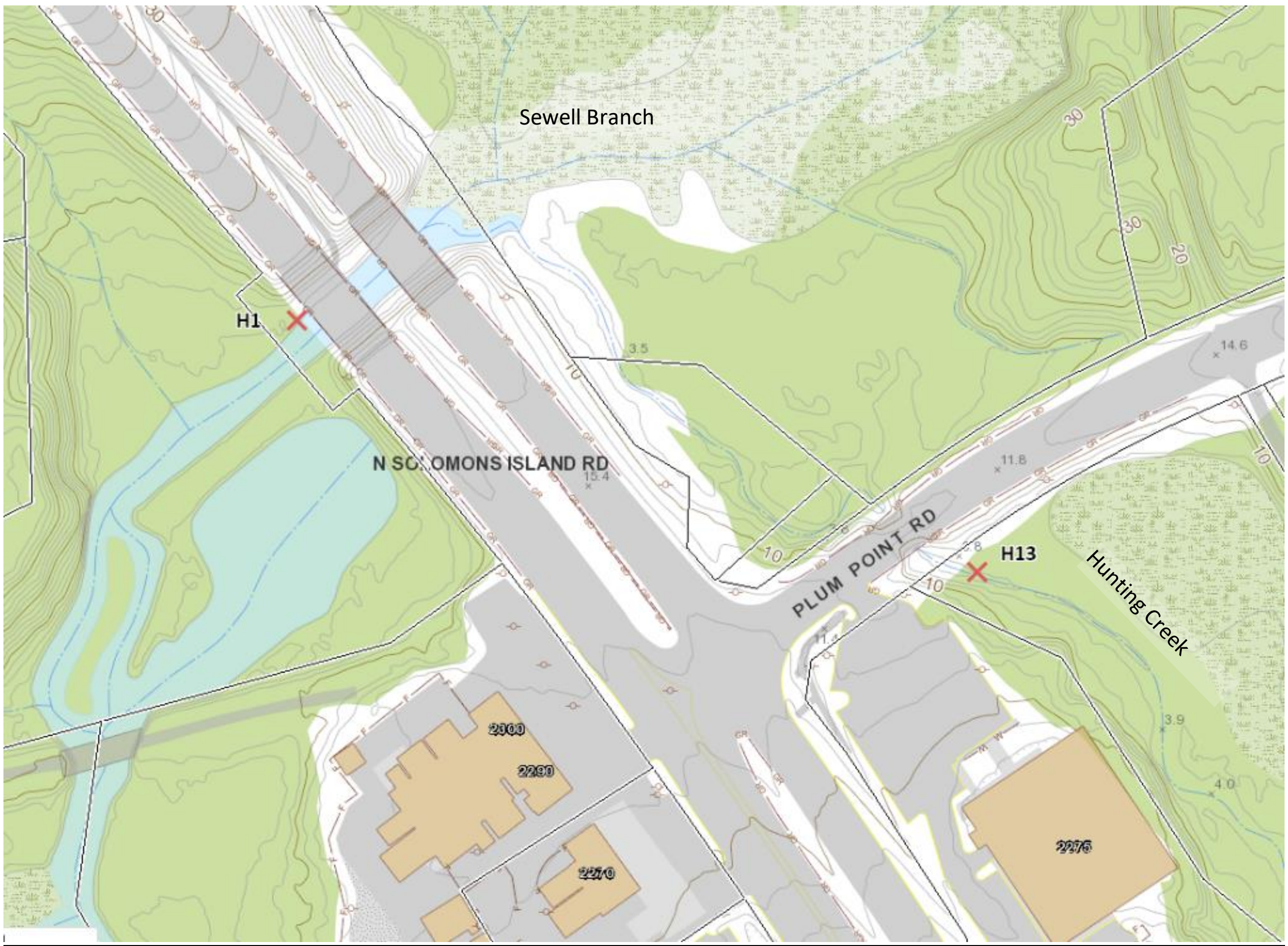
Appendix 1

Detailed Test Site Location Maps

The following maps are closeups of the locations of the test sites with sufficient resolution to allow future sample volunteers to locate the site and take a repeat sample. Note that in some cases more than one sample may appear on an image. The coordinates are the same as those in the body of the report.

