



May 20, 2020

Mr. Chris Dugan
Stormwater Coordinator
City of Spring Hill
P.O. Box 789
Spring Hill, TN 37174

Dear Mr. Dugan:

Subject: 2020 Visual Stream Assessment (VSA)
MS4 Permit – Non-Analytical Stream Monitoring
City of Spring Hill, Maury and Williamson Counties, Tennessee
CEC Project 194-523.0001

Civil & Environmental Consultants, Inc. (CEC) performed a Visual Stream Assessment (VSA) on Crooked Creek (TN06040003034-0700), Grassy Branch (TN06040003034-0410), McCutcheon Creek (TN06040003034-0300) and Rutherford Creek (TN06040003034-2000) for the City of Spring Hill according to our proposal dated September 6, 2019. The VSA was conducted between February 3, 2020 and April 17, 2020 using the Maryland Department of Natural Resources' Stream Corridor Assessment Survey (2001).

All visual survey locations have been logged into a geodatabase. Each location includes completed data fields, GPS location, and a photo (some points may not have an attached photo). The geodatabase is included on the USB flash drive provided. The total mileage assessed for each stream is included in the following table.

Permit Year 4 Streams for Assessment	Miles
Crooked Creek (TN06040003034-0700)	2.60
Grassy Branch (TN06040003034-0410)	7.20
McCutcheon Creek (TN06040003034-0300)	9.90
Rutherford Creek (TN06040003034-2000)	3.60
Total	23.30

There were a few locations of concern that CEC wanted to bring to the City's attention. These locations are described as follows:

Crooked Creek

1) Erosion Site near Port Royal Park

During the stream survey, CEC personnel observed streambank erosion near Port Royal Park. The bank erosion is approximately 300 Linear Feet (LF) with an average exposed bank height of 10 feet. A change in the surrounding land use is likely a contributor to the streambank erosion. This point is listed as an “Erosion Site” point (Object ID 9) in the geodatabase provided. Refer to Figure 1.



*Photo 1 - Aerial View of Erosion Site
(Red Triangle Indicates Erosion Site Location)*



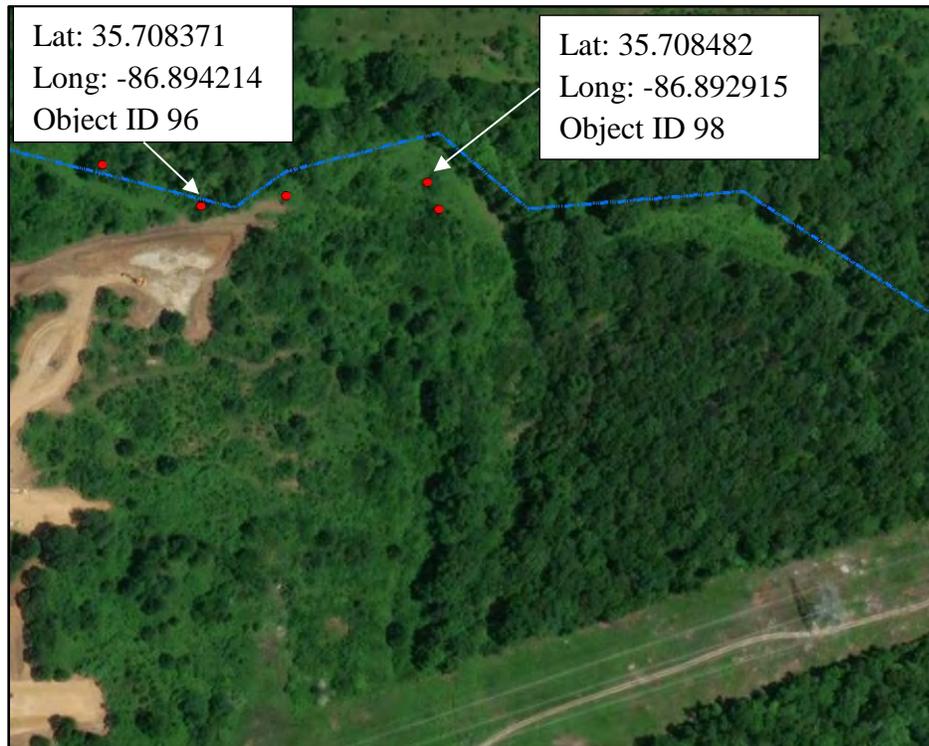
Photo 2 - View of Streambank Erosion (Object ID 9)



Photo 3 - View of Streambank Erosion near the Confluence of Crooked and Rutherford Creeks

2) Sedimentation at Pipe Outfalls

Multiple pipe outfalls were noted discharging directly into Crooked Creek. Two pipe outfalls were of particular concern due to the amount of sedimentation that was observed in and around the outfalls. TDEC lists Crooked Creek as a water with unavailable parameters due to sedimentation and siltation as well as habitat alteration. CEC recommends that the City inspect these outfall locations for potential maintenance. These points are listed as “Pipe Outfall” points (Object ID 96 and 98) in the geodatabase provided. Refer to Figure 1.



