FINAL
YEAR 5 (2020) ANNUAL MONITORING REPORT

NEIGHBORS BRANCH/WALTON CRAWLEY BRANCH STREAM & WETLAND RESTORATION SITE

NCDMS Project No. 92872
Contract No. D09023S
USACE Action ID No. SAW-2009-917 & NCDWR Project No. 10-0122
SCO No. 08-07308-01
McDowell County, North Carolina

Data Collection: May-November 2020
Submission: January 2021

PREPARED FOR:

N.C. DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1601 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1601

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PREPARED BY:

AXIOM ENVIRONMENTAL, INC.
218 SNOW AVENUE
RALEIGH, NORTH CAROLINA 27603

Axiom Environmental, Inc.

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, NC 27603 919-215-1693

January 19, 2021

Mr. Matthew Reid
North Carolina Department of Environmental Quality
Division of Mitigation Services
5 Ravenscroft Drive, #102
Asheville, North Carolina 28801

RE: Neighbors Branch/Walton Crawley Branch Monitoring (DMS Project # 92872, Contract # D09023S)
Final Year 5 (2020) Annual Monitoring Report **12-004.21**

Dear Matthew:

Axiom Environmental, Inc. (AXE) is pleased to provide you with one hard copy and one cd of electronic files for the Final Neighbors Branch/Walton Crawley Branch Year 5 (2020) Annual Monitoring Report. We received your comments via email on January 15, 2021 and have addressed them as follows.

- Table 1: Please update the Length and Area Summations section of the table to reflect the official assets associated with the project. Neighbors Branch/Walton Crawley will be presented for closeout in 2021, and the official credits on the site are 3,953.667 SMUs and 1.588 WMUs.
  Table 1 was updated to reflect the official project assets.

- Table 2: Please add the following activities and dates to table:
  - In order to capture the amount of invasive work conducted on the site, please update the August 2019 entry to: Aug/Sep/Nov/Dec 2019.
  - Please add another Invasive Treatment entry for 2020: Apr/Jun 2020

  The 2019 invasive species treatment entry was edited to show Aug/Sep/Nov/Dec 2019, and a 2020 invasive species treatment entry was added to the table.

- Figure E1: The legend has * symbols next to the years. Are there notes associated with the * that should be included with the table? Please update or remove as necessary.
  *The * symbols correspond with data citations that didn't print for the draft submittal. The citations have been re-added to the figure.*

- CCPV: Thank you for providing updated invasive polygons on the CCPV. DMS will direct the invasive contractor to these areas before the project closes out.
  No problem, keep us posted regarding pre-closeout invasive treatments.

Digital Files Review

- It appears that there are 2 encroachment features in the digital submission, but only one is displayed on Fig 2B. Please include this encroachment on the CCPV and discuss briefly in report, or remove the encroachment feature from the digital submission if it is not relevant.
  The irrelevant encroachment area was removed from the shapefile.

Please let us know if you have any questions or comments regarding any component of this submittal. Thank you for the opportunity to continue to assist the Division of Mitigation Services with this important project.

Sincerely,
AXIOM ENVIRONMENTAL, INC.

Kenan R. Jernigan
Project Scientist

Attachments: 1 hard copy Year 5 (2020) Neighbors Branch/Walton Crawley Branch Annual Monitoring Report
1 CD containing digital support files

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APPENDICES

1.0 PROJECT SUMMARY

The North Carolina Division of Mitigation Services (NCDMS) has established the Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site (Site). The primary goals of the project focused on improving water quality and long term stability by reducing nutrient loading from the on-site cattle and horse operation, reducing excess sedimentation input from Site channel banks and contributing non-jurisdictional tributaries/drainages, reducing excess sedimentation from Site access roads and deteriorated crossings, increasing the attenuation of floodwater flows, reintroducing natural watershed flows to Walton Crawley Branch by removing a pond and restoring the channel through its natural valley, and restoring and enhancing aquatic and riparian habitat. Long term stability will be evidenced by channels maintaining stable inverts and banks over an extended period of time.

These goals were accomplished through the following objectives.

- Reduce point (i.e. cattle/horses directly accessing the channel) and non-point source (i.e. stormwater runoff through pastures) pollution associated with an on-site cattle and horse operation by installing exclusionary fencing along the stream and riparian buffer, and by providing a vegetative buffer on stream banks and adjacent floodplains to treat nutrient enriched surface runoff from adjacent pastureland.
- Stabilize degraded portions of on-site streams, eroding ephemeral/stormwater channels, and existing maintained dirt roads to reduce sediment inputs. Stabilization methods included:
    - Restoring a stable dimension, pattern, and profile to selected sections of channels to ensure the channel will transport and attenuate watershed flows and sediment loads without aggrading or degrading.
    - Stabilize selected channel banks by excavating bankfull benches, placing stream structures to reduce shearing forces on outside meander bends, and planting native vegetative species to provide soil stability.
    - Stabilize ephemeral/stormwater channels by planting native vegetation along eroded banks and floodplain and constructing stabilization weirs through the channel valley to lower facet slopes and decrease erosion.
    - Place gravel along existing degraded soil roads that are situated adjacent to Site streams.
- Reintroduce natural watershed flows to Walton Crawley Branch by restoring the channel through the low point of the natural valley and removing a dam that impedes natural down valley flows.
- Improve aquatic habitat by enhancing stream bed variability, providing shading/covered areas within the stream channel, and introducing woody debris in the form of rootwads, log vanes, and log sills.
- Enhance fish passage within Neighbors Branch and Walton Crawley Creek. This was accomplished by eliminating a pond and restoring the stream through the natural valley and by restoring Neighbors Branch and replacing an existing perched culvert to allow fish passage upstream.
- Enhance riparian wildlife habitat by:
    - Fencing cattle out of existing wetlands and planting impacted wetlands with native vegetative species. Wetlands were also restored by raising Site stream inverts to allow groundwater tables to rise throughout the affected valleys.
    - Fencing livestock out of existing and restored riparian buffers as well as installing alternative watering devices that will ensure livestock have sufficient watering areas. This is detailed further in the Farm Management Plans completed for the Site by NCDMS.
    - Vegetating the existing fescue dominated riparian buffers with native trees, shrubs, herbs, and grasses. Forest vegetation species were selected by studying a Reference Forest Ecosystem located on-site and reviewing Montane Alluvial Forest species listed in

Classification of the Natural Communities of North Carolina: Third Approximation (Schafale and Weakley 1990).

- Creating wildlife corridors through agricultural lands which have significantly dissected the landscape. The corridors will provide connectivity to a diversity of habitats including mature forest, early successional forest, stream-side forest, riparian wetlands, and uplands.

The Site is located approximately six miles southeast of the town of Marion (Figure 1, Appendix B). The Site is situated due southwest of the intersection of Deer Park Road and Harmony Grove Road in McDowell County, North Carolina and is located within the United States Geological Survey (USGS) Hydrologic Unit and Targeted Local Watershed 03050101040010 (North Carolina Division of Water Quality Subbasin 03-08-30) of the Catawba River Basin and will service USGS 8-digit Cataloging Unit 03050101.

The contributing watersheds are characterized primarily by forest land (approximately 84 percent of the total area) with pasture at the lower elevations (approximately 10 percent of the total area) and low-density residential development scattered along the outer fringes of the watershed. Impervious surfaces appear to account for approximately one percent of the watershed land surface. Prior to Site construction, riparian vegetation had been removed, stream channels were manipulated, and hoof shear from livestock on stream banks and floodplain soils was responsible for degraded water quality and unstable channel characteristics (stream entrenchment, erosion, and bank collapse).

Project mitigation efforts resulted in the following:

- Restore 2456 linear feet of Site streams
- Enhance (Level I) 202 linear feet of Site streams
- Enhance (Level II) 1863 linear feet of Site streams
- Preserve 3139 linear feet of Site streams
- Restore 0.52 acre of existing hydric soils to riparian wetlands
- Enhance 1.62 acres of riparian wetlands
- Preserve 1.29 acres of riparian wetlands

The Muddy Creek Restoration Partnership (Partnership) was formed in 1998 to address impacts to the Muddy Creek Watershed. The Partnership completed the *Muddy Creek Watershed Restoration Initiative Feasibility Report and Restoration Plan* (Watershed Plan) for the Muddy Creek Watershed in December of 2003 (MCRP 2003). Since 2004 NCDMS has informally participated in the Partnership by implementing priority projects named by the partnership and adopted the 2003 report as part of its Local Watershed Plan (LWP). The NCDMS's *Upper Catawba River Basin Restoration Priorities* (2009) identifies North Muddy Creek as a Targeted Local Watershed (TLW). The Site is located within the North Muddy Creek Watershed. In 2008 NCDMS contracted with a consulting firm to conduct outreach programs with landowners and identify additional project sites in the Muddy Creek Watershed.

The primary goals identified by the Partnership's Watershed Plan include the following.

1. Restore the Watershed to its Full Intended Use
2. Restore Riparian Buffers
3. Enhance Open Space Preservation
4. Improve Water Quality
5. Restore Physical Habitat
6. Establish a Trout Fishery

The Watershed Plan listed the following components of watershed restoration to be expected:

1. Natural Channel Design Stream Restoration
2. Riparian Reforestation
3. Livestock Exclusion
4. Riparian Forest Preservation

These four components were included within the *Neighbors Branch/Walton Crawley Branch Site Mitigation Plan* (NCDMS 2013). The project restored the watershed to its full intended use by restoring a stream, floodplain, and riparian wetland ecosystem through stream and wetland restoration, enhancement, and preservation. The project restored riparian buffers through revegetation of buffer zones with native riparian and wetland species along all Site streams. The project enhanced open space preservation by placing Site streams, wetlands, and their buffers into a permanent conservation easement. The overall Site helps improve water quality by reducing sedimentation in on-Site streams and planted a vegetated riparian buffer that filters nutrients from adjacent pasturelands. Additionally, exclusionary fencing and alternate watering devices removed livestock from accessing on-site channels and riparian buffers. The project restored and enhanced physical habitat for both aquatic and terrestrial species by planting native vegetation along stream banks and riparian buffers, creating wildlife corridors through a dissected landscape, and restoring bedform variability to Site streams. The stabilization of streams and buffers in the project area enhanced water quality in downstream receiving waters, which should help in the re-establishment of the watershed's ability to host trout and enhance their ability to propagate.

Site design was completed on March 7, 2013. Site construction and planting were completed in December 2015. Completed project activities, reporting history, completion dates, project contacts, and project attributes are summarized in Tables 1-4 (Appendix A).

Stream Success Criteria: Success criteria for stream restoration will include 1) successful classification of the reach as a functioning stream system (Rosgen 1996) and 2) channel variables indicative of a stable stream system.

Collected data will be utilized to determine the success in restoring stream channel stability. Specifically, the width-to-depth ratio and bank-height ratios should be indicative of a stable or moderately unstable channel with minimal changes in cross-sectional area, channel width, and/or bank erosion along the monitoring reach. In addition, channel abandonment and/or shoot cutoffs must not occur and sinuosity values must remain relatively constant. Visual assessment of instream structures will be conducted to determine if failure has occurred. Failure of a structure may be indicated by collapse of the structure, undermining of the structure, abandonment of the channel around the structure, and/or stream flow beneath the structure.

Stream Dimension: General maintenance of a stable cross-section and hydrologic access to the floodplain features over the course of the monitoring period will generally represent success in dimensional stability. Some changes in dimension (such as lowering of bankfull width) should be expected. Riffle cross-sections should generally maintain a bank-height ratio approaching 1.0, with some variation in this ratio naturally occurring. Pool cross-sections naturally adjust based on recent flows and time between flows, therefore more leeway on pool cross-section geometry is expected.

Stream Pattern and Profile: The profile should not demonstrate significant trends towards degradation or aggradation over a significant portion of a reach. Additionally, bed form variables should remain noticeably intact and consistent with original design parameters that were based off

of reference conditions. Pattern features should show little adjustment over the standard 5-year monitoring period and will be monitored to ensure adjustment is minor prior to close out.

Substrate: Substrate measurements should indicate the progression towards or the maintenance of the known distributions from the design phase.

Sediment Transport: There should be an absence of any significant trend in the aggradational or depositional potential of the channel.

Hydraulics: A minimum of two bankfull events must be documented within the standard 5-year monitoring period. The two bankfull events shall occur within separate years.

Vegetation Success Criteria: Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria are dependent upon the density and growth of characteristic forest species. An average density of 320 stems per acre of planted stems must be surviving in the first three monitoring years. Subsequently, 290 planted stems per acre must be surviving in year 4, and 260 planted stems per acre in year 5.

Wetland Hydrology Success Criteria: Target hydrological characteristics include saturation or inundation for 5 to 12.5 percent of the growing season, during average climatic conditions. During growing seasons with atypical climatic conditions, groundwater gauges in reference wetlands may dictate threshold hydrology success criteria (75 percent of reference). These areas are expected to support hydrophytic vegetation. If wetland parameters are marginal as indicated by vegetation and/or hydrology monitoring, a jurisdictional determination will be performed.

2.0 METHODS

Monitoring of restoration efforts will be performed for five years, or until success criteria are fulfilled. Monitoring is proposed for the stream channel, vegetation, and wetland hydrology. In general, the restoration success criteria, and required remediation actions, are based on the *Stream Mitigation Guidelines* (USACE et al. 2003). Monitoring features are described below and are depicted on Figures 2A-B (Appendix B).

Streams

The restored stream reaches are proposed to be monitored for geometric activity as follows.

- 1750 linear feet of stream profile
- 5 riffle cross-sections
- 3 pool cross-section

The data will be presented in graphic and tabular format. Data to be presented will include 1) cross-sectional area, 2) bankfull width, 3) average depth, 4) maximum depth, 5) width-to-depth ratio, 6) meander wavelength, 7) belt-width, 8) water surface slope, and 9) sinuosity. Substrate analysis will be evaluated through pebble counts at five cross sections and data presented as a D50 for stream classification and tracking purposes. The stream will subsequently be classified according to stream geometry and substrate (Rosgen 1996). Significant changes in channel morphology will be tracked and reported by comparing data in each successive monitoring year. Annual photographs will include 43 fixed station photographs (Appendix B). In addition, the Site contains two stream crest gauges to assist with documentation of

bankfull events. Two bankfull events were documented during monitoring year 5 (2020) making a total of at least eight bankfull events occurring in five separate monitoring years (Table 12, Appendix E).