A1

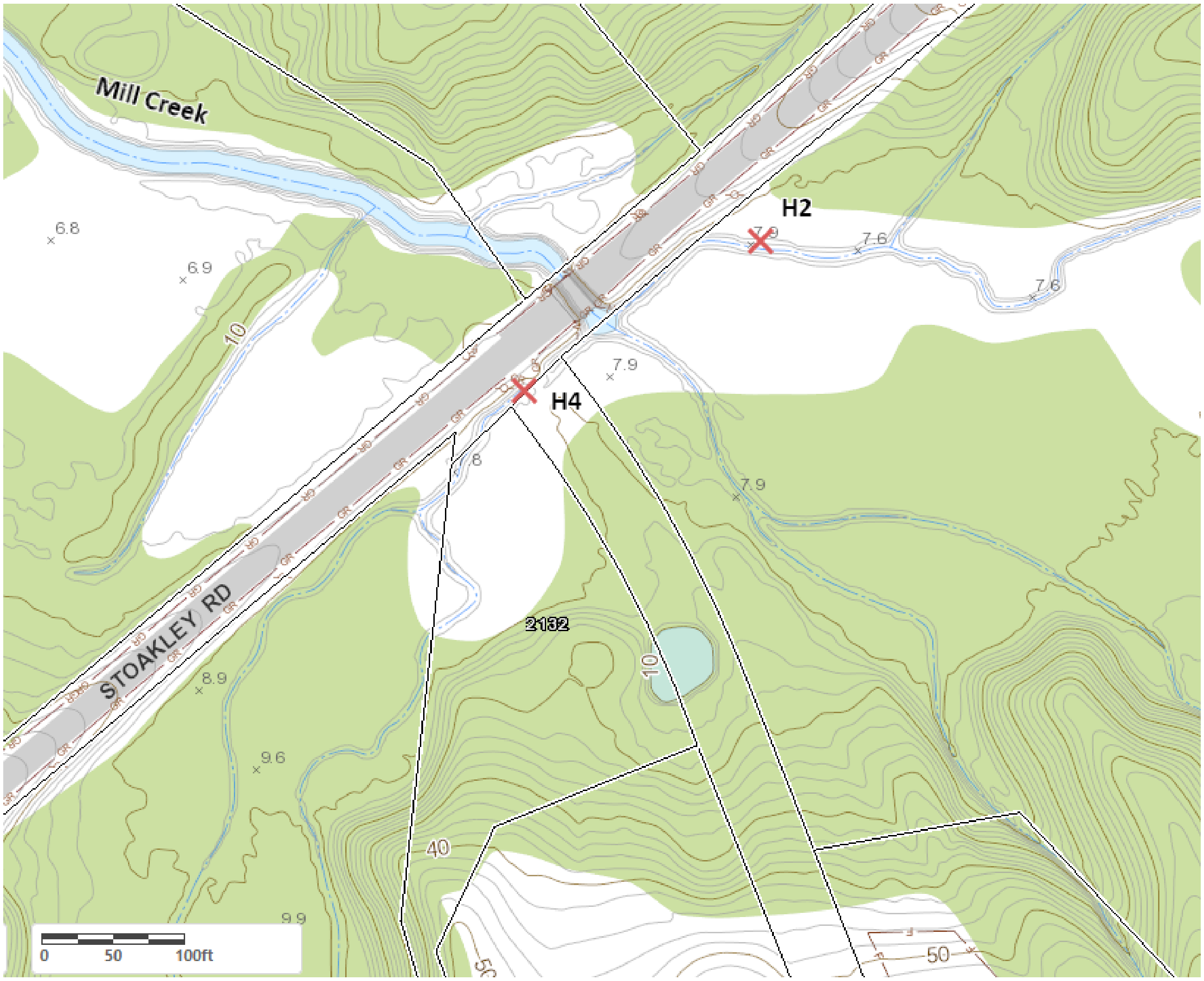
HUNT-1 (Hunting Creek at Route 2/4 bridge, 38.58497, -76.60701)
HUNT-13 (Hunting Creek just upstream from Plum Pt. Rd. bridge, 38.584290 **-**76.604860)



A2

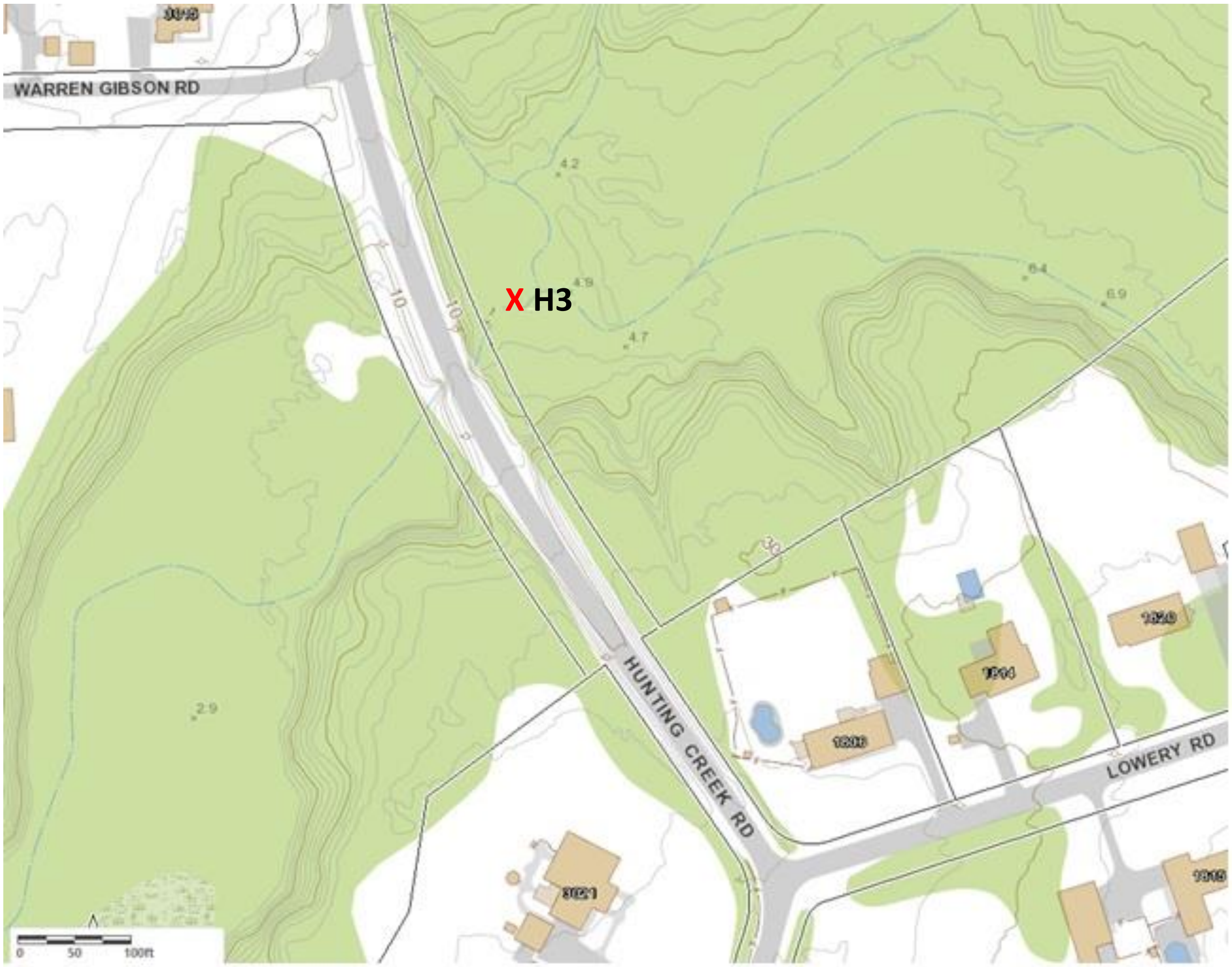
HUNT-2   (Mill Creek at Stoakley Rd. bridge, 38.550892 -76.630039)