*Photo 4 - Aerial View of Pipe Outfalls
(Red Dots Indicate Outfall Locations)*



Photo 5 - View of Sedimentation at Pipe Outfall (Object ID 96)



Photo 6 - View of Sedimentation at Pipe Outfall (Object ID 98)

Grassy Branch

1) Erosion Site near Brixworth Dr.

Streambank erosion was noted south of Brixworth Drive. The erosion was occurring behind a wing wall and encroaching near a sidewalk. CEC recommends that the City inspect the site for potential threat to infrastructure. This point is an “Erosion Site” point (Object ID 28) in the geodatabase provided. Refer to Figure 2.



*Photo 7 - Aerial View of Erosion Site
(Red Triangle Indicates Erosion Site Location)*



Photo 8 - View of Erosion Site (Object ID 28)

2) Fish Barrier near Cadence Dr.

A debris dam was noted as blocking a box culvert thereby creating a fish barrier. CEC recommends that the City inspect this site for maintenance. This point is a “Fish Barrier” point (Object ID 7) in the geodatabase provided. Refer to Figure 2.



*Photo 9 - Aerial View of Fish Barrier
(Red Cross Indicates Fish Barrier Location)*



Photo 10 - View of Fish Barrier (Object ID 7)

3) Inadequate Buffer near Campbell Station Pkwy.

Approximately 368 LF of stream was observed to have little or no riparian buffer. Adequate riparian buffers provide a reduction in the amount of sediment, nutrients and other contaminants that enter surface waters. Riparian buffers also provide stream shading which is important to sensitive benthic invertebrates that require cooler water temperatures. This point is an “Inadequate Buffer” point (Object ID 4) in the geodatabase provided. Refer to Figure 2.



*Photo 11 - Aerial View of Inadequate Buffer
(Red Line Indicates Inadequate Buffer Location)*



Photo 12 - View of Inadequate Buffer (Object ID 4)

4) Inadequate Buffers

CEC field personnel noted inadequate buffers near Savannah Park Drive. Approximately 3,156 LF of streambank exhibited little to no riparian buffer. Many areas appeared to allow cattle to access the stream. CEC wants to bring the locations to the attention of the City due to the loss of habitat. These points are “Inadequate Buffer” points (Object IDs 1, 38 and 39) in the geodatabase provided. Refer to Figure 2.



*Photo 13 - Aerial View of Inadequate Buffers
(Red Lines Indicate Inadequate Buffer Locations)*



Photo 14 - View of the Inadequate Buffer



Photo 15 - View of the Inadequate Buffer



Photo 16 - View of the Inadequate Buffer where cattle access the stream

5) Residential Construction Areas

Near stream construction sites were present on both sides of the stream with multiple areas of concern. Some construction sites were observed to have inadequately maintained erosion control measures, and an inadequate buffer of approximately 2,843 LF was noted. An email was sent to the City on March 6, 2020, the same day that these points were collected, to expedite attention to the matter. These points are referenced as an “Inadequate Buffer” point (Object ID 37), “Pipe Outfall” point (Object IDs 127 and 131) and “In/Near Stream Construction” (Object ID 12, 13 and 14) point in the geodatabase provided. Refer to Figure 2.



*Photo 17 - Aerial View of the Near Stream Construction
(Red Line Indicates Inadequate Buffer Location, Red Dots Indicate Pipe Outfall
Locations, and Red Diamonds Indicate Near Stream Construction Locations)*



Photo 18 - View of the Inadequate Buffer (Object ID 37)