Early in year 1 (2016), several structures were damaged by significant storm events that occurred shortly after Site construction. Warranty repair work was completed in October 2016 to address these issues. The repaired structures remained stable during year 5 (2020). One stream area of concern remained during year 5 (2020) monitoring. The header of a drop structure at the bottom of a series of structures on UT-1 to Neighbors Branch (approximately 11+15) has failed, causing serious degradation in the accompanying pool and downstream riffle (Area of Concern #1, Figure 2A, Appendix B). The down-cutting is a threat to the integrity of the rock structure above the pool. Overall site streams were exhibiting stability and no areas of additional instability were observed.

In March 2019, DMS developed implemented an adaptive management plan and repaired several areas of concern that were identified in the MY3 report. The work included removing debris that was dumped in the easement near the downstream end of Walton Crawley Branch and around two culverted crossings outside the easement. A log J-hook structure at approximately sta: 21+35 on Walton Crawley Branch was repaired by hand. The material behind the vane arm had scoured out during a high flow event and this material was replaced by hand. The final repair consisted of stabilizing a log J-hook structure near sta: 26+65 on Walton Crawley Branch and repairing approximately 20 feet of adjacent stream bank erosion. The eroding banks were upstream of the structure and were damaged during a high flow event. If these banks were not repaired, the log J-hook would have likely failed in the future. The banks were regraded, matted and live staked. During the stream bank repairs, the log J-hook structure was stabilized by adding additional rock and ensuring the footer and header logs were intact. The repairs that occurred in March 2019 have been successful and remain stable through year 5 (2020).

Vegetation

Restoration monitoring procedures for vegetation will monitor plant survival and species diversity. Planted areas within the Site include approximately 12.3 acres. After planting of the area was completed, eight vegetation plots were installed and monitored at the Site; annual monitoring results can be found in Appendix C. Annual measurements of vegetation will consist of 8 CVS vegetation plots.

A photographic record of plant growth should be included in each annual monitoring report; current monitoring photographs are included in Appendix B. During the first year, vegetation will receive a cursory, visual evaluation on a periodic basis to ascertain the degree of overtopping of planted elements by nuisance species. Subsequently, quantitative sampling of vegetation will be performed as outlined in the *CVS-EEP Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008) in September of the first monitoring year and annually between June 1 and September 30 for the remainder of the monitoring period until vegetation success criteria are achieved.

Year 5 stem count measurements indicate planted stem densities are well-above the required 260 stems per acre. Planted stem density across the Site is 435 planted stems per acre (excluding livestakes) (Table 9, Appendix C). In addition, all eight individual CVS plots met success criteria based on planted stems alone. Therefore, the Site is currently meeting vegetation success criteria.

Several dense populations of Chinese privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*) were observed along Neighbors Branch, Walton Crawley Branch, and UT-2 to Walton-Crawley Branch (Figures 2A-B, Appendix B). NCDMS currently has implemented an invasive management plan and is under contract through closeout. During the last site visit invasive treatment areas were closely inspected. Treatments throughout the site have been extremely successful, and populations of invasive species have

been reduced significantly.

Several areas of compromised easement integrity were observed during year 5 (2020). The fence on the northeast side of the crossing over UT-2 to Neighbors Brach has been compromised by large amounts of sediment during several high flow events. DMS has been working with the landowner to repair the downed fence, and some repairs have been made; however, the overall integrity of the fence remains compromised. Additionally, the footpath and foot-bridge identified in MY3 that extends through the conservation easement just north of UT-1 remains. DMS and DEQ Stewardship worked with the landowner to limit the width of the path to a minimum cutting for foot traffic only. Based on visual observations and photo-documentation, the foot path has remained the same width with no additional vegetation disturbed. These areas are depicted on Figures 2A-B (Appendix B).

Wetland Hydrology

Two groundwater monitoring gauges were installed to take measurements after hydrological modifications were performed at the Site. Hydrological sampling will occur during the growing season (March 26 to November 5). Approximate locations of gauges are depicted on Figure 2A (Appendix B) and hydrology data can be found in Appendix E.

Both gauges were saturated or inundated for the entire 2020 growing season. Wetland hydrology is currently meeting success criteria.

3.0 REFERENCES

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

Muddy Creek Restoration Partners (MCRP), 2003. Feasibility Report and Restoration Plan for the Muddy Creek Watershed.

NOAA Regional Climate Centers (NRCC). 2020. AgACIS Station MARION, NC. Available: http://agacis.rcc-acis.org/?fips=37111 [November 17, 2020]. Applied Climate Information System (ACIS).

North Carolina Division of Mitigation Services (NCDMS). 2013. Neighbor Branch/Walton Crawley Branch Stream and Wetland Mitigation Site Mitigation Plan. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.

North Carolina Ecosystem Enhancement Program (NCEEP). 2009. Upper Catawba River Basin Restoration Priorities 2009 (online). Available: http://www.nceep.net/services/restplans/Upper_Catawba_RBRP_2009.pdf [March 12, 2009]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.

Rosgen D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.

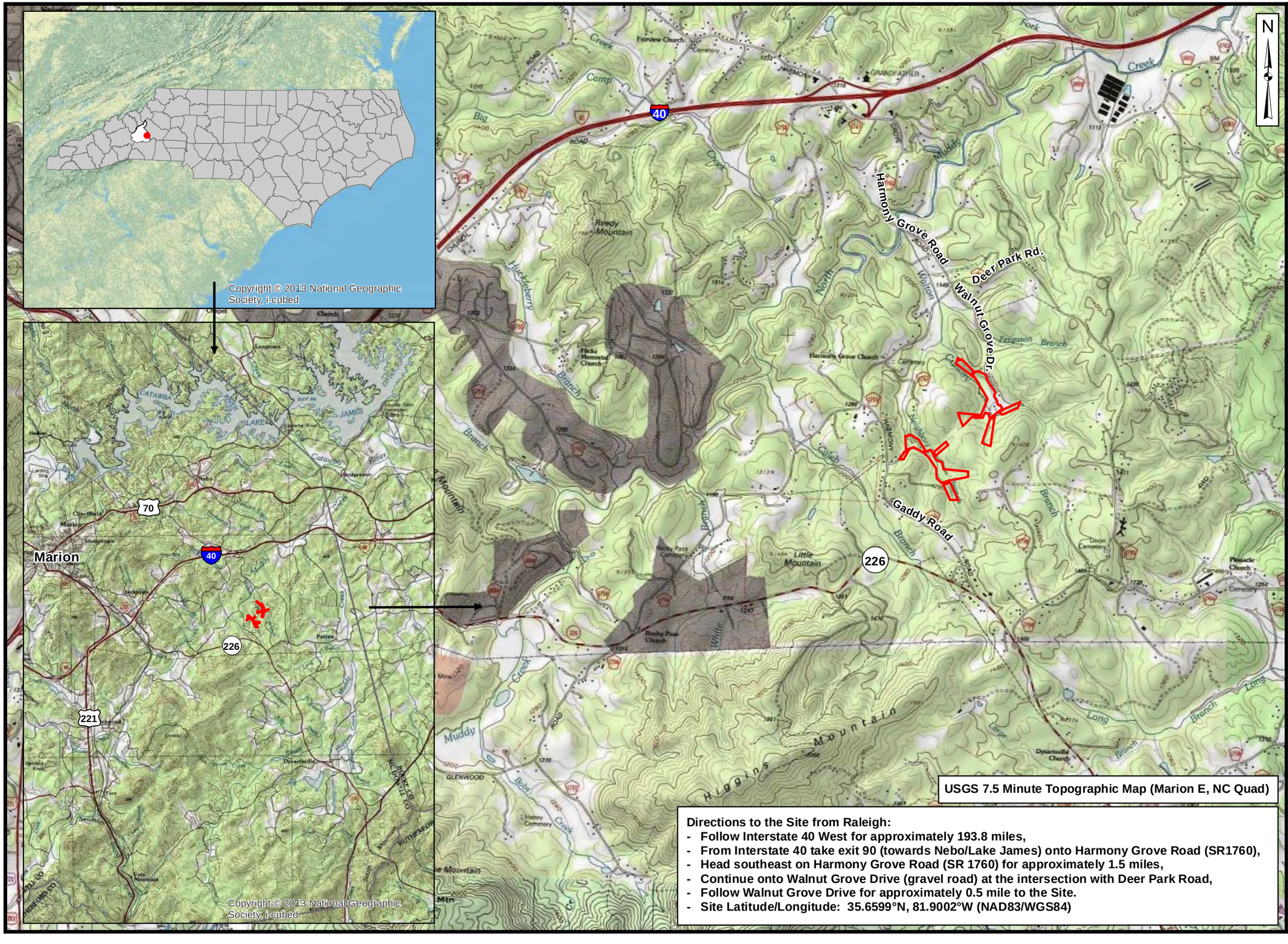
United States Army Corps of Engineers (USACE), United States Environmental Protection Agency (USEPA), North Carolina Wildlife Resources Commission (NCWRC), Natural Resources Conservation Service (NRCS), and North Carolina Division of Water Quality (NCDWQ). 2003. Stream Mitigation Guidelines. State of North Carolina.

Weather Underground. 2017. Station KFQD at Bostic, North Carolina (online). Available: www.wunderground.com/history/airport/KFQD/ [November 28, 2017]. Weather Underground.

Weather Underground. 2018. Station KEHO at Shelby, North Carolina (online). Available: https://www.wunderground.com/history/monthly/us/nc/shelby/KEHO/date/2018-10 [November 8, 2018]. Weather Underground.

Appendix A.
Site Location Map and Background Tables

Figure 1. Site Location
Table 1. Project Mitigation Components
Table 2. Project Activity and Reporting History
Table 3. Project Contacts Table
Table 4. Project Attributes Table



USGS 7.5 Minute Topographic Map (Marion E, NC Quad)

Directions to the Site from Raleigh:

- Follow Interstate 40 West for approximately 193.8 miles,
- From Interstate 40 take exit 90 (towards Nebo/Lake James) onto Harmony Grove Road (SR1760),
- Head southeast on Harmony Grove Road (SR 1760) for approximately 1.5 miles,
- Continue onto Walnut Grove Drive (gravel road) at the intersection with Deer Park Road,
- Follow Walnut Grove Drive for approximately 0.5 mile to the Site.
- Site Latitude/Longitude: 35.6599°N, 81.9002°W (NAD83/WGS84)

Axiom Environmental, Inc.

Prepared for:

NC Department of Environmental Quality

Division of Mitigation Services

Project:

Neighbors Branch/ Walton Crawley Branch Stream and Wetland Restoration Site

DMS Project # 92872

McDowell County, NC

Title:

Site Location

Drawn by: KRJ

Date: JUN 2016

Scale: 1:30000

Project No.: 12-004.21

FIGURE

1

Table 1. Project Components and Mitigation Credits

Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site/ DMS Number 92872

Mitigation Credit Summations					
Stream	**Riparian Wetland**	**Nonriparian Wetland**	**Buffer**	**Nitrogen Offset**	**Phosphorous Offset**
3953.667	**1.588**	**---**	**---**	**---**	**---**

Projects Components							
Project Component –or-Reach ID	**Stationing**	**Existing Footage or Acreage**	**Restoration Footage or Acreage**	**Restoration Level/Equivalent**	**Mitigation Ratio**	**Mitigation Credits**	**Comment**
Walton Crawley	15+40 – 27+36 (09+37 – 21+68)	2498	1196 1231-35 = 1196	Restoration (PI)	1:1	1186	Channel returned to natural valley. The easement break at the road crossing has been removed from credit summation. A 20 foot reach lies within a powerline ROW and will receive half credit. Removed 35 feet from credit calculations for road crossing.
Walton Crawley	29+11 – 29+23		12	Enhance I	1.5:1	8	Bank grading and stabilization.
Walton Crawley	27+36 – 29+11 29+23 – 29+90		242	Enhance II	2.5:1	97	Fence cattle out of easement area and remove invasive plants. The easement break at 29+90 has been removed from credit summation.
Walton Crawley	10+00 – 15+40 29+90 – 35+01		1051	Preservation	5:1	210	The easement break has been removed from credit summation.
UT 1 Walton Crawley As-built Plan Stationing	18+13 – 20+01 (10+00 – 11+88)	872	188 188	Restoration (PI)	1:1	188	Restore channel through existing pond and reconnect to Walton Crawley.
UT 1 Walton Crawley	14+83 – 18+13		330	Enhance II	2.5:1	132	Fence cattle out of easement area and remove invasive plants.
UT 1 Walton Crawley	10+00 – 14+83		483	Preservation	5:1	97	The easement break has been removed from credit summation.
UT 2 Walton Crawley As-built Plan Stationing	10+00 – 13+83 (10+00 – 13+83) 16+36 – 18+02 (10+00 – 11+66)	600	549 549	Restoration (PI)	1:1	549	Channel routed to the center of the valley, away from toe of slope.
UT 2 Walton Crawley	13+83 – 16+36		253	Enhance II	2.5:1	101	Fence cattle out of easement area and remove invasive plants.
Neighbors Branch As-built Plan Stationing	24+74 – 29+97 (09+93 – 15+52)	2262	523 559 – 36 = 523	Restoration (PI)	1:1	523	Channel routed through low point of valley and invert raised from perched culvert. The easement break at the road crossing has been removed from credit summation. Removed 36 feet from credit calculations for road crossing.