HUNT-4 (UT Mill Creek just upstream from Stoakley Rd. bridge, 38.550599   -76.630630)



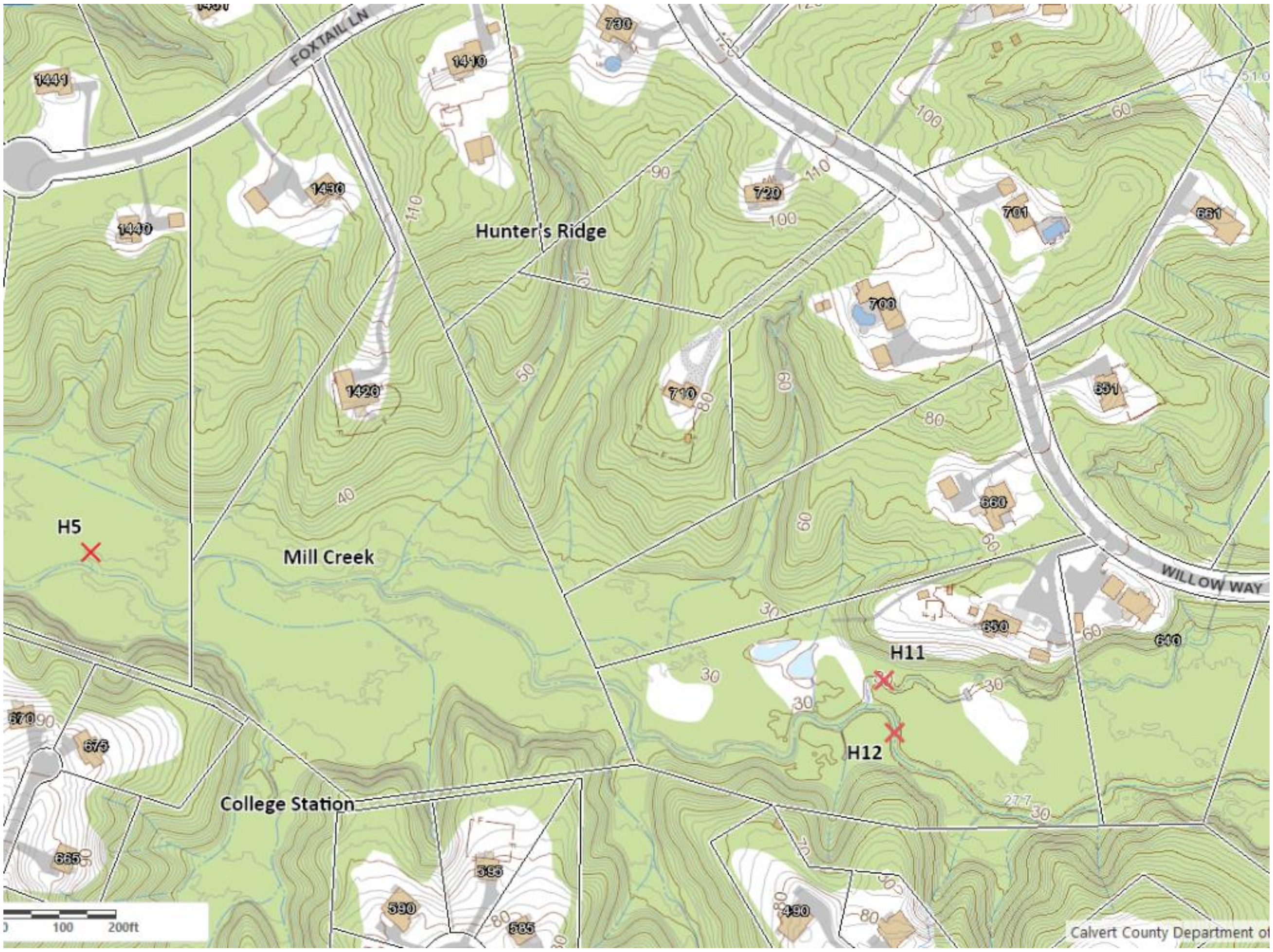
A3

HUNT-3 (Little Lyons Creek at Hunting Creek Rd. bridge, 38.573129 -76.656298)