Photo 19 - View of Sedimentation at a Pipe Outfall



Photo 20 - View of Sedimentation at a Pipe Outfall near the Stream

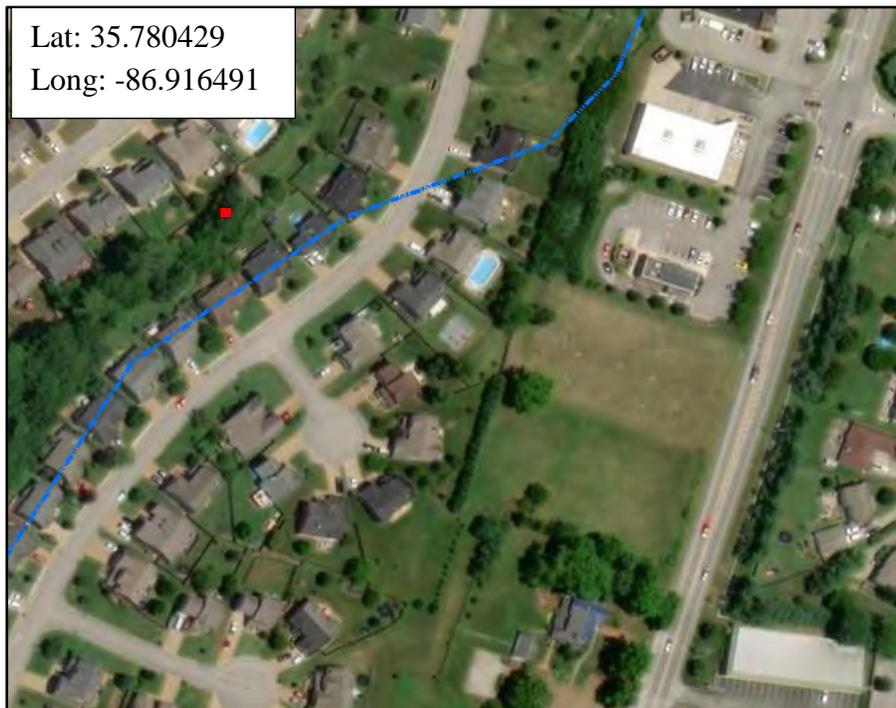


Photo 21 - View of Inadequately Maintained Erosion Control Measures

McCutcheon Creek

1) Channel Alteration near Williford Way

CEC personnel noted a channel alteration to the stream in the form of a berm with a reinforced concrete pipe (RCP) and rip rap. The outlet end of the RCP is sloughing above the headwall and rip rap has migrated downstream. The channel alteration appears to be causing streambank erosion downstream. This point is a “Channel Alteration” point (Object ID 12) in the geodatabase provided. Refer to Figure 3.



*Photo 22 - Aerial View of the Channel Alteration
(Red Square Indicates Alteration Location)*



Photo 23 - View of Channel Alteration (Object ID 12)



Photo 24 - View of Erosion Downstream of Channel Alteration (Object ID 12)

2) Erosion Site near Wilkes Lane

Streambank erosion was noted downstream of the previously mentioned channel alteration. The erosion site is approximately 100 LF on both the right and left streambanks with an average exposed bank height of six feet. This point is an “Erosion Site” point (Object ID 8) in the geodatabase provided. Refer to Figure 3.



*Photo 25 - Aerial View of the Erosion Site
(Red Triangle Indicates Erosion Location)*



Photo 26 - View of the Erosion Site (Object ID 8)



Photo 27 - View Downstream of the Erosion Site (Object ID 8)

3) Fish Barrier near Belshire Village Dr.

CEC personnel noted a fish barrier comprised of natural debris. The debris dam has resulted in a drop of approximately two feet. This point is a “Fish Barrier” point (Object ID 9) in the geodatabase provided. Refer to Figure 3.



*Photo 28 - Aerial View of the Fish Barrier
(Red Cross Indicates Barrier Location)*



Photo 29 - View of the Fish Barrier (Object ID 9)

4) Erosion Sites near Kedron Rd.

CEC personnel observed three erosion sites near Kedron Road. Each erosion site is approximately 150 LF with an average exposed bank height of 15 feet. The proximity of the erosion sites, the easy access and open, low-lying adjacent areas of this 0.25-mile stretch of McCutcheon Creek may serve as potential stream restoration and/or wetland mitigation sites. These points are “Erosion Site” points (Object ID 23, 24 and 25) and “Unusual Condition or Comment” (Object ID 97, 98 and 99) in the geodatabase provided. Refer to Figure 4.



*Photo 30 - Aerial View of Erosion Sites and Potential Mitigation Sites
(Red Triangles Indicate Erosion Locations and Red Question Marks Indicate Potential
Wetland Mitigation Sites)*