Neighbors Branch	18+89 – 19+09		20	Enhance I	1.5:1	13	Place channel structure and stabilize bank. The easement break has been removed from credit summation.
Neighbors Branch	18+69 – 18+89 19+09 – 24+74 29+97 – 33+39		927	Enhance II	2.5:1	371	Fence cattle out of easement area and matt, seed, and plant vegetation on scoured banks.
Neighbors Branch	09+67 – 18+69		902	Preservation	5:1	180	The easement break has been removed from credit summation.
UT 1 Neighbors Branch As-built Plan Stationing	10+56 – 10+95 11+50 – 12+81 (10+06 – 10+44 10+77 – 12+09)	281	170 170	Enhance I	1.5:1	113	Bank grading and stabilization.
UT 1 Neighbors Branch	10+00 – 10+56 10+95 – 11+50		111	Enhance II	2.5:1	44	Fence cattle out of easement area and plant vegetation.
UT 3 Neighbors Branch	11+72 – 18+75	703	703	Preservation	5:1	141	---
Riparian Wetland	---	0.0	0.52	Restoration	1:1	0.52	Restore hydrology to hydric soils adjacent to Neighbors Branch.
Riparian Wetland	---	1.62	1.62	Enhancement	2:1	0.81	Plant native vegetation on impacted wetlands and fence cattle.
Riparian Wetland	---	1.29	1.29	Preservation	5:1	0.26	---

Length and Area Summations

Restoration Level	**Stream (linear footage)**	**Riparian Wetland (acreage)**		**Nonriparian Wetland (acreage)**	**Buffer (square feet)**	**Upland (acres)**
		Riverine	Non-Riverine			
Restoration	2,456	0.52		--		
Enhancement (Level I)	202	1.62		--		
Enhancement (Level II)	1,863	--		--		
Preservation	3,139	1.29		--		
Totals	**7,660**	**3.43**		--		
Mitigation Units	**3,953.667 SMUs**	**1.588 Riparian WMUs**		**0.00 Nonriparian WMUs**		

BMP Elements

Element	**Location**	**Purpose/Function**	**Notes**

Table 2. Project Activity and Reporting History
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site / DMS Number 92872

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Project Institution		
Mitigation Plan	April 2009	March 7, 2013
Permits Issued		
Final Design – Construction Plans		April 2014
Construction	--	December 2015
Temporary S&E Mix applied to Entire Project Site	--	December 2015
Permanent Seed Mix applied to the Entire Project Site	--	December 2015
Bare Root; Containerized; and B&B Plantings for the Entire Project Site	--	December 2015
Baseline Monitoring Document (Year 0 Monitoring Baseline)	April 2016	July 2016
Repair	--	October 2016
Year 1 Monitoring	November 2016	January 2017
Year 2 Monitoring	November 2017	December 2017
Year 2 Vegetation Monitoring	August 30, 2017	--
Year 2 Geomorphology Monitoring	February 22, 2017	--
Year 3 Monitoring	November 2018	November 2018
Year 3 Vegetation Monitoring	September 26, 2018	--
Year 3 Geomorphology Monitoring	March 22, 2018	--
Repair/Maintenance	--	March 2019
Year 4 Monitoring	November 2019	January 2020
Year 4 Vegetation Monitoring	July 2019	--
Year 4 Geomorphology Monitoring	May 2019	--
Invasive Species Treatment	--	Aug/Sep/Nov/Dec 2019
Year 5 Monitoring	November 2020	January 2021
Year 5 Vegetation Monitoring	October 2020	--
Year 5 Geomorphology Monitoring	February 2020	--
Invasive Species Treatment	--	Apr/Jun 2020

Table 3. Project Contact Table
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site / DMS Number 92872

Designer	Florence & Hutcheson Engineering (Now HDR) 5121 Kingdom Way, Suite 100 Raleigh, NC 27607 Kevin Williams (919) 851-6066
Construction Plans and Sediment and Erosion Control Plans	Florence & Hutcheson Engineering (Now HDR) 5121 Kingdom Way, Suite 100 Raleigh, NC 27607 Kevin Williams (919) 851-6066
Construction Contractor	Carolina Environmental Contracting, Inc. Mount Airy, NC (336) 320-3849
Planting Contractor	Keller Environmental 7291 Haymarket Lane Raleigh, NC 27615 Jay Keller (919) 749-8259
As-built Surveyor	Turner Land Surveying. PLLC 3719 Benson Drive Raleigh, NC 27609 Elisabeth Turner (919) 827-0745
Baseline Data Collection	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis (919) 215-1693

Table 4. Project Baseline Information and Attributes

Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site / DMS Number 92872

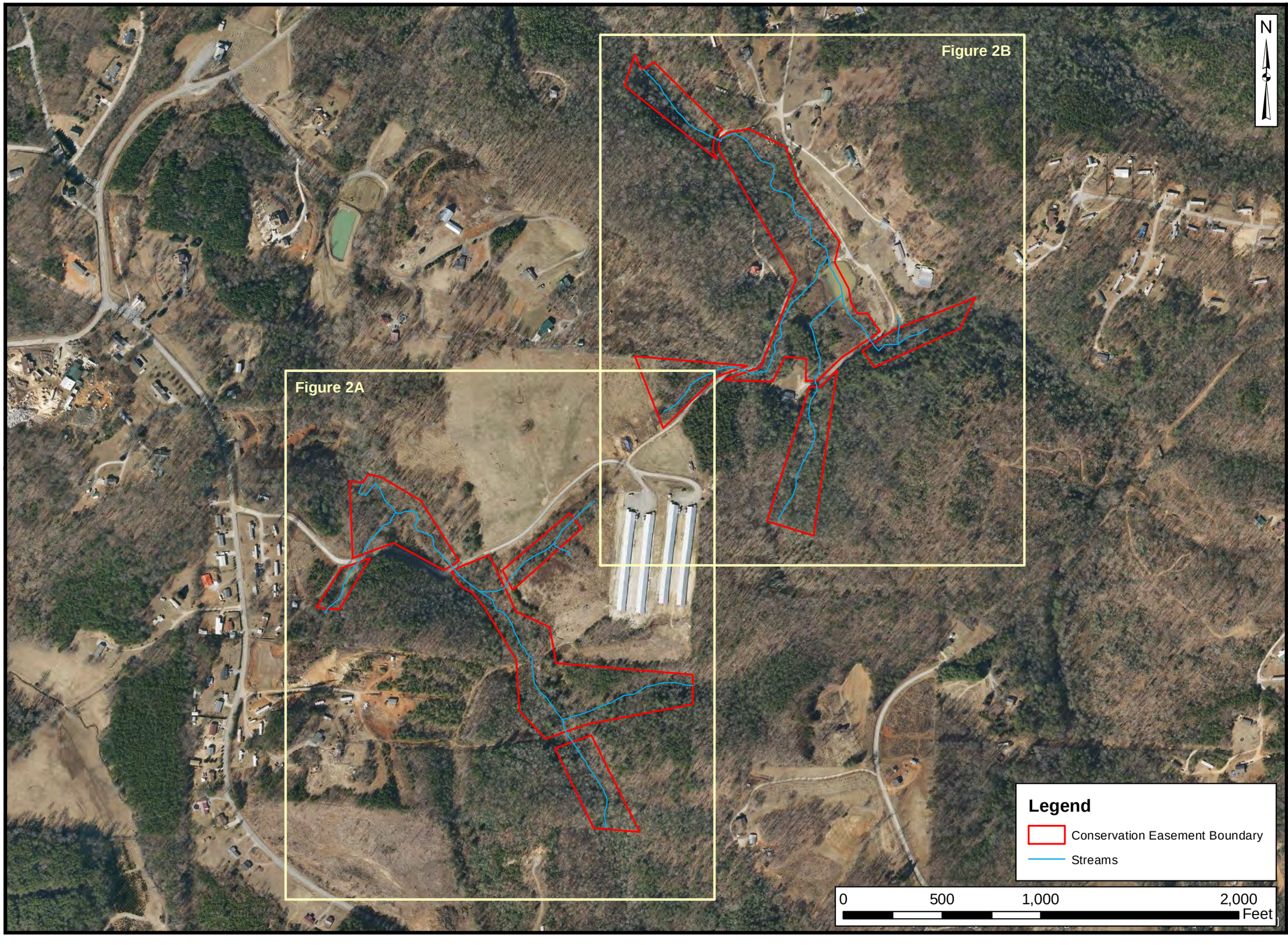
Project Information						
Project name	Neighbors Branch/Walton Crawley Branch Mitigation Site					
Project county	McDowell County, North Carolina					
Project area (Acres)	33.4					
Project coordinates (lat/long)	35.6599°N, 81.9002°W					
Project Watershed Summary Information						
Physiographic region	Blue Ridge					
Project river basin	Catawba River Basin					
USGS hydrologic unit (8 digit)	03050101					
NCDWQ Sub-basin	03-08-30					
Project drainage area (acres)	678					
% Drainage area impervious	< 1%					
CGIA land use classification	----					
Reach Summary Information						
Parameters	**Walton Crawley Branch**	**UTs to Walton Crawley Branch**		**Neighbors Branch**	**UTs to Neighbors Branch**	
		UT 1	**UT 2**		**UT 1**	**UT 3**
Length of reach (linear feet)	2529	1001	802	2339	281	875
Valley classification	VIII	II	II	VIII	II	II
Drainage area (acres)	458	29	20	220	13	15
NCDWQ stream identification score	18.5	25	25	33.5	23.5	16.5
NCDWQ water quality classification	C	C	C	C	C	C
Morphological description (stream type)	B4/5c-G4/5	E5	E5-G5	E5/4-G5/4	E5/4	E5
Design Rosgen stream type	C4	E/C5	E/C5	C4	E5/4	E5
Evolutionary trend						
Design approach (P1, P2, P3, E, etc.)	PI, EI, EII, & P	PI, EII, & P	PI & EII	PI, EI, EII, & P	EI & EII	P
Underlying mapped soils	Elsinboro, Evard, Hayesville	Evard	Evard, Hayesville	Hayesville, Iotla	Evard	Hayesville
Drainage class	Well	Well	Well	Well / SW Poorly	Well	Well
Soil hydric status	Nonhydric	Nonhydric	Nonhydric	Nonhydric / Hydric	Nonhydric	Nonhydric
Slope	0.0340	0.0380	0.0545	0.0260	0.0820	0.0656
FEMA classification	Not Mapped	Not Mapped	Not Mapped	Not Mapped	Not Mapped	Not Mapped
Native vegetation community	Forest / Pasture	Forest	Forest	Forest / Pasture	Forest	Forest
% Composition of exotic invasive spp.	<5	<5	<5	<5	<5	<5

Wetland Summary Information						
Parameters	**Walton Crawley Branch**	**UTs to Walton Crawley Branch**		**Neighbors Branch**	**UTs to Neighbors Branch**	
		UT 1	**UT 2**		**UT 1**	**UT 3**
Size of wetland (acres)	0.95	0.37	N/A	1.88	0.23	N/A
Wetland type	Riparian Riverine	Riparian Riverine	N/A	Riparian Riverine	Riparian Riverine	N/A
Mapped soil series	Wehadkee	Wehadkee	N/A	Wehadkee	Wehadkee	N/A
Drainage class	poorly	poorly	N/A	poorly	poorly	N/A
Soil hydric status	hydric	hydric	N/A	hydric	hydric	N/A
Source of hydrology	Overbank and springs	Overbank and springs	N/A	Overbank and springs	Overbank and springs	N/A
Hydrologic impairment	Cleared	Invasives	N/A	Drained/ Cleared/ Invasives	Invasives	N/A
Native vegetation community	Forest / Pasture	Forest	N/A	Forest / Pasture	Forest	N/A
% Composition of exotic invasive spp.	<5	<5	N/A	<5	<5	N/A

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the US – Section 404	Yes	Yes	SAW-2009-917
Waters of the US – Section 401	Yes	Yes	SAW-2009-917
Endangered Species Act	Yes	Yes	No Effect – CE Document
Historic Preservation Act	Yes	Yes	CE Document
Coastal Zone Management Act (CZMA/CAMA)	No	NA	NA
FEMA Floodplain Compliance	No	NA	NA
Essential Fisheries Habitat	No	NA	NA

Appendix B
Visual Assessment Data

Figures 2, 2A-2B. Current Conditions Plan View
Figures 3, 3A-3B. Project Assets
Tables 5A-5E. Visual Stream Morphology Stability Assessment
Table 6. Vegetation Condition Assessment
Stream Fixed Station Photo Points
Vegetation Plot Photos



Axiom Environmental, Inc.