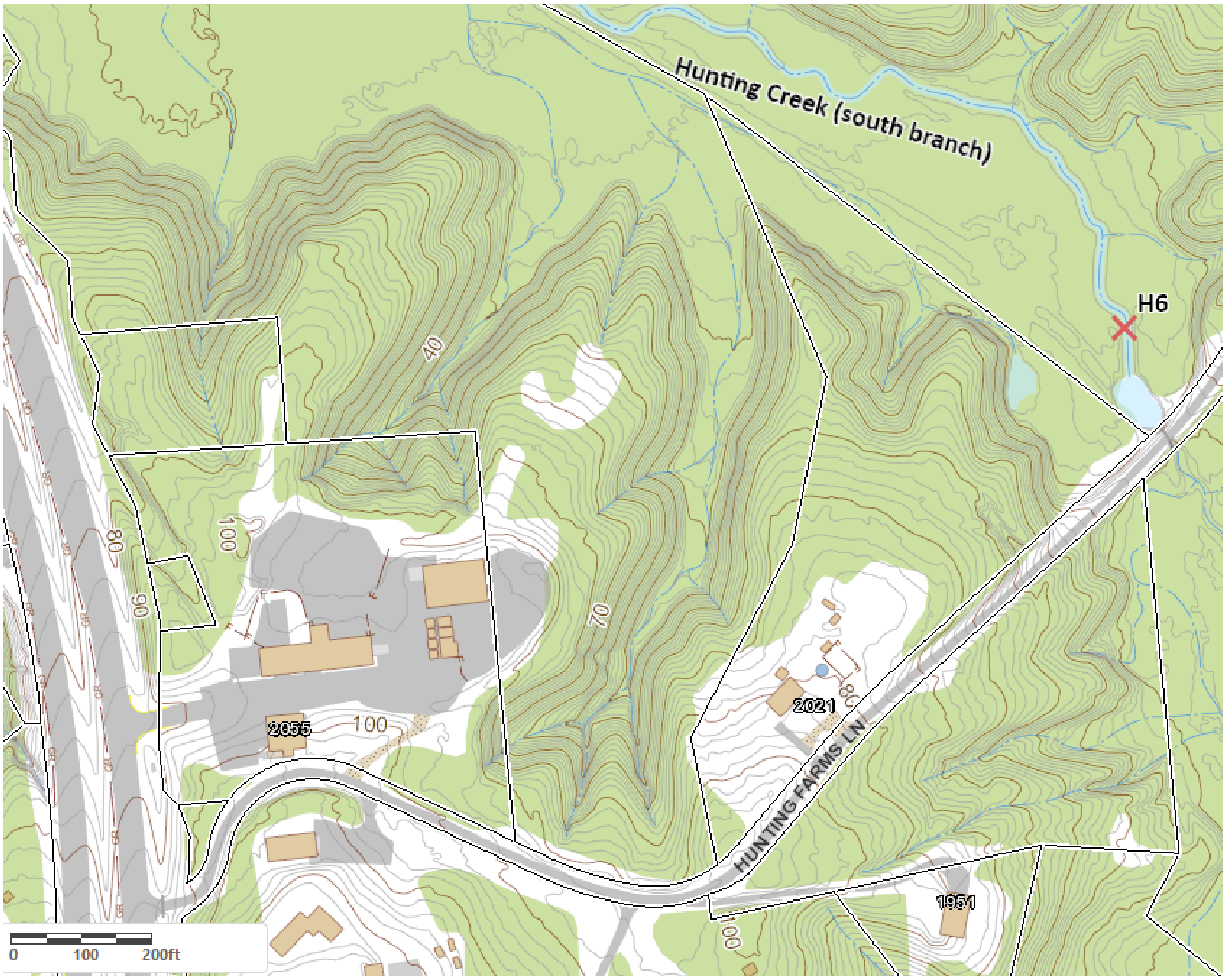
A4

HUNT-5 (Mill Creek behind 1440 Foxtail Lane, Hunters Ridge (38.54854, -76.61815)
HUNT-11 (UT Mill Creek behind 650 Willow Way, Hunters Ridge, 38.547895 -76.613193)
HUNT 12 (Mill Creek behind 650 Willow Way, Hunters Ridge, 38.547643 -76.613125)