Photo 31 - View of Streambank Erosion



Photo 32 - View of Streambank Erosion



Photo 33 - View of Low-lying Area Adjacent to the Stream

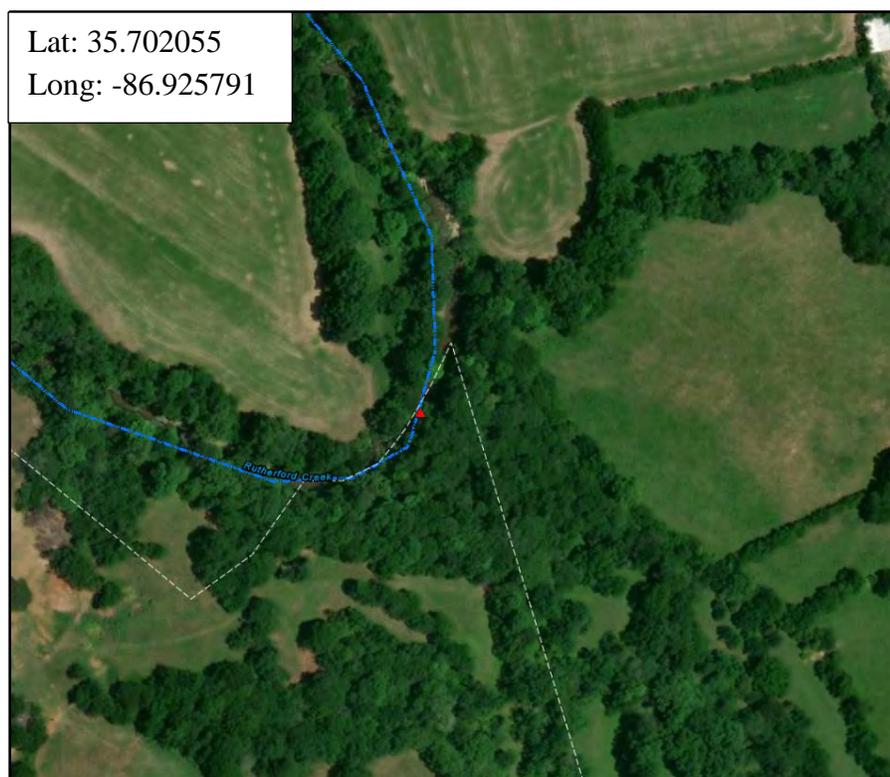


Photo 34 - View of a Low-lying Area Adjacent to the Stream

Rutherford Creek

1) Erosion Site

An erosion site of approximately 800 LF was noted on the left streambank. The average exposed bank height was 10 feet. Recent clearing activities were evident. CEC wants to bring the erosion site to the attention of the City as it appears that additional clearing and/or construction activities may be planned. This point is an “Erosion Site” point (Object ID 6) in the geodatabase provided. Refer to Figure 5.



*Photo 35 - Aerial View of Erosion Site
(Red Triangle Indicates Erosion Location)*



Photo 36 - View of a Low-lying Area Adjacent to the Stream (Object ID 6)

2) Inadequate Buffer

An inadequate buffer of approximately 1274 LF was observed by field personnel. The average buffer width on the left streambank was approximately 15 feet. An adjacent low-lying area along the narrow tree line was also observed. This location could be a potential wetland mitigation site. CEC wants to bring the inadequate buffer to the attention of the City as it appeared during the field survey that construction activities may be planned near this area. This point is an “Inadequate Buffer” point (Object ID 9) and an “Unusual Condition or Comment” (Object ID 29) point in the geodatabase provided. Refer to Figure 5.



*Photo 37 - Aerial View of Inadequate Buffer
(Red Line Indicates Inadequate Buffer Location and Red Question Mark indicates
Potential Wetland Mitigation Area)*



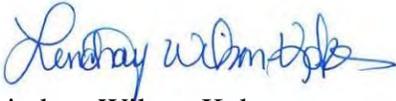
Photo 38 - View of the Inadequate Buffer and Adjacent Low-lying Area

Mr. Dugan – City of Spring Hill
CEC Project 194-523.0001
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May 20, 2020

CEC appreciates this opportunity to perform this VSA and provide this summary report. Please contact Lindsay Wilson-Kokes at 615-333-7797 or lwilsonkokes@cecinc.com if you should have any questions regarding this deliverable.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.