Prepared for:

NC Department of Environmental Quality

Division of Mitigation Services

Project:

Neighbors Branch/ Walton Crawley Branch Stream and Wetland Restoration Site

DMS Project # 92872

McDowell County, NC

Title:

Current Conditions Plan View

Drawn by: KRJ

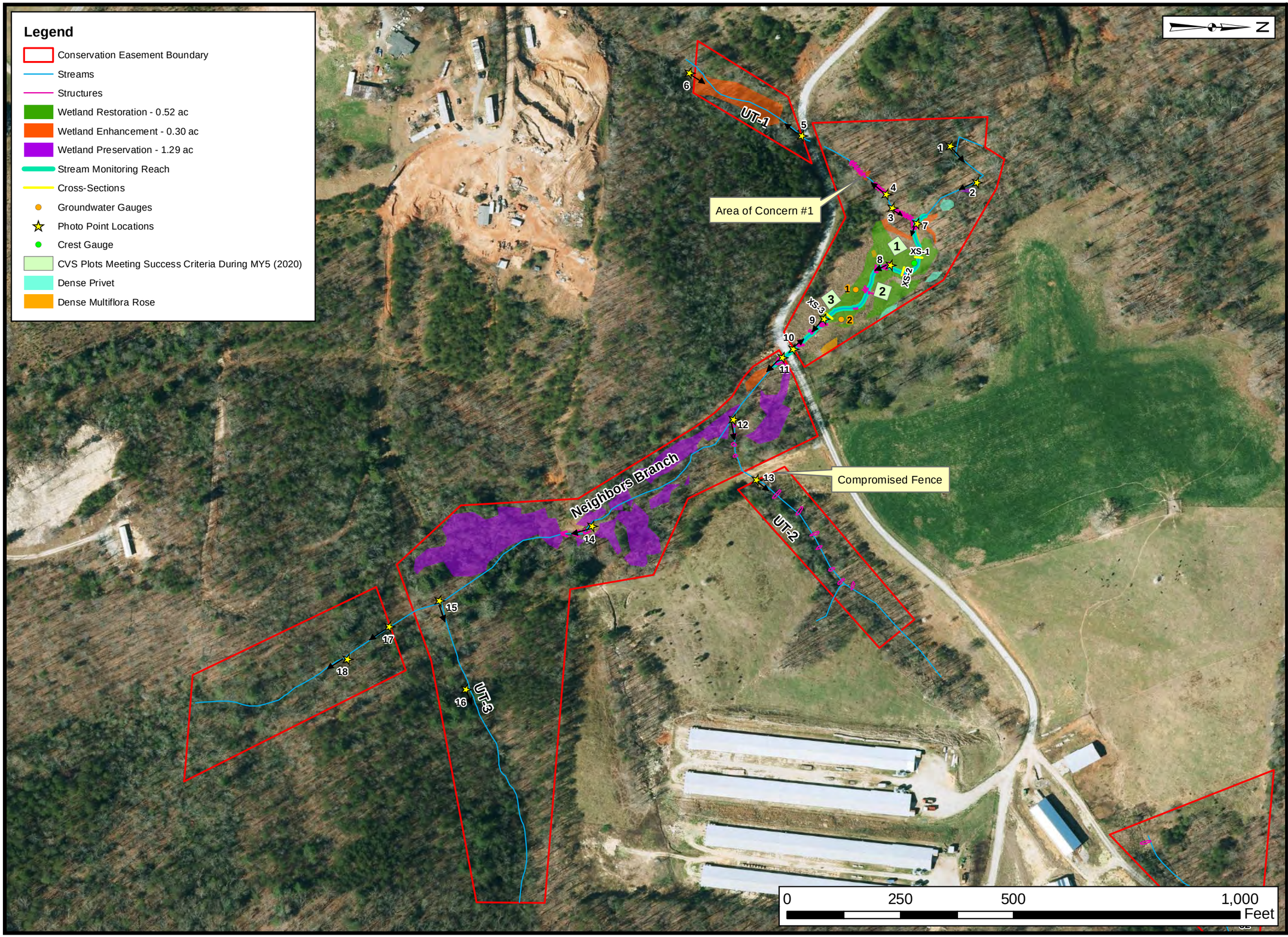
Date: NOV 2020

Scale: 1:5500

Project No.: 12-004.21

FIGURE

2



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Project:

Neighbors Branch/ Walton Crawley Branch Stream and Wetland Restoration Site

DMS Project # 92872

McDowell County, NC

Title:

Current Conditions Plan View

Drawn by: KRJ

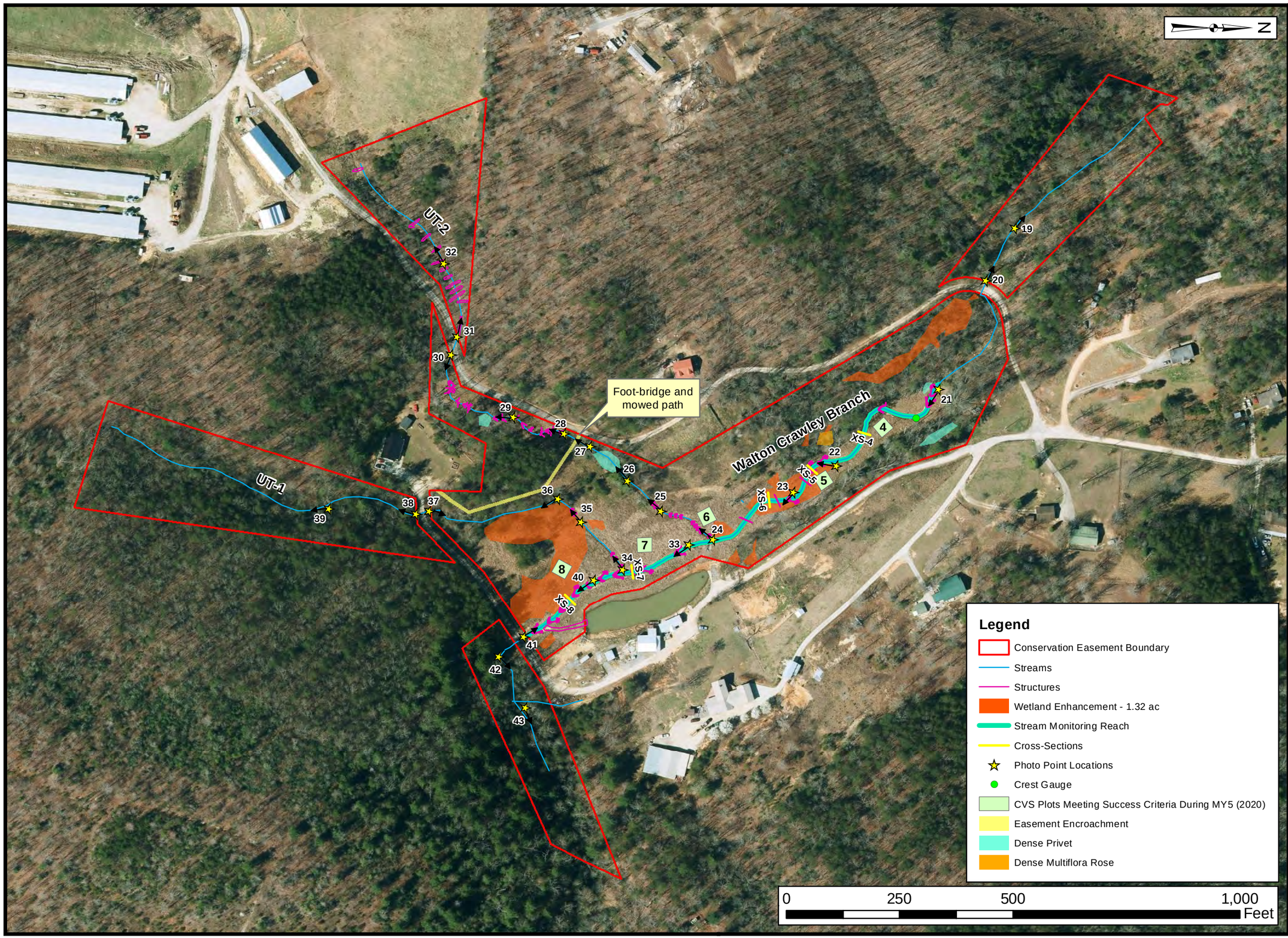
Date: NOV 2020

Scale: 1:2400

Project No.: 12-004.21

FIGURE

2A



Axiom Environmental, Inc.

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McDowell County, NC

Title:

Current Conditions Plan View

Drawn by: KRJ

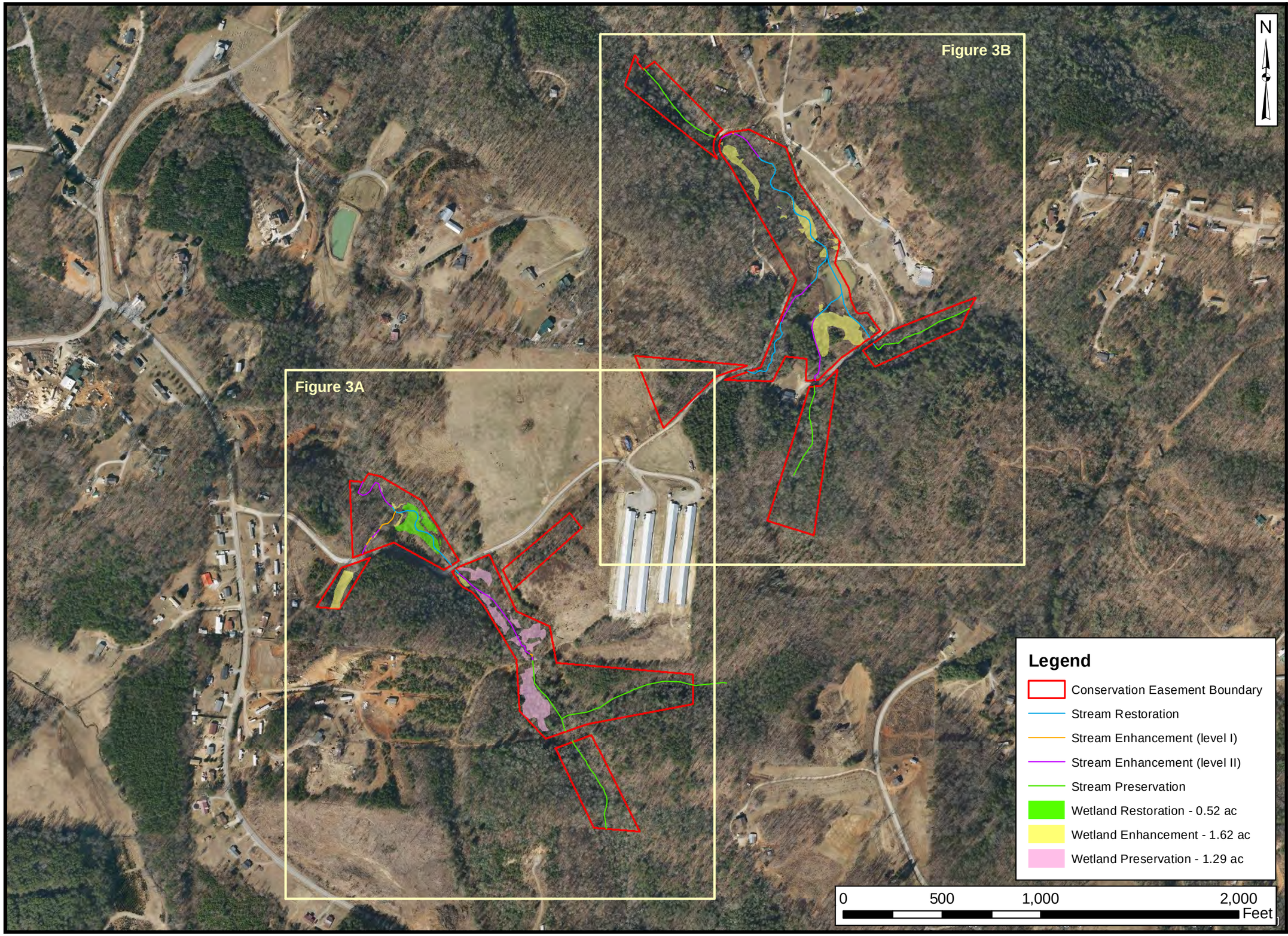
Date: NOV 2020

Scale: 1:2400

Project No.: 12-004.21

FIGURE

2B



Axiom Environmental, Inc.

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Project:

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DMS Project # 92872

McDowell County, NC

Title:

Project Assets

Drawn by: KRJ

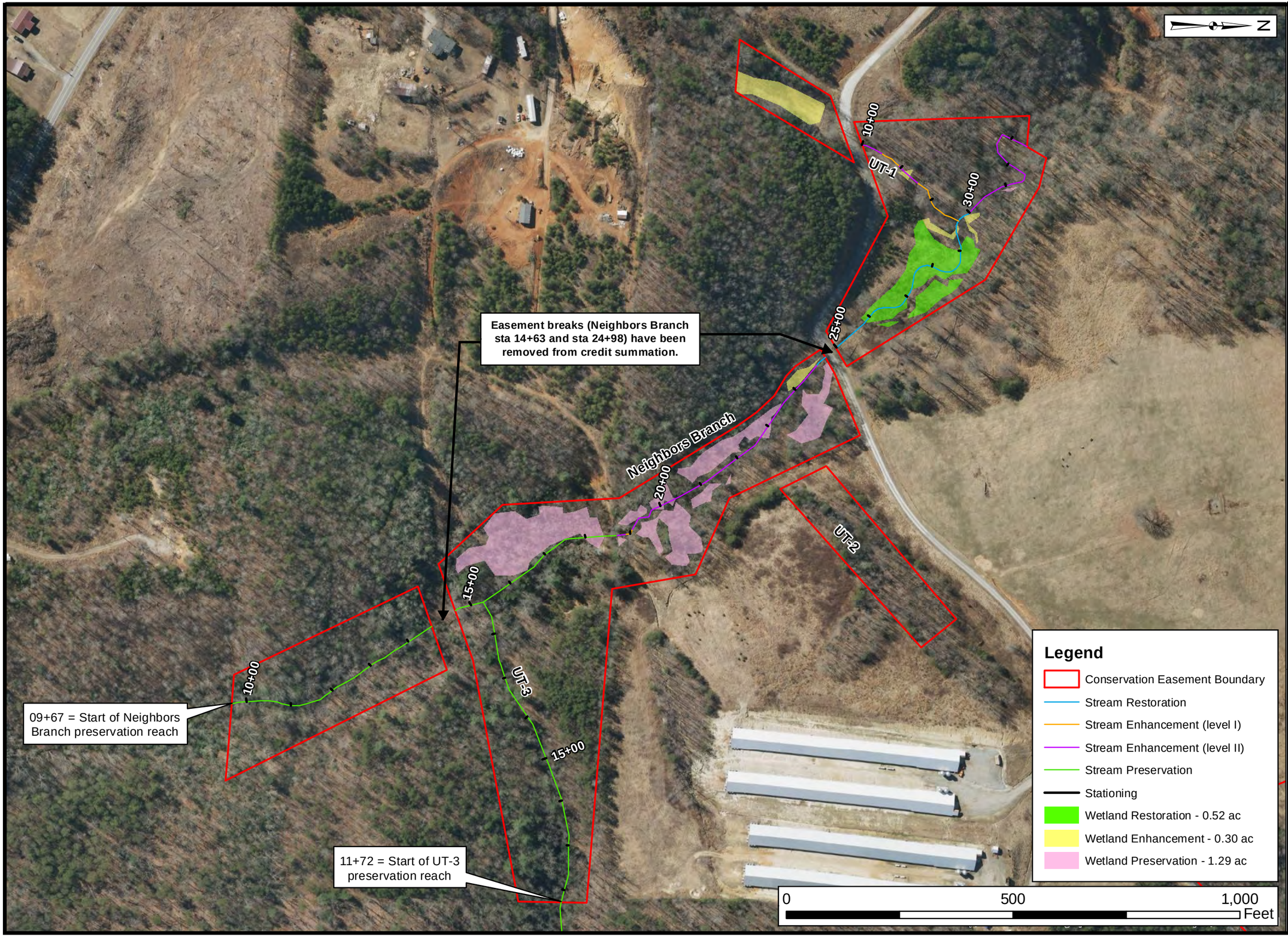
Date: JUL 2016

Scale: 1:5500

Project No.: 12-004.21

FIGURE

3



Axiom Environmental, Inc.