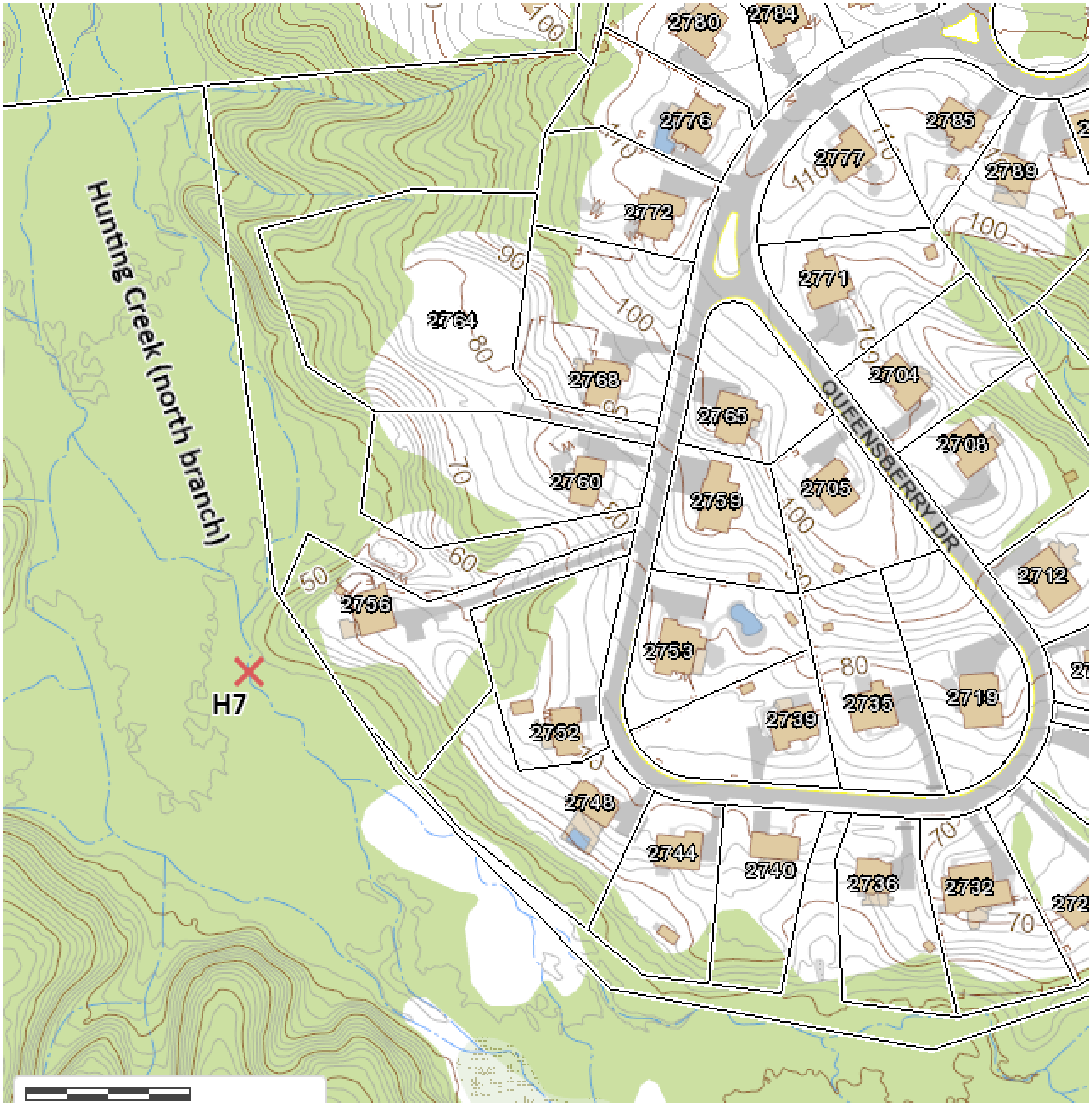
A5

HUNT-6 (UT Hunting Creek at Hunting Farms Lane bridge, 38.579145 -76.596554)



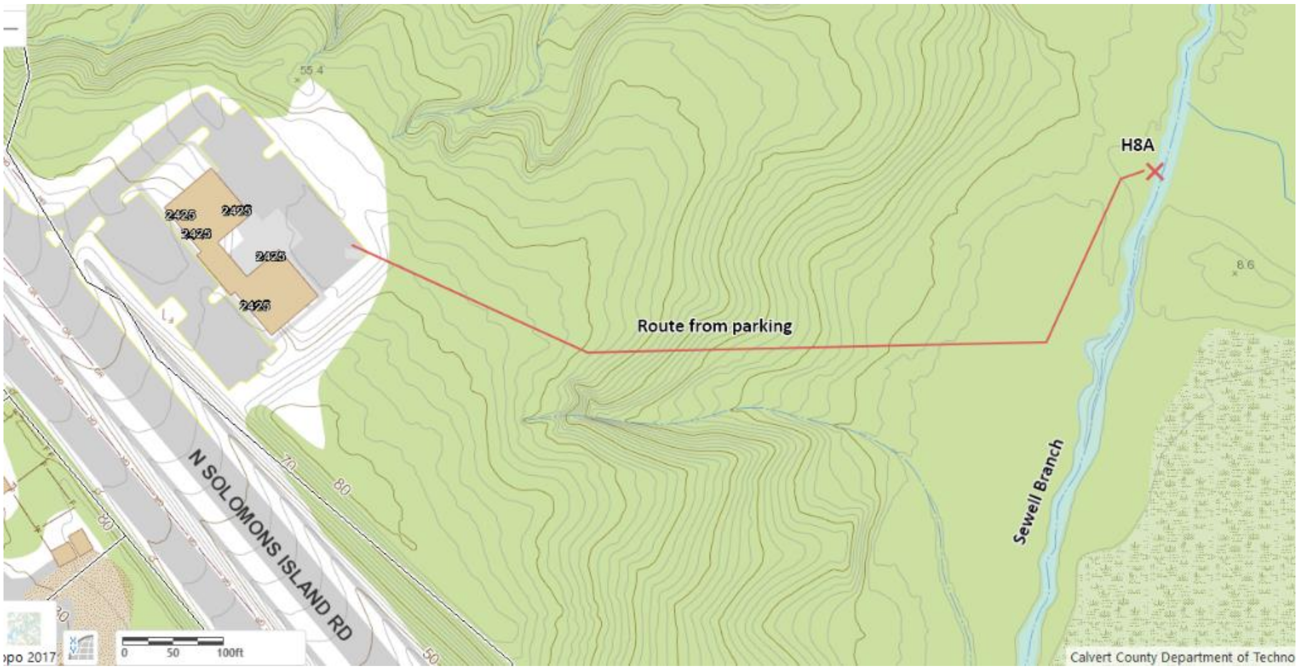
A6

HUNT-7 (upper Hunting Creek west of Queensberry; 38.58236, -76.56302), property of Kyle Pellegrino, 2756 QUEENSBERRY DR