Lindsay Wilson-Kokes
Assistant Project Manager

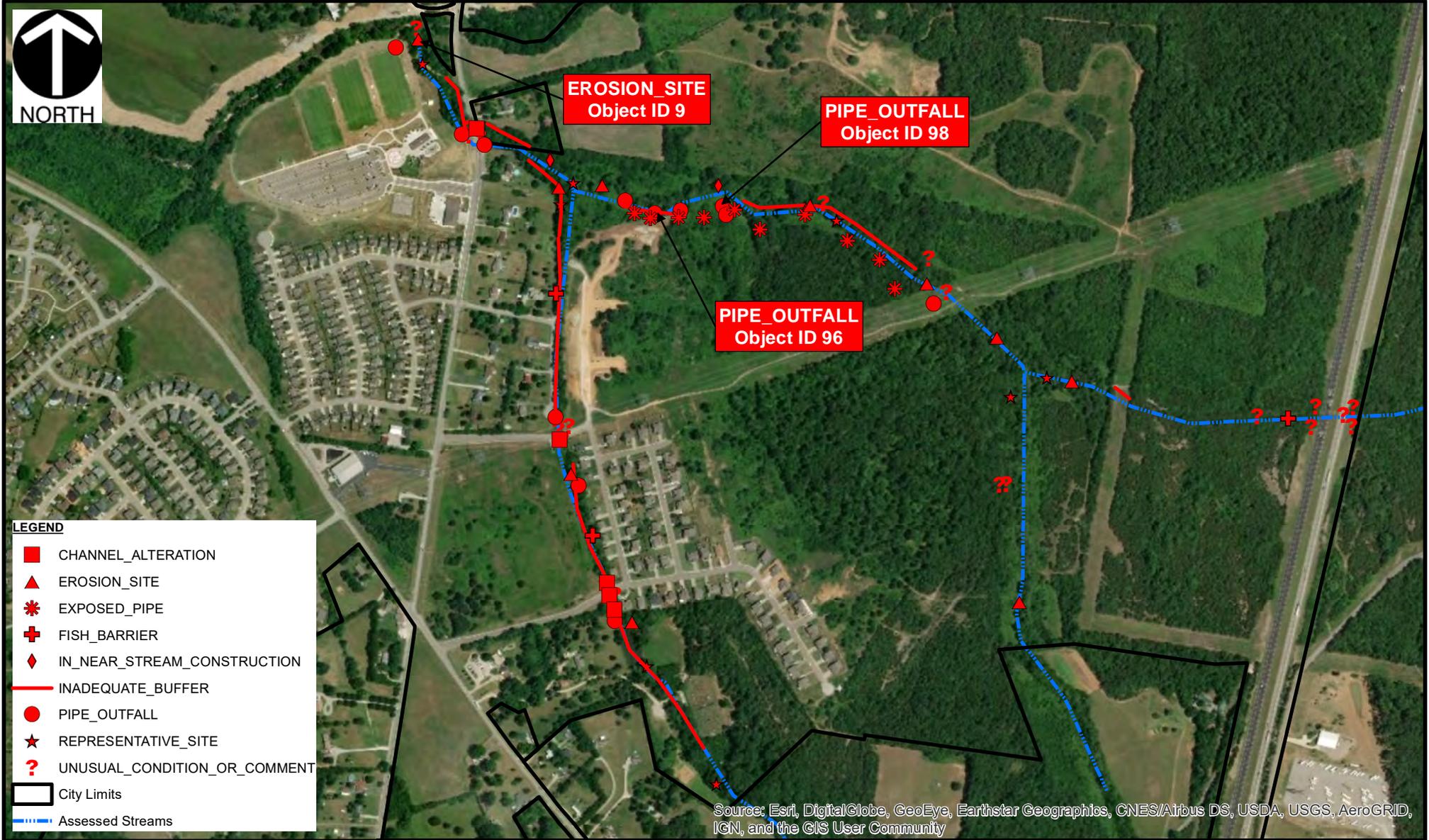


Steven E. Casey, P.E., CPESC
Senior Principal

Enclosures: Appendix A: Figures
Figure 1 – Crooked Creek
Figure 2 – Grassy Branch
Figures 3 and 4 – McCutcheon Creek
Figure 5 – Rutherford Creek
Appendix B: Maryland Department of Natural Resources' Stream Corridor
Assessment Survey Definitions
USB flash drive

APPENDIX A

FIGURES



LEGEND

- CHANNEL_ALTERATION
- ▲ EROSION_SITE
- ✱ EXPOSED_PIPE
- + FISH_BARRIER
- ◆ IN_NEAR_STREAM_CONSTRUCTION
- INADEQUATE_BUFFER
- PIPE_OUTFALL
- ★ REPRESENTATIVE_SITE
- ? UNUSUAL_CONDITION_OR_COMMENT
- City Limits
- Assessed Streams