Prepared for:

NC Department of Environmental Quality

Division of Mitigation Services

Project:

Neighbors Branch/ Walton Crawley Branch Stream and Wetland Restoration Site

DMS Project # 92872

McDowell County, NC

Title:

Project Assets

Drawn by: KRJ

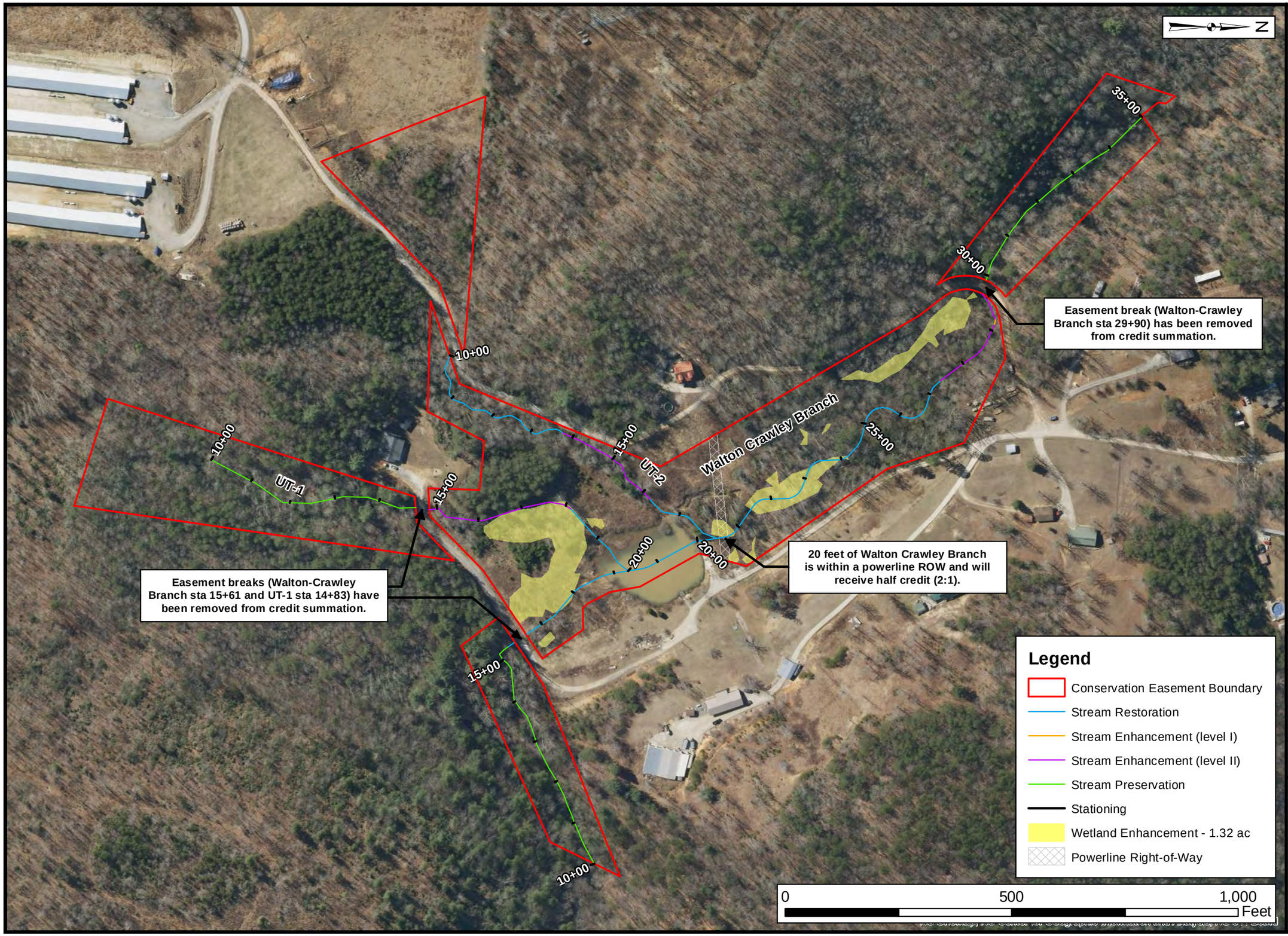
Date: JUL 2016

Scale: 1:2400

Project No.: 12-004.21

FIGURE

3A



Axiom Environmental, Inc.

Prepared for:

NC Department of Environmental Quality

Division of Mitigation Services

Project:

Neighbors Branch/ Walton Crawley Branch Stream and Wetland Restoration Site

DMS Project # 92872

McDowell County, NC

Title:

Project Assets

Drawn by: KRJ

Date: MAY 2018

Scale: 1:2400

Project No.: 12-004.21

FIGURE

3B

Table 5A **Visual Stream Morphology Stability Assessment**
Reach ID **Walton Crawley Branch**
Assessed Length **1450**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	26	26			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	25	25			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	25	25			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	25	25			100%			
		2. Thalweg centering at downstream of meander (Glide)	25	25			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	24	24			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	24	24			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	24	24			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	23	24			96%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	24	24			100%			

Table 5B **Visual Stream Morphology Stability Assessment**
Reach ID **UT1 to Walton Crawley Branch**
Assessed Length **518**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	8	8			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	7	7			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	7	7			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	7	7			100%			
		2. Thalweg centering at downstream of meander (Glide)	7	7			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	10	10			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	10	10			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	10	10			100%			

Table 5C **Visual Stream Morphology Stability Assessment**
Reach ID **UT2 to Walton Crawley Branch**
Assessed Length **802**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	12	12			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	13	13			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	13	13			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	13	13			100%			
		2. Thalweg centering at downstream of meander (Glide)	13	13			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	12	12			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	12	12			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	12	12			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	12	12			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	12	12			100%			

Table 5D **Visual Stream Morphology Stability Assessment**
Reach ID **Neighbors Branch**
Assessed Length **1470**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	22	22			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	21	21			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	21	21			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	21	21			100%			
		2. Thalweg centering at downstream of meander (Glide)	21	21			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	16	16			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	16	16			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	16	16			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	16	16			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	16	16			100%			

Table 5E **Visual Stream Morphology Stability Assessment**
Reach ID **UT1 to Neighbors Branch**
Assessed Length **281**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			1	60	79%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	19	20			95%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	19	19			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	19	19			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	19	19			100%			
		2. Thalweg centering at downstream of meander (Glide)	19	19			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	17	20			85%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	17	20			85%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	20	20			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	17	20			85%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	17	20			85%			

Table 6 Vegetation Condition Assessment

Neighbors Branch/Walton Crawley Branch Mitigation Project

Planted Acreage[1] **11.78**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	None	0.1 acres	none	0	0.00	0.0%
2. Low Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
2B. Low Planted Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	None	0.25 acres	N/A	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%

Easement Acreage[2] **33.4**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Isolated populations of Chinese privet, and multiflora rose	1000 SF	blue and orange polygons	11	0.18	0.5%
5. Easement Encroachment Areas[3]	Mowed footpath and footbridge contructed within easement.	none	yellow	1	0.07	0.2%

1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

2 = The acreage within the easement boundaries.

3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern spcies are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by DMS such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likley trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolzing invasives polygons, particulalry for situations where the conditon for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
May & October 2020

Photo Point 1 – Neighbors Branch

Photo Point 2 – Neighbors Branch

Photo Point 3 – UT-1 to Neighbors Branch

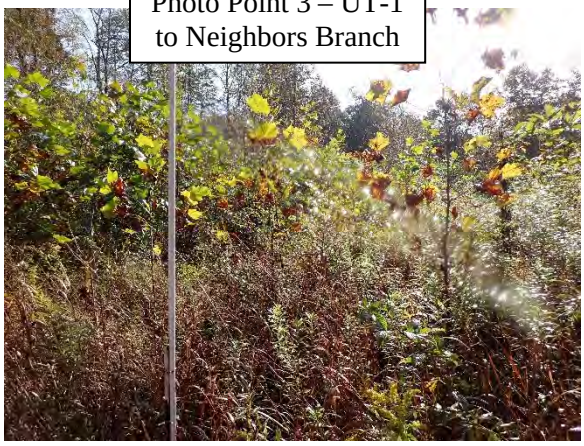


Photo Point 4 – UT-1 to Neighbors Branch

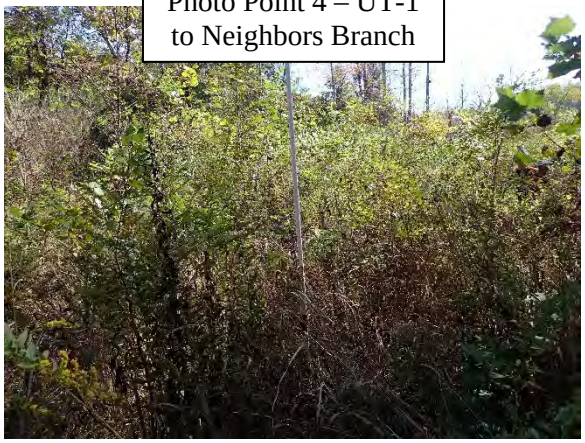


Photo Point 5 – UT-1 to Neighbors Branch

Photo Point 6 – UT-1 to Neighbors Branch

Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
October 2020
(continued)

Photo Point 7 – Neighbors Branch

Photo Point 8 – Neighbors Branch

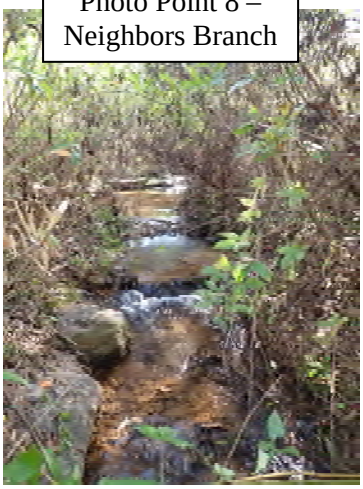


Photo Point 9 – Neighbors Branch

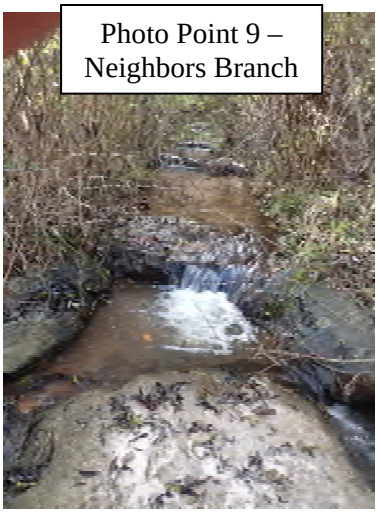


Photo Point 10 – Neighbors Branch

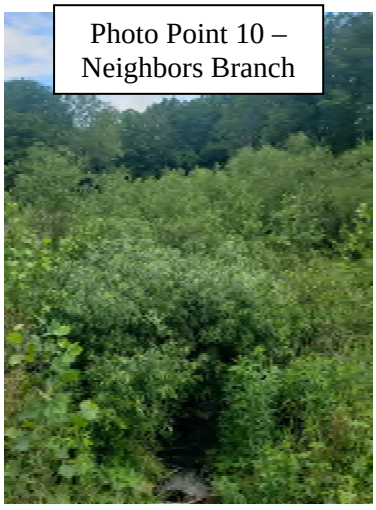


Photo Point 11 – Neighbors Branch

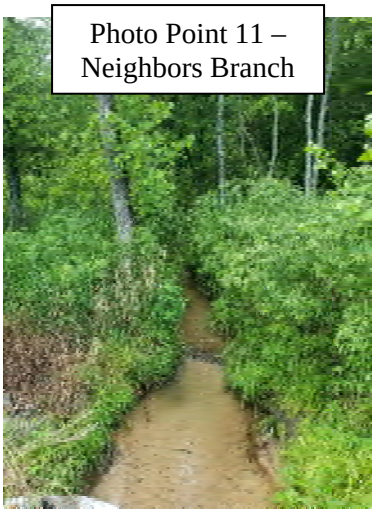
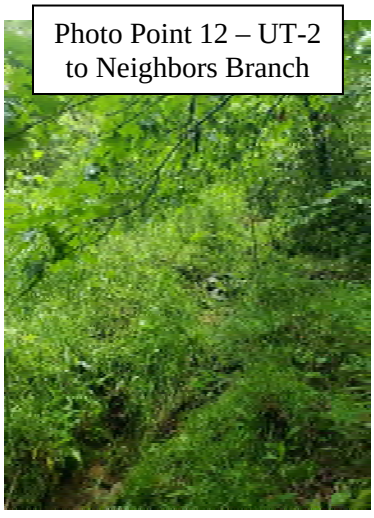


Photo Point 12 – UT-2 to Neighbors Branch



Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
May & October 2020
(continued)

Photo Point 13 – UT-2 to Neighbors Branch

Photo Point 14 – Neighbors Branch

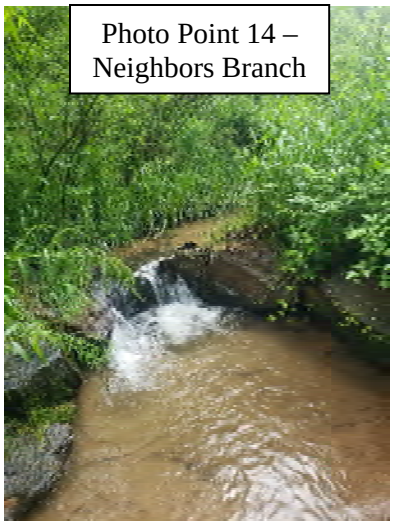


Photo Point 15 – UT-3 to Neighbors Branch

Photo Point 16 – UT-3 to Neighbors Branch

Photo Point 17 – Neighbors Branch - Not taken in Year 5 (2020) due to hunting in the area