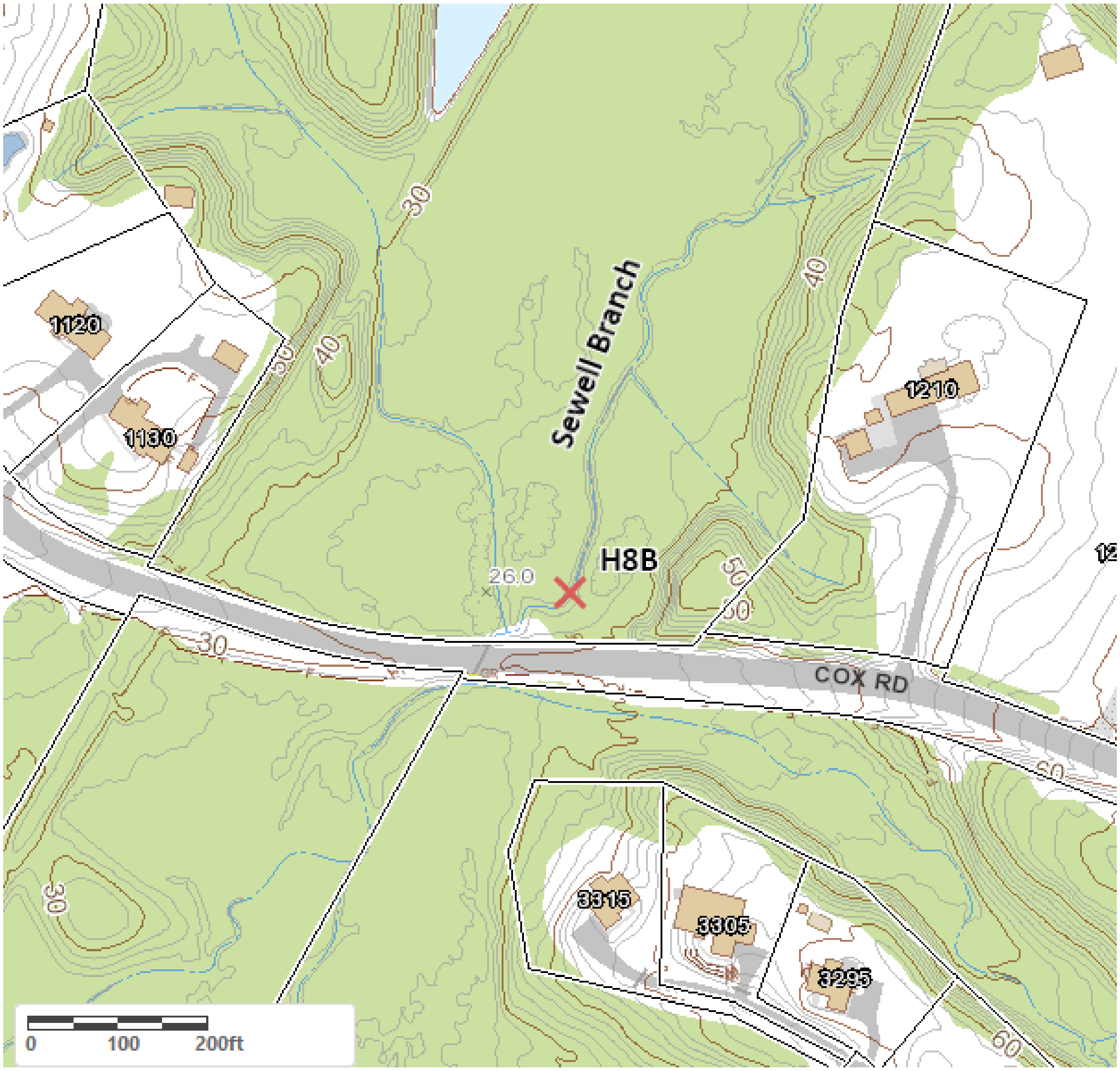
A7

HUNT-8A (Sewell Branch upstream of confluence with Hunting Creek, 38.58779 -76.60520) Property of Dr Hawit, 2427 Solomons Island Rd.



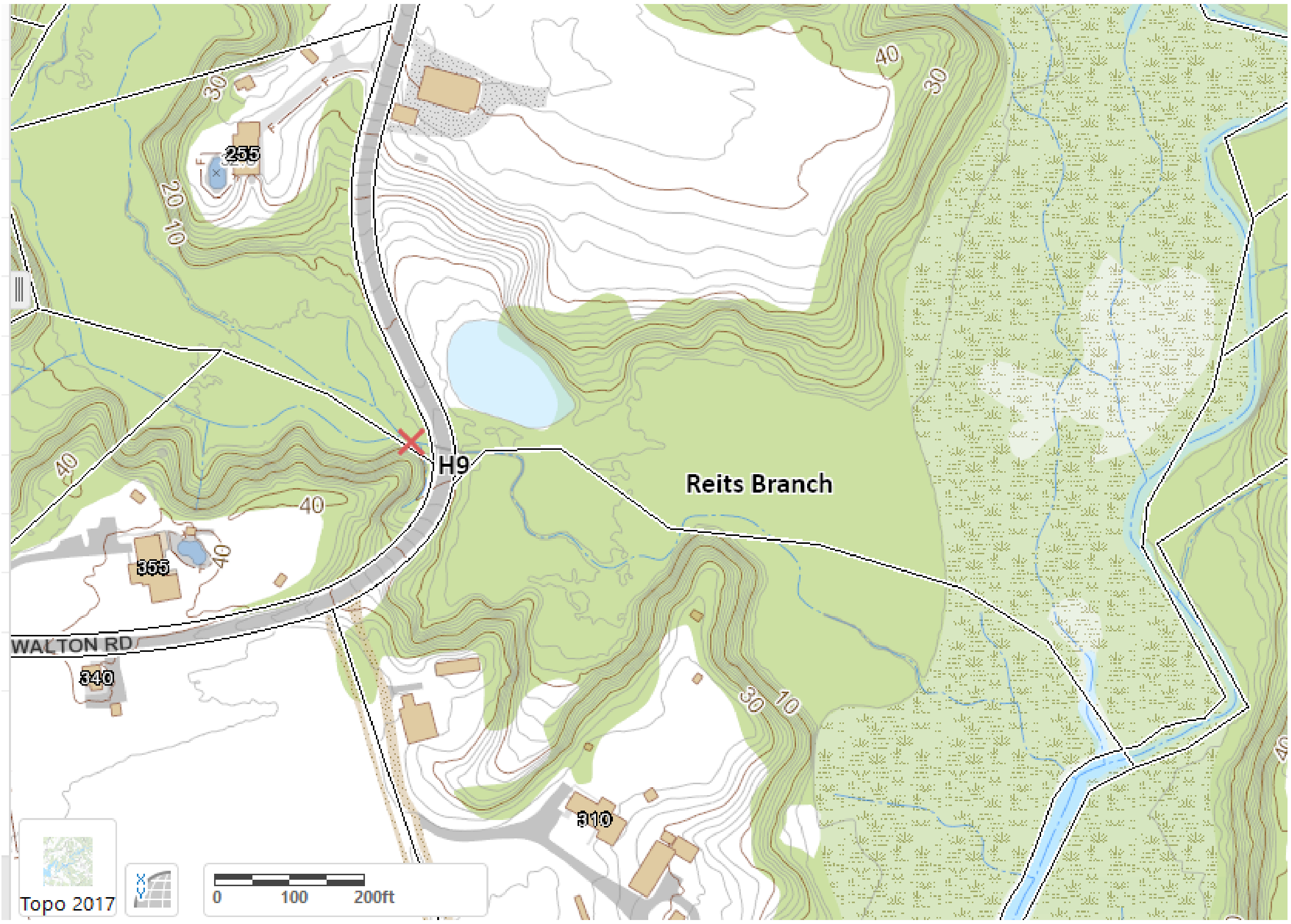
A8

HUNT-8b (Sewell Branch at Cox Rd. bridge, 38.607864 -76.586875)