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

REFERENCE

• BING IMAGERY
 MICROSOFT VIRTUAL EARTH / BING IMAGERY
 PROVIDED BY ESRI, ACCESSED 5/17/2020

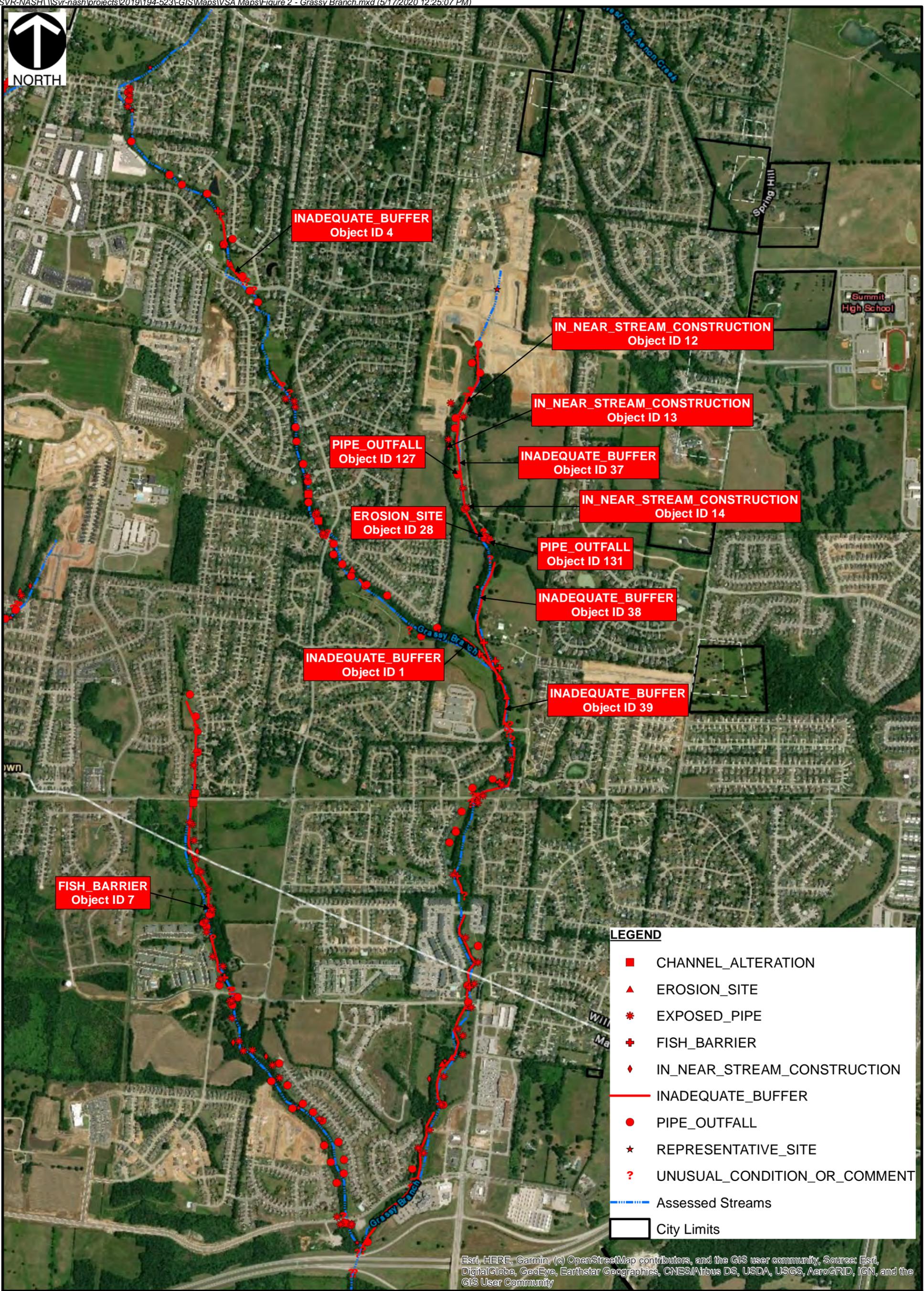


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AREAS OF CONCERN
 VISUAL STREAM ASSESSMENT
 CITY OF SPRING HILL
 MAURY AND WILLIAMSON COUNTIES, TN

CROOKED CREEK

DRAWN BY:	LWK	CHECKED BY:	TJN	APPROVED BY:	SEC	FIGURE NO:	1
DATE:	5/17/2020	SCALE:	1" = 750'	PROJECT NO:	194-523.0001		



LEGEND

- CHANNEL_ALTERATION
- ▲ EROSION_SITE
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- ? UNUSUAL_CONDITION_OR_COMMENT
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Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

REFERENCE
 USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE:
 HTTP://GOTO.ARCGISONLINE.COM/MAPS/
 USA_TOPO_MAPS, ACCESSED 5/17/2020

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DRAWN BY:	LWK	CHECKED BY:	TJN
DATE:	5/17/2020	SCALE:	1" = 1,250'

AREAS OF CONCERN
 VISUAL STREAM ASSESSMENT
 CITY OF SPRING HILL
 MAURY AND WILLIAMSON COUNTIES, TN

GRASSY BRANCH

APPROVED BY:	SEC	FIGURE NO:
PROJECT NO:	194-523.0001	2



LEGEND

- CHANNEL ALTERATION
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- ★ REPRESENTATIVE_SITE
- ⬠ TRASH_DUMPING
- ? UNUSUAL_CONDITION_OR_COMMENT
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- ▭ City Limits

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DATE:	5/17/2020	SCALE:	1" = 833'