Photo Point 18 – Neighbors Branch - Not taken in Year 5 (2020) due to hunting in the area

Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
May & October 2020
(continued)

Photo Point 19 – Walton Crawley Branch

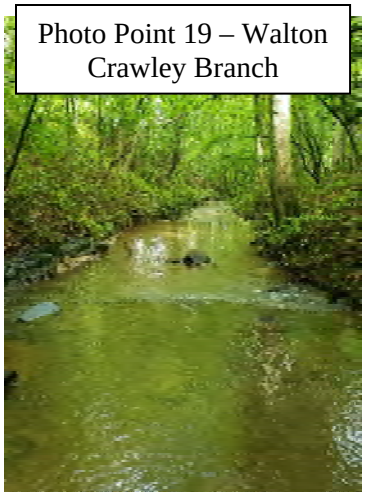


Photo Point 20 - Walton Crawley Branch

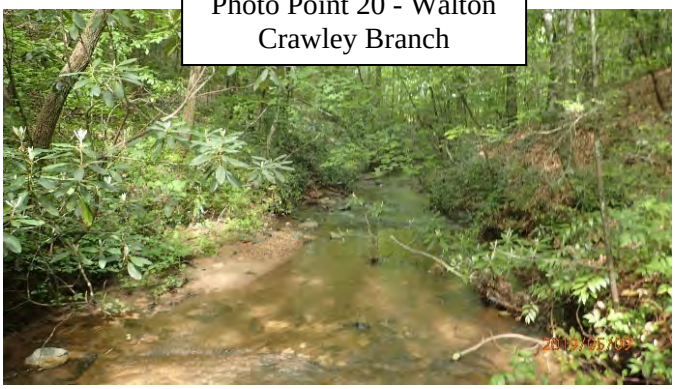


Photo Point 21 - Walton Crawley Branch

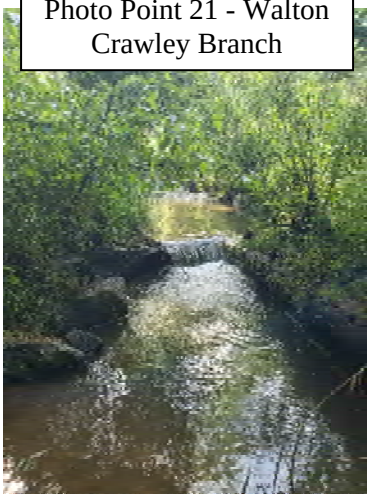


Photo Point 22 - Walton Crawley Branch

Photo Point 23 - Walton Crawley Branch

Photo Point 24 – UT-2 to Walton Crawley Branch

Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
May & October 2020
(continued)

Photo Point 25 – UT-2 to Walton Crawley Branch

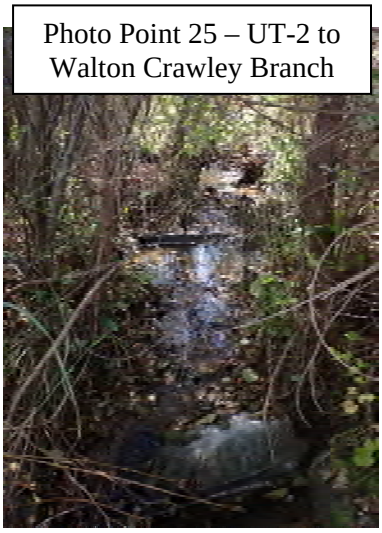


Photo Point 26 – UT-2 to Walton Crawley Branch

Photo Point 27 – UT-2 to Walton Crawley Branch

Photo Point 28 – UT-2 to Walton Crawley Branch

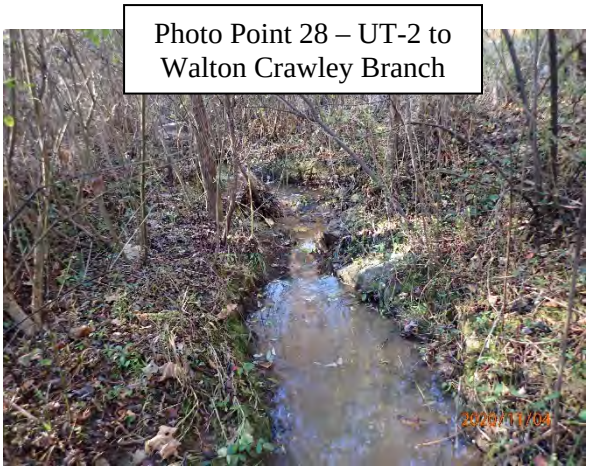


Photo Point 29 – UT-2 to Walton Crawley Branch

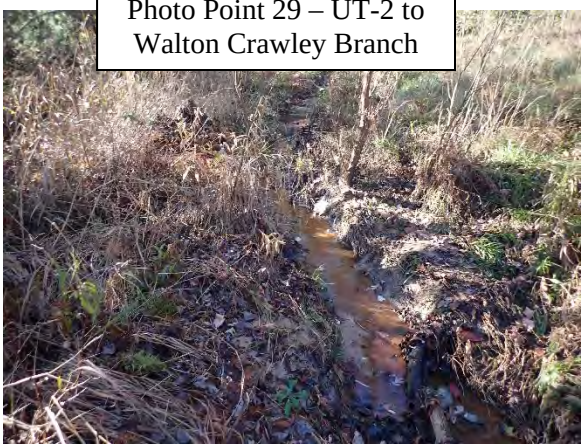


Photo Point 30 – UT-2 to Walton Crawley Branch

Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
May & October 2020
(continued)

Photo Point 31 – UT-2 to Walton Crawley Branch

Photo Point 32 – UT-2 to Walton Crawley Branch

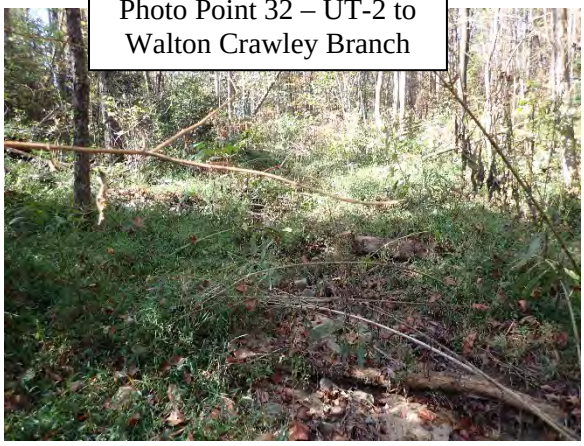


Photo Point 33 - Walton Crawley Branch

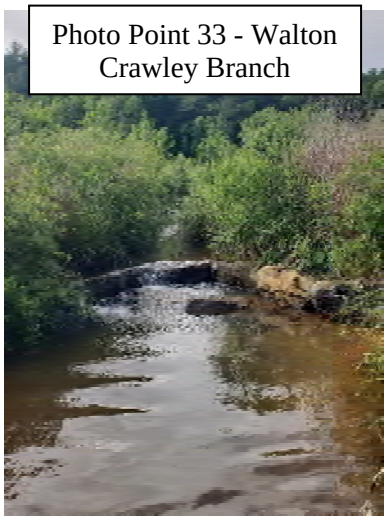


Photo Point 34 – UT-1 to Walton Crawley Branch

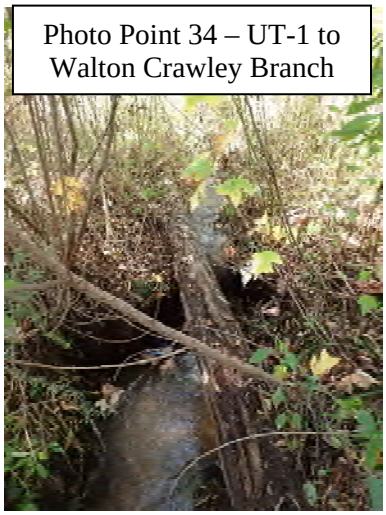


Photo Point 35 – UT-1 to Walton Crawley Branch

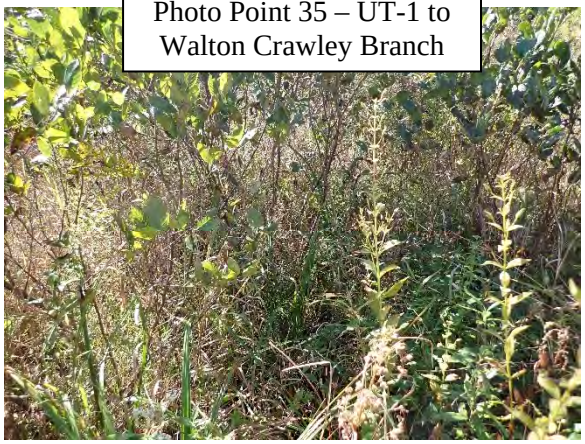


Photo Point 36 – UT-1 to Walton Crawley Branch

Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
May & October 2020
(continued)

Photo Point 37 – UT-1 to Walton Crawley Branch

Photo Point 38 – UT-1 to Walton Crawley Branch

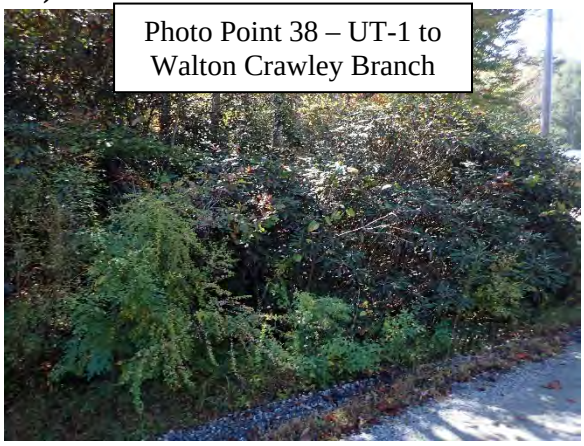


Photo Point 39 – UT-1 to Walton Crawley Branch

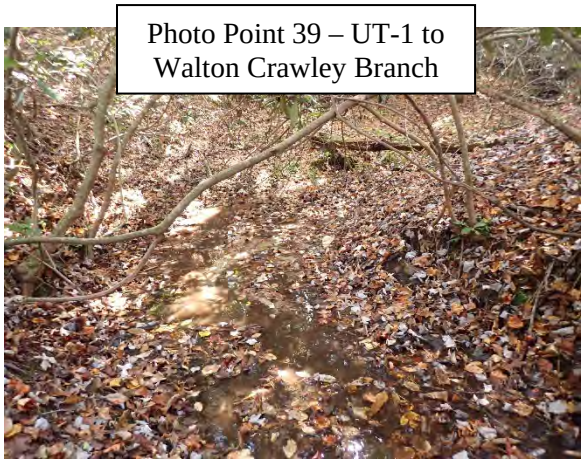


Photo Point 40 - Walton Crawley Branch

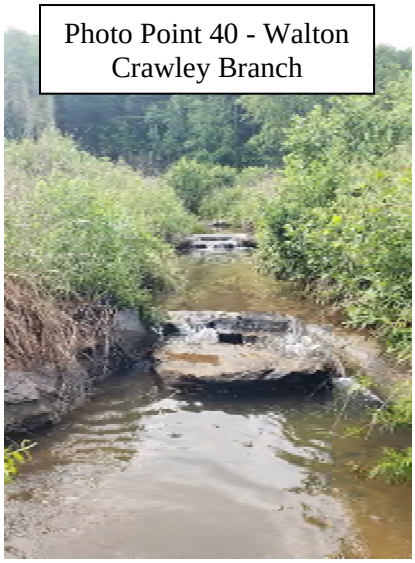


Photo Point 41 - Walton Crawley Branch

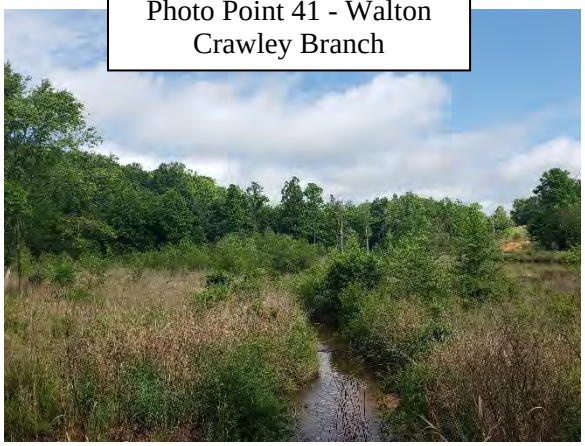
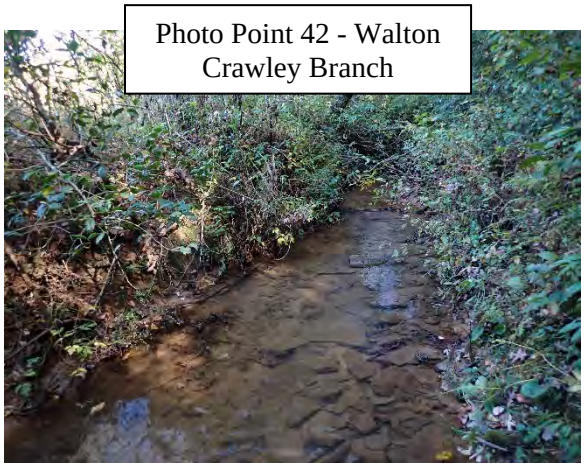
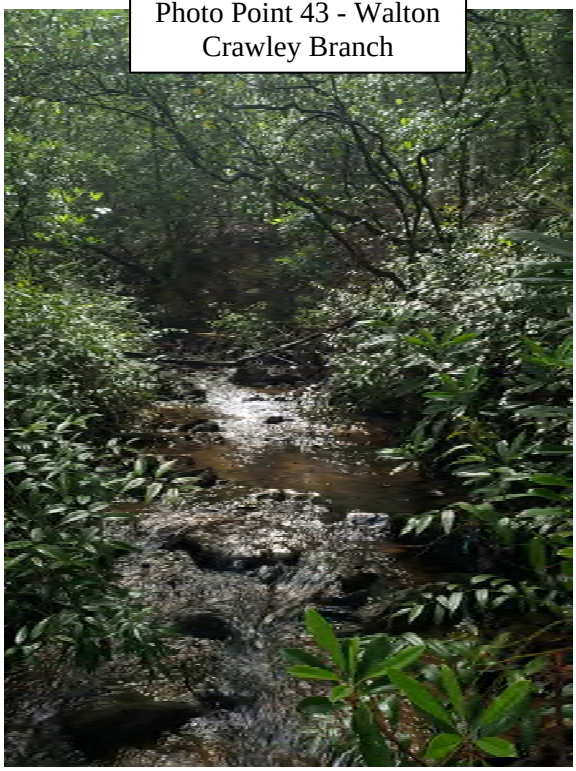