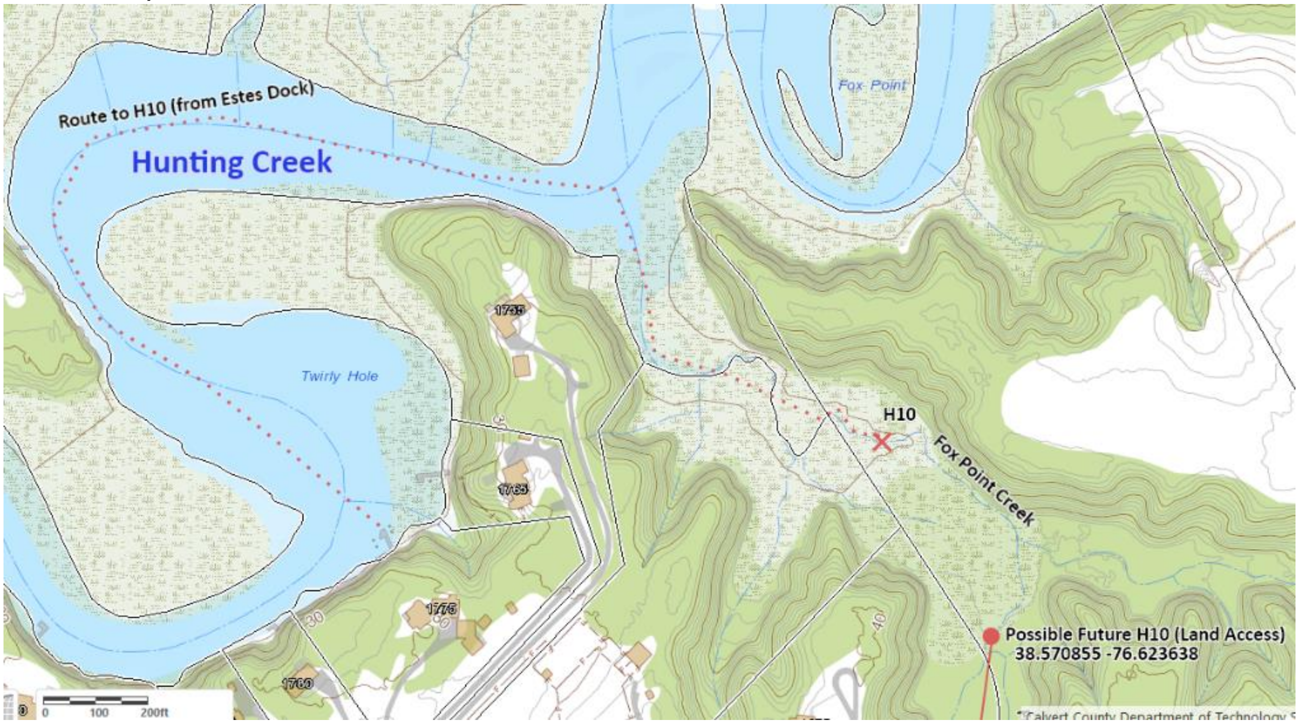
A9

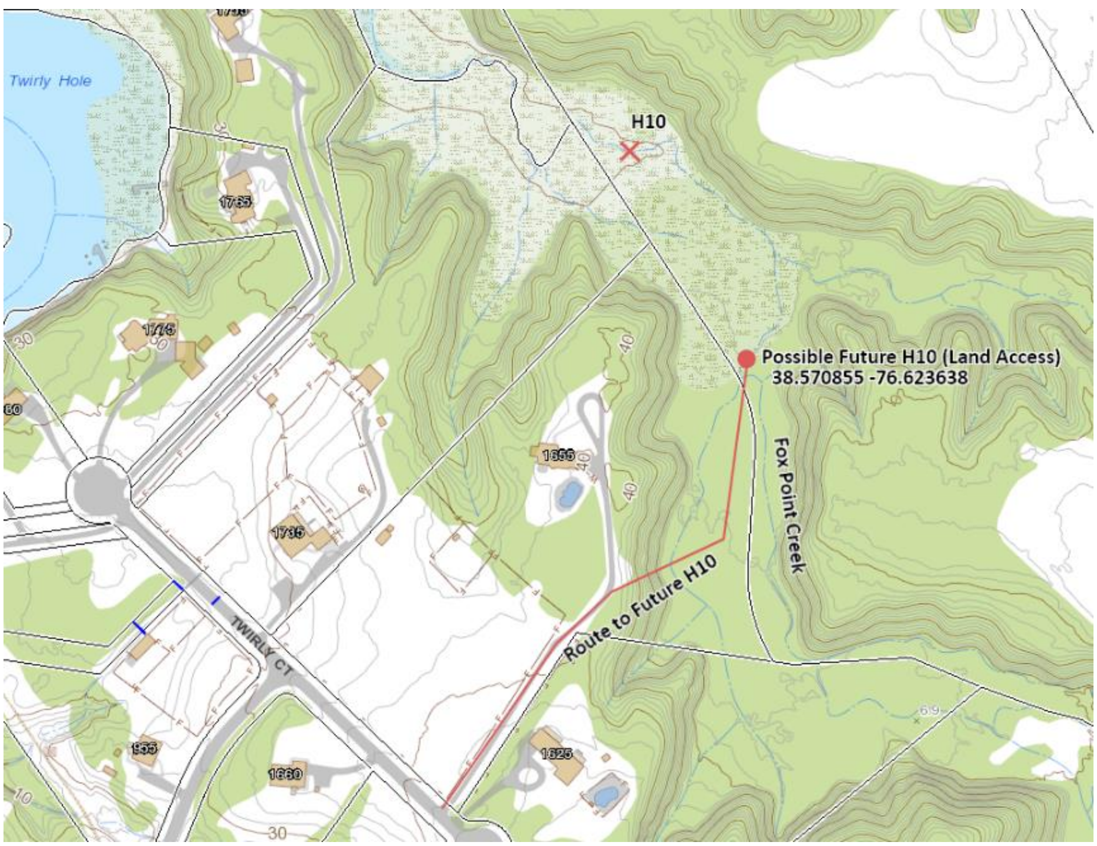
HUNT-9 (Reits Branch at Walton Rd. bridge, 38.581751 -76.611328)