AREAS OF CONCERN
 VISUAL STREAM ASSESSMENT
 CITY OF SPRING HILL
 MAURY AND WILLIAMSON COUNTIES, TN

McCutcheon Creek

APPROVED BY:	SEC	FIGURE NO:	3
PROJECT NO:	194-523.0001		



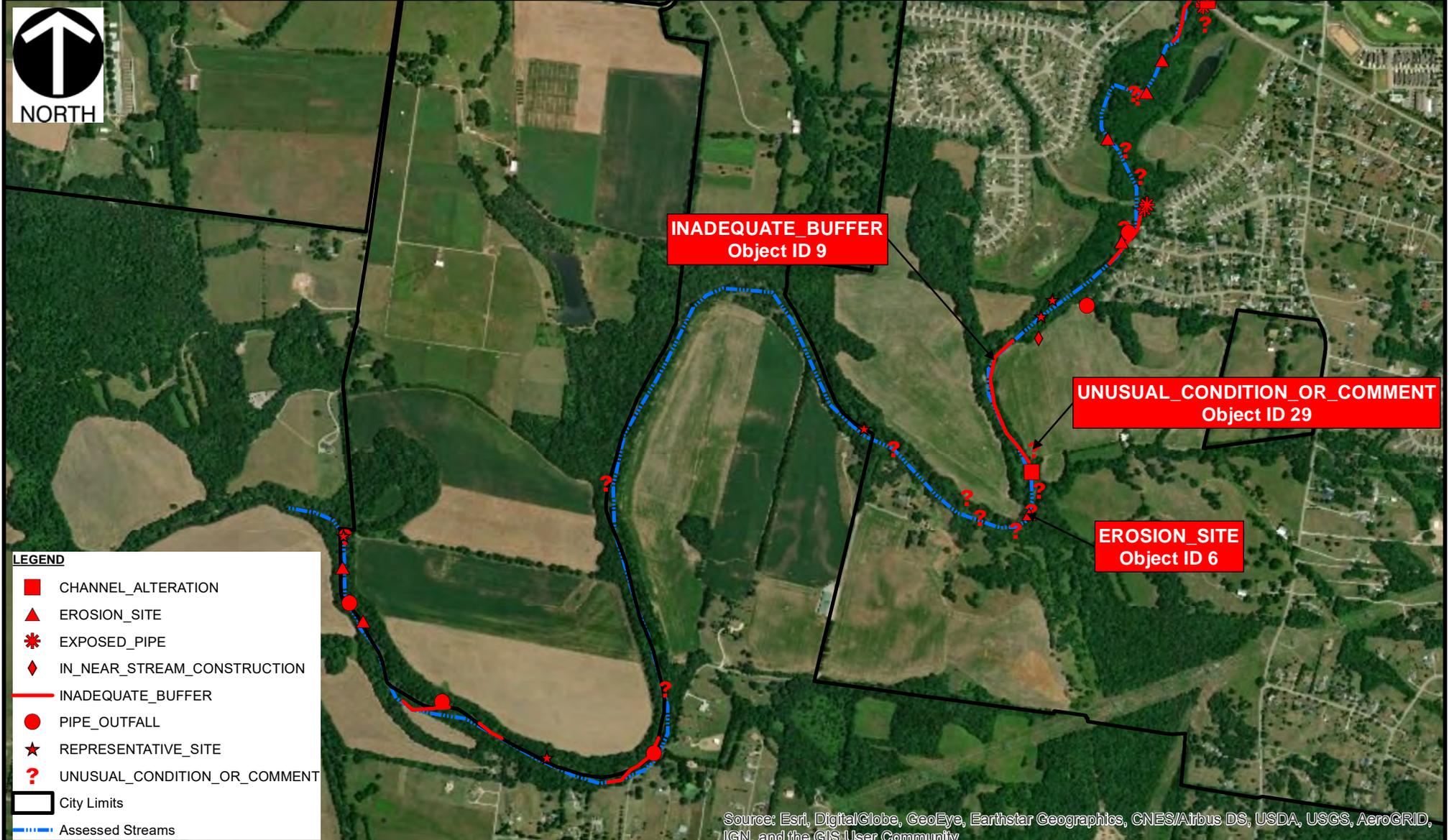
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<p>REFERENCE</p> <p>USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE: HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS, ACCESSED 5/17/2020</p>	 Civil & Environmental Consultants, Inc. 117 Seaboard Lane, Suite E100 Franklin, Tennessee 37067 615-333-7797 • 800-763-2326 www.cecinc.com	AREAS OF CONCERN VISUAL STREAM ASSESSMENT CITY OF SPRING HILL MAURY AND WILLIAMSON COUNTIES, TN McCutcheon Creek											
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">DRAWN BY:</td> <td style="width: 25%;">LWK</td> <td style="width: 25%;">CHECKED BY:</td> <td style="width: 25%;">TJN</td> </tr> <tr> <td>DATE:</td> <td>5/17/2020</td> <td>SCALE:</td> <td>1" = 917'</td> </tr> </table>	DRAWN BY:	LWK	CHECKED BY:	TJN	DATE:	5/17/2020	SCALE:	1" = 917'	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">APPROVED BY:</td> <td style="width: 50%;">SEC</td> </tr> <tr> <td>PROJECT NO:</td> <td>194-523.0001</td> </tr> </table>	APPROVED BY:	SEC	PROJECT NO:
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PROJECT NO:	194-523.0001												
		FIGURE NO: 4											



LEGEND

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AREAS OF CONCERN
 VISUAL STREAM ASSESSMENT
 CITY OF SPRING HILL
 MAURY AND WILLIAMSON COUNTIES, TN