Photo Point 42 - Walton Crawley Branch



Neighbors Branch/Walton Crawley Branch
Fixed Station Photographs
May & October 2020
(continued)

Photo Point 43 - Walton Crawley Branch



Neighbors Branch/Walton Crawley Branch
Vegetation Monitoring Photographs Taken October 2020

Plot 1

Plot 2

Plot 3

Plot 4

Plot 5

Plot 6

Plot 7

Plot 8

Appendix C.
Vegetation Data

Table 7. Vegetation Plot Success Summary
Table 8. CVS Vegetation Plot Metadata
Table 9. Total Planted Stems by Plot and Species

Table 7. Vegetation Plot Success Summary

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	100%
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	Yes	
7	Yes	
8	Yes	

Table 8. CVS Vegetation Plot Metadata

Report Prepared By	Phillip Perkinson
Date Prepared	10/26/2020 15:03
database name	Axiom-NeighborsWalton-MY5.mdb
database location	S:\Business\Projects\12\12-004 EEP Monitoring\12-004.21 Neighbors Bob\Neighbors Branch and Walton Crawley Branch\2020 MY-05\CVS
computer name	PHILLIP-LT
file size	58728448
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	92872
project Name	Neighbors Branch/ Walton Crawley Branch
River Basin	Catawba
length(ft)	
stream-to-edge width (ft)	
Required Plots (calculated)	
Sampled Plots	8

Table 9. Total Planted Stems by Plot and Species
EEP Project Code 92872. Project Name: Neighbors Branch/ Walton Crawley Branch

			Current Plot Data (MY5 2020)																								Annual Means																	
			92872-01-0001			92872-01-0002			92872-01-0003			92872-01-0004			92872-01-0005			92872-01-0006			92872-01-0007			92872-01-0008			MY5 (2020)			MY4 (2019)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree	2	2	2				2	2	2	5	5	5	1	1	1									2	10	10	12	10	10	11	10	10	14	10	10	10	11	11	11	6	6	17
Alnus serrulata	hazel alder	Shrub																													1													
Betula nigra	river birch	Tree				1	1	1	5	5	5	4	4	4							1	1	1	1	1	1	12	12	12	12	12	12	12	12	12	12	12	12	15	15	15	16	16	16
Cornus amomum	silky dogwood	Shrub																																					1	1	1	1	1	1
Diospyros virginiana	common persimmon	Tree							1	1	1				1	1	1	1	1	2	2	2	2	2	2	2	7	7	8	7	7	11	5	5	5	5	5	8	1	1	1	1	1	1
Fraxinus pennsylvanica	green ash	Tree							4	4	4	1	1	1	6	6	6	5	5	5	2	2	2	1	1	1	19	19	19	19	19	19	19	19	19	19	19	19	24	24	24	31	31	31
Liriodendron tulipifera	tuliptree	Tree												8	1	1	3						3				1	1	14	1	1	20	1	1	12	1	1	8			3			
Nyssa	tupelo	Tree																												1	1	1	2	2	2	1	1	1	1	1	1			
Nyssa sylvatica	blackgum	Tree				1	1	1																			1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	6	6	6
Platanus occidentalis	American sycamore	Tree	7	7	13	6	6	13	4	4	11						2				4	4	4	2	2	2	23	23	45	23	23	54	23	23	41	24	24	59	28	28	81	29	29	29
Quercus	oak	Tree																																					1	1	1			
Quercus nigra	water oak	Tree													1	1	1	4	4	4	2	2	2				7	7	7	7	7	7	7	7	7	6	6	6	2	2	2	4	4	4
Quercus phellos	willow oak	Tree	1	1	1							1	1	1										2	2	2	4	4	4	4	4	4	4	4	4	5	5	5	12	12	12	12	12	12
Quercus rubra	northern red oak	Tree																						2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	1	1	1	1	1	1
Salix nigra	black willow	Tree																																							3			10	
Sambucus canadensis	Common Elderberry	Shrub						1																					1			1					2						4
		Stem count	10	10	16	8	8	16	16	16	23	11	11	19	10	10	14	10	10	11	11	11	14	10	10	12	86	86	125	87	87	144	87	87	121	87	87	140	100	100	159	107	107	132
		size (ares)	1			1			1			1			1			1			1			1			8			8			8			8			8			8		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.20			0.20			0.20			0.20			0.20			0.20		
		Species count	3	3	3	3	3	4	5	5	5	4	4	5	5	5	6	3	3	3	5	5	6	6	6	7	10	10	11	11	11	13	11	11	11	11	11	13	12	12	14	10	10	12
		Stems per ACRE	404.7	404.7	647.5	323.7	323.7	647.5	647.5	647.5	930.8	445.2	445.2	768.9	404.7	404.7	566.6	404.7	404.7	445.2	445.2	445.2	566.6	404.7	404.7	485.6	435	435	632.3	440.1	440.1	728.4	440.1	440.1	612.1	440.1	440.1	708.2	505.9	505.9	804.3	541.3	541.3	667.7

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

Appendix D.
Stream Measurements and Geomorphology Data

Cross Section Plots
Longitudinal Profile Plots
Substrate Plots
Tables 10A-10B. Baseline Stream Data Summary
Tables 11A-11D. Monitoring Data-Dimensional Data Summary

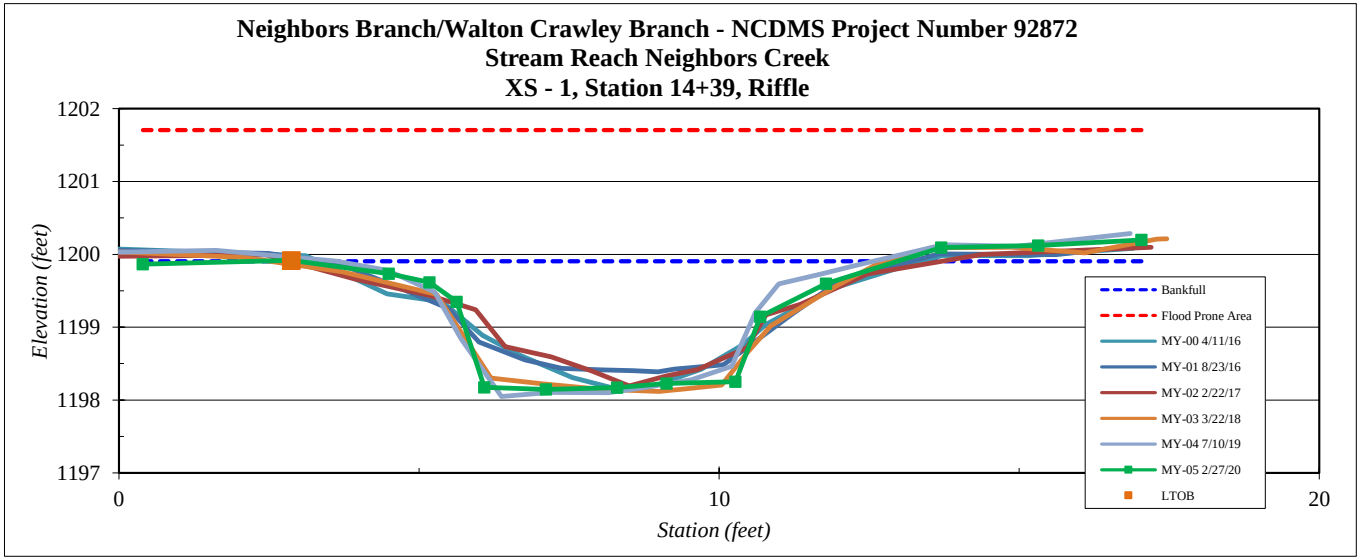
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 1, Riffle
Reach	Neighbors Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.40	1199.86
2.87	1199.92
4.50	1199.73
5.18	1199.62
5.63	1199.35
6.09	1198.17
7.12	1198.15
8.30	1198.17
9.13	1198.23
10.27	1198.25
10.69	1199.14
11.78	1199.60
13.70	1200.09
15.32	1200.12
17.04	1200.20

SUMMARY DATA	
Bankfull Elevation:	1199.9
LTOB Elevation:	1199.9
Bankfull Cross-Sectional Area:	9.5
Bankfull Width:	11.9
Flood Prone Area Elevation:	1201.7
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.8
Low Bank Height:	1.8
Mean Depth at Bankfull:	0.8
W / D Ratio:	14.9
Entrenchment Ratio:	8.4
Bank Height Ratio:	1.0

XS 1 Looking Upstream

Stream Type	E



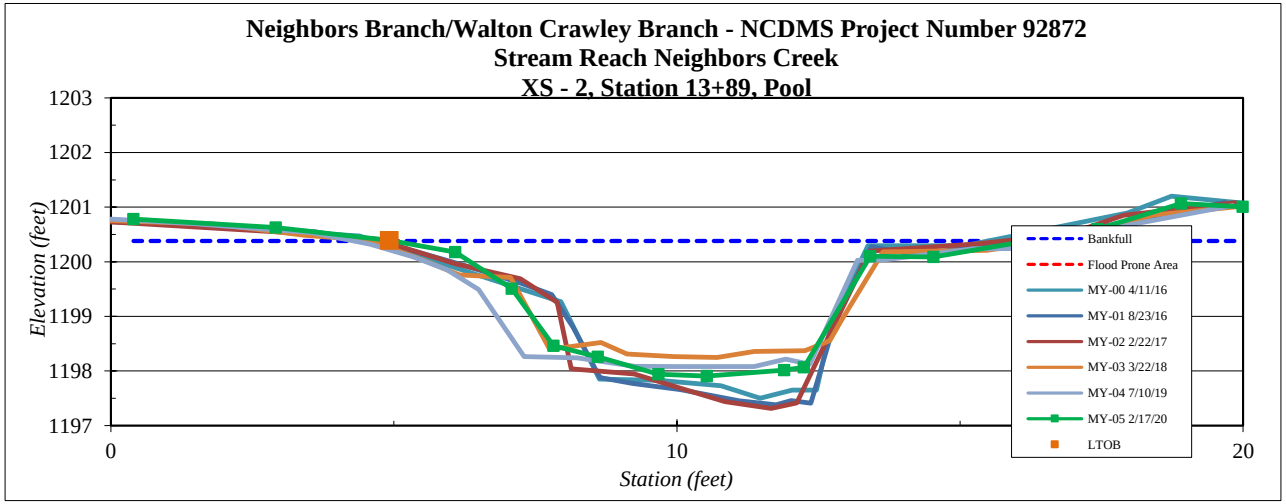
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 2, Pool
Reach	Neighbors Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.4	1200.8
2.9	1200.6
4.9	1200.4
6.1	1200.2
7.1	1199.5
7.8	1198.5
8.6	1198.3
9.7	1197.9
10.5	1197.9
11.9	1198.0
12.2	1198.1
13.4	1200.1
14.5	1200.1
17.4	1200.6
18.9	1201.1
20.0	1201.0

SUMMARY DATA	
Bankfull Elevation:	1200.4
LTOB Elevation:	1200.4
Bankfull Cross-Sectional Area:	14.0
Bankfull Width:	11.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.5
Low Bank Height:	2.5
Mean Depth at Bankfull:	1.3
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 2 Looking Upstream

Stream Type	E



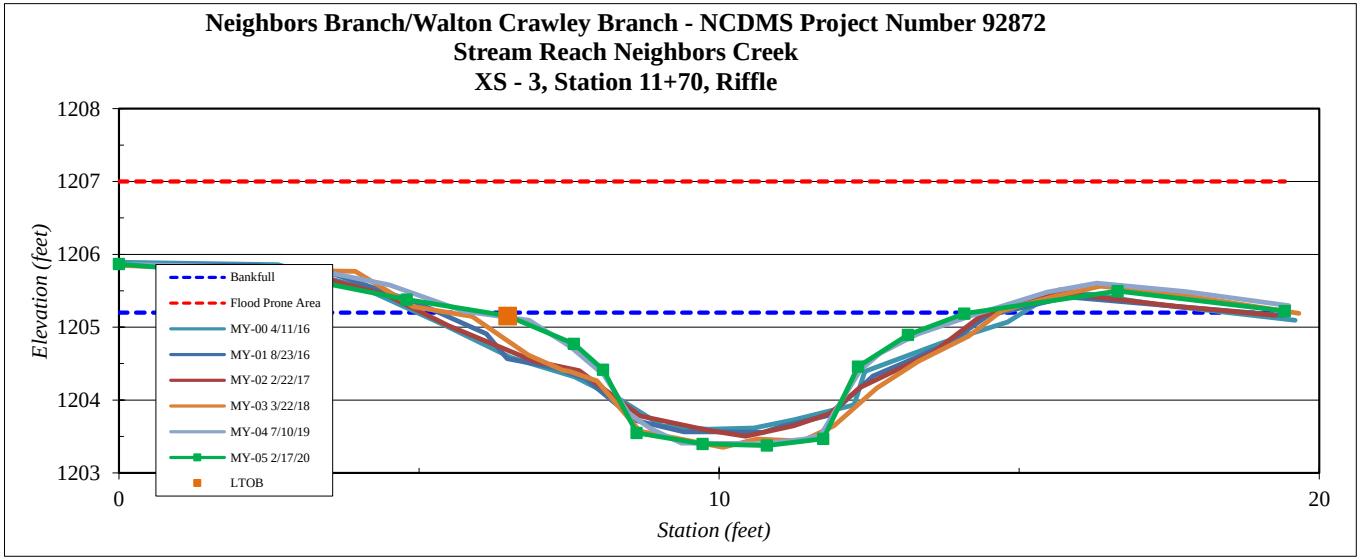
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 3, Riffle
Reach	Neighbors Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
0.00	1205.87
3.07	1205.66
4.80	1205.38
6.48	1205.16
7.58	1204.77
8.07	1204.42
8.63	1203.55
9.73	1203.40
10.80	1203.38
11.74	1203.47
12.32	1204.46
13.15	1204.90
14.09	1205.19
16.64	1205.50
19.43	1205.22