A10

HUNT-10 (Fox Point Creek upstream from confluence with Hunting Creek, 38.57192 -76.62436)





Possible future site for HUNT-10 (Upstream of high tide)

Appendix 2: Field Data Sheets for Flow Test Sites

Flow (discharge) calculations were based on measurements of stream width, depth, and current velocity at HUNT-3, HUNT-6, HUNT-11, and HUNT-12. Note that other data was also recorded on these data sheets.

Site: HUNT-3
Date: 4-3-21
Time: 1630
GPS WP / Coordinates:

Water Quality

Temperature (C)	13.96
Conductivity	0.141
Salinity	0.04
DO %	99.1
DO mg/L	10.19
pH	6.95

Water Collection

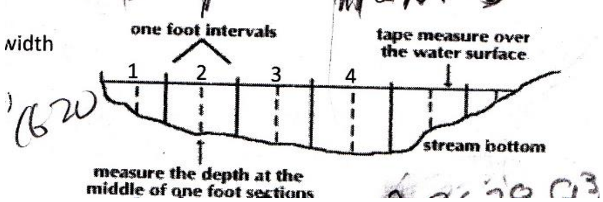
Water ☐ 1.5 L + Chem (NO23 measured here)

Discharge

Stream Width:
Width of Each Segment:

Number	Location (in./ft)	Depth (ft)	Velocity (ft/s)
Right Bank (L looking upstream)			
1	6"	1.68'	0.35
2	18"	1.5'	0.44
3	30"	1.28'	0.57
4	42"	1.18'	0.59
5	54"	1.05'	0.46
6			
7			
8			
9			
10			
Left Bank (R looking upstream)			

Notes: Width = 5'7" HUNT-3



Site: HUNT-6
Date: 4-3-21
Time: 1510
GPS WP / Coordinates:

Water Quality Let Probe sit 5 min while taking Velocity

Temperature (C)	14.01
Conductivity	0.164
Salinity	0.08
DO %	102.8
DO mg/L	10.59
pH	7.30

Water Collection

Water ☐ 1.5 L + Chem (NU23 sample collected here)

Discharge

Stream Width:
Width of Each Segment:

Number Segment	Location (in./ft)	Depth (decimal ft)	Velocity (ft/s)
Right Bank (L looking upstream)			
1	6"	1.4'	0.67
2	18"	1.4'	1.47
3	30"	1.5'	2.32
4	42"	1.3'	1.44
5	54"	0.93'	1.08
6	66"	0.5'	0.08
7			
8			
9			
10			
Left Bank (R looking upstream)			

Notes: Width = 5'7" HUNT-6

Hunting Creek Monitoring Study

Site: HUNT-12
Date: 4-3-21
Time: 1400
GPS WP / Coordinates:

Water Quality

Temperature (C)	13.55
Conductivity	0.209
Salinity	0.1
DO %	101.6
DO mg/L	10.56
pH	7.39

Water Collection

Water ☐ 1.5 L + Chem

(No water sample for NO23 collected here)

Discharge

Stream Width:
Width of Each Segment:

Number Segment	Location (in./ft)	Depth (decimal ft)	Velocity (ft/s)
Right Bank (L looking upstream)			
1	6"	0.54'	1.25
2	12"	0.45'	1.20
3	18"	0.45'	1.00
4	30"	0.30'	0.44
5	42"	0.20'	0.52
6	54"	0.27'	0.76
7	66"	0.32'	1.77
8	78"	0.35'	1.84
9	90"	0.31'	1.05
10	102"	0.30'	0.96
Left Bank (R looking upstream)			

Notes: 12 Feet 5 in width HUNT-12 (4-3-21)

Site: HUNT-11
Date: 4-3-21
Time: 1430
GPS WP / Coordinates:

Water Quality

Temperature (C)	14.43
Conductivity	0.198
Salinity	0.09
DO %	99.9
DO mg/L	10.18
pH	7.32

Water Collection

Water ☐ 1.5 L + Chem

(No water sample for NO23 collected here)

Discharge

Stream Width:
Width of Each Segment:

Number	Location (in./ft)	Depth (ft)	Velocity (ft/s)
Right Bank (L looking upstream)			
1	6"	0.3'	1.63
2	18"	0.5'	1.32
3	30"	0.35'	1.04
4	42"	0.2'	0.89
5	54"	0.2'	0.74
6	66	0.1'	0.65
7			
8			
9			
10			
Left Bank (R looking upstream)			

Notes: 6'10" wide HUNT-11

- Measure stream width/ break into 5-10 segments of equal width
- Take velocity in middle of each segment (Location)
- Take depth and velocity at **0.6 depth** from surface (use pole)

Example: A 72 in. wide stream is broken into 6 segments of 12 inches. Location 1 is 6 in, Location 2 is 18 in.