RUTHERFORD CREEK

DRAWN BY:	LWK	CHECKED BY:	TJN	APPROVED BY:	SEC	FIGURE NO:	5
DATE:	5/20/2020	SCALE:	1" = 1,250'	PROJECT NO:	194-523.0001		

APPENDIX B

MARYLAND DEPARTMENT OF NATURAL RESOURCES' STREAM CORRIDOR
ASSESSMENT SURVEY DEFINITIONS

MARYLAND DEPARTMENT OF NATURAL RESOURCES' STREAM CORRIDOR ASSESSMENT SURVEY DEFINITIONS¹

1. *Channel Alteration:* Channelization refers to the once common practice of dredging, straightening, and/or widening stream channels in an attempt to reduce flooding or to lower ground water table. Survey teams should look not only for stream reaches that are in concrete channels but for any areas where the stream has been significantly altered. A good indication of this is an unusually straight stream channel for a fairly long stretch. Channel alteration does not include road crossing unless a significant amount of stream channelization has occurred either upstream of downstream of the road crossing.
2. *Erosion Site:* Erosion is a natural process and necessary to maintain good aquatic habitat in a stream. Too much erosion, however, can have the opposite effect, destabilizing stream banks, destroying in-stream habitat and causing significant sediment pollution problems downstream. Severe erosion problems occur when either a stream's hydrology and/or sediment supply have been significantly altered. When conducting the SCA survey, you are primarily interested in identifying unstable stream reaches that are experiencing a significant amount of erosion along the stream's banks.
3. *Exposed Pipes:* Exposed pipes are any pipes that are either in the stream or along the stream's immediate banks that could be damaged by a high flow event. It does not include pipe outfalls where only the open end of the pipe is exposed. Exposed pipes do include: 1) manhole stacks in or along the stream's banks; 2) pipes that are exposed along the stream's banks; 3) pipes that run under the stream's bed and have been exposed by stream down-cutting; and 4) pipes that are built over a stream but are low enough that they could be affected by occasional high storm flows. Pipes that are placed along the support beams of a bridge or suspended high enough above the stream to not be affected by very large storm events should not be included in this survey unless they are leaking.
4. *Pipe Outfalls:* Pipe outfalls include any pipes or small manmade channels that discharge into the stream through the stream corridor. Pipe outfalls are considered a potential environmental problem in the survey because they can carry uncontrolled runoff and pollutants such as oil, heavy metals, and nutrients to a stream system. Any pipes or manmade channels that are designed to discharge into the stream are considered pipe outfalls and must be included in the survey. This includes pipes with openings outside of the immediate stream corridor, but which discharge into a channel which eventually enters the stream.
5. *Fish Barrier:* Fish migration barriers are anything in the stream that significantly interferes with the upstream movement of fish. Unimpeded upstream movement is important for resident fish species, many of which also move both up and down stream during different parts of their life cycle. Fish blockages can be caused by man-made structures such as dams or road culverts, and by natural features such as waterfalls or beaver dams.
6. *Inadequate Buffer:* Forested stream buffers are very important for maintaining healthy streams. Forest buffers help shade the stream, preventing excessive solar heating, and the

roots stabilize the stream banks. Forest buffers remove nutrients, sediment and other pollutants from runoff, while the leaves of trees are a major component of the stream's food web. Because of the importance of stream buffers, not only in maintaining healthy streams, but also in reducing nutrient loading to the stream. For the purpose of this study, a buffer is generally considered inadequate if it is less than 50 feet wide from the edge of the stream.

7. *In/Near Stream Construction:* In or near stream construction data sheets are used to document the locations of major disturbances located in or near the stream corridor at the time of the survey. If construction is seen in or near the stream, indicate the location on the survey map and look at the general condition of the stream near and downstream of the construction site. Survey teams should be on alert for evidence of inadequate sediment control measures or if sediment pollution from the site has affected the stream.
8. *Trash Dumping:* The trash dumping data sheets are used to record the location of places where large amounts of trash have been dumped inside the stream corridor or to note places where trash tends to accumulate. The main purpose of identifying where trash is being dumped in or near the stream is so that steps can be taken to limit access to these areas by vehicles if possible. A second reason for noting trash dumping sites is to assist community volunteer groups looking for possible sites to do stream clean-ups.
9. *Unusual Condition or Comment:* The unusual condition or comment data sheets are used by survey teams to record the location of anything out of the ordinary or to provide some additional written comments on a specific problem.
10. *Representative Site:* Representative site data sheets are used to document the general condition of both in-stream habitat and the condition of the adjacent stream corridor.

Reference:

1: "Stream Corridor Assessment Survey: SCA Survey Protocols." Watershed Restoration Division & Coastal Watershed Services, Maryland Dept. of Natural Resources.