SUMMARY DATA	
Bankfull Elevation:	1205.2
LTOB Elevation:	1205.2
Bankfull Cross-Sectional Area:	8.1
Bankfull Width:	8.0
Flood Prone Area Elevation:	1207.0
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.8
Low Bank Height:	1.8
Mean Depth at Bankfull:	1.0
W / D Ratio:	7.9
Entrenchment Ratio:	12.5
Bank Height Ratio:	1.0

XS 3 Looking Upstream

Stream Type	E



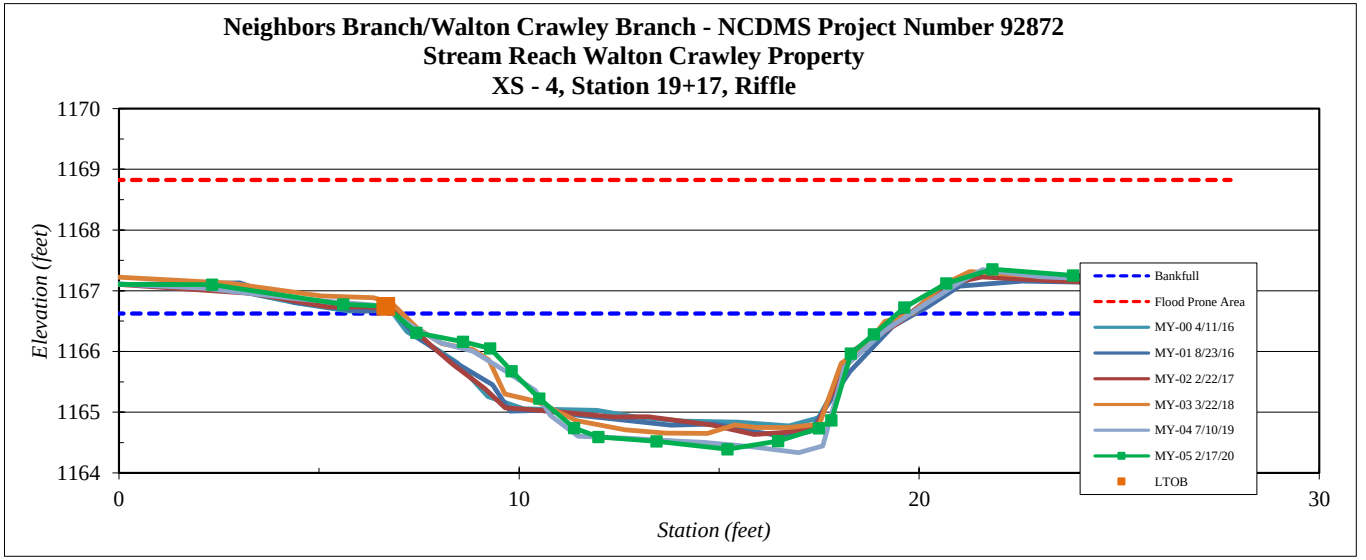
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 4, Riffle
Reach	Walton Crawley Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.10	1167.11
2.33	1167.10
5.61	1166.77
6.67	1166.75
7.44	1166.31
8.60	1166.16
9.28	1166.05
9.82	1165.67
10.51	1165.23
11.38	1164.74
11.98	1164.59
13.44	1164.52
15.21	1164.39
16.48	1164.52
17.49	1164.73
17.81	1164.86
18.3	1165.97
18.9	1166.28
19.63	1166.72
20.68	1167.12
21.84	1167.36
23.85	1167.25
25.84	1167.14
27.78	1167.21

SUMMARY DATA	
Bankfull Elevation:	1166.6
LTOB Elevation:	1166.7
Bankfull Cross-Sectional Area:	17.9
Bankfull Width:	12.6
Flood Prone Area Elevation:	1168.8
Flood Prone Width:	100.0
Max Depth at Bankfull:	2.2
Low Bank Height:	2.4
Mean Depth at Bankfull:	1.4
W / D Ratio:	8.9
Entrenchment Ratio:	7.9
Bank Height Ratio:	1.1

XS 4 Looking Upstream

Stream Type	E



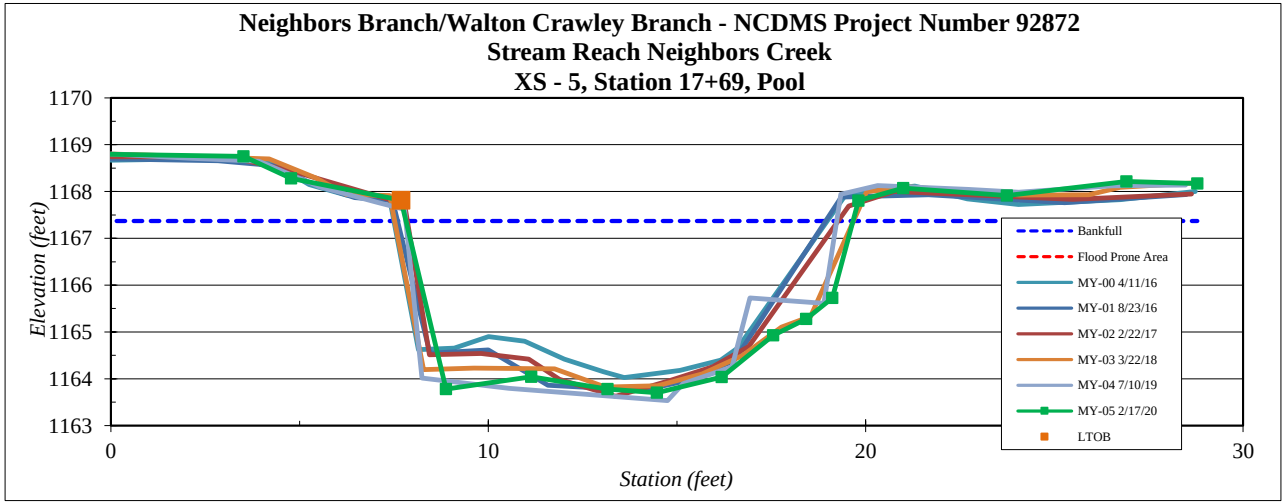
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 5, Pool
Reach	Walton Crawley Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.3	1168.8
3.5	1168.7
4.8	1168.3
7.7	1167.8
8.9	1163.8
11.1	1164.0
13.2	1163.8
14.5	1163.7
16.2	1164.0
17.5	1164.9
18.4	1165.3
19.1	1165.7
19.8	1167.8
21.0	1168.1
23.7	1167.9
26.9	1168.2
28.8	1168.2

SUMMARY DATA	
Bankfull Elevation:	1167.4
LTOB Elevation:	1167.8
Bankfull Cross-Sectional Area:	35.1
Bankfull Width:	11.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.7
Low Bank Height:	4.1
Mean Depth at Bankfull:	3.0
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.1

XS 5 Looking Upstream

Stream Type	E



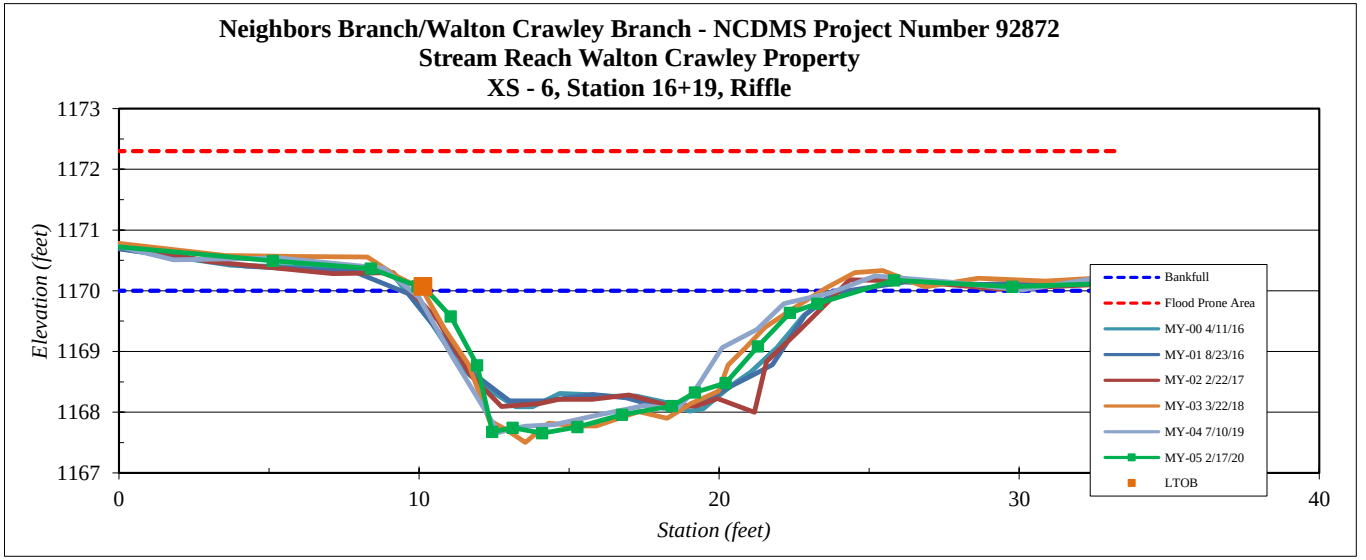
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 6, Riffle
Reach	Walton Crawley Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.10	1170.73
5.13	1170.49
8.40	1170.37
9.95	1170.07
10.13	1170.08
11.06	1169.58
11.94	1168.77
12.44	1167.68
13.12	1167.74
14.10	1167.65
15.28	1167.76
16.76	1167.96
18.43	1168.10
19.20	1168.32
20.22	1168.48
21.29	1169.08
22.4	1169.64
23.3	1169.79
25.8	1170.17
29.8	1170.07
33.3	1170.13

SUMMARY DATA	
Bankfull Elevation:	1170.0
LTOB Elevation:	1170.1
Bankfull Cross-Sectional Area:	20.2
Bankfull Width:	14.4
Flood Prone Area Elevation:	1172.3
Flood Prone Width:	100.0
Max Depth at Bankfull:	2.3
Low Bank Height:	2.4
Mean Depth at Bankfull:	1.4
W / D Ratio:	10.3
Entrenchment Ratio:	6.9
Bank Height Ratio:	1.0

XS 6 Looking Upstream

Stream Type	E



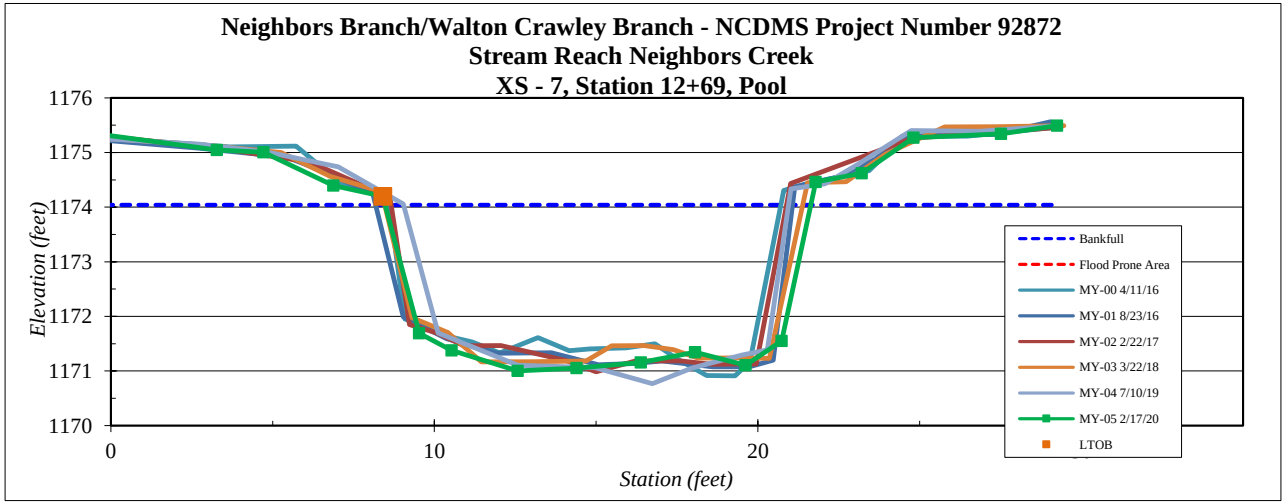
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 7, Pool
Reach	Walton Crawley Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.2	1175.3
3.3	1175.0
4.7	1175.0
6.9	1174.4
8.4	1174.2
9.5	1171.7
10.5	1171.4
12.6	1171.0
14.4	1171.1
16.4	1171.2
18.1	1171.3
19.6	1171.1
20.7	1171.5
21.8	1174.5
23.2	1174.6
24.8	1175.3
27.5	1175.3
29.2	1175.5

SUMMARY DATA	
Bankfull Elevation:	1174.0
LTOB Elevation:	1174.2
Bankfull Cross-Sectional Area:	34.1
Bankfull Width:	13.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	3.0
Low Bank Height:	3.2
Mean Depth at Bankfull:	2.6
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	<1

XS 7 Looking Upstream

Stream Type	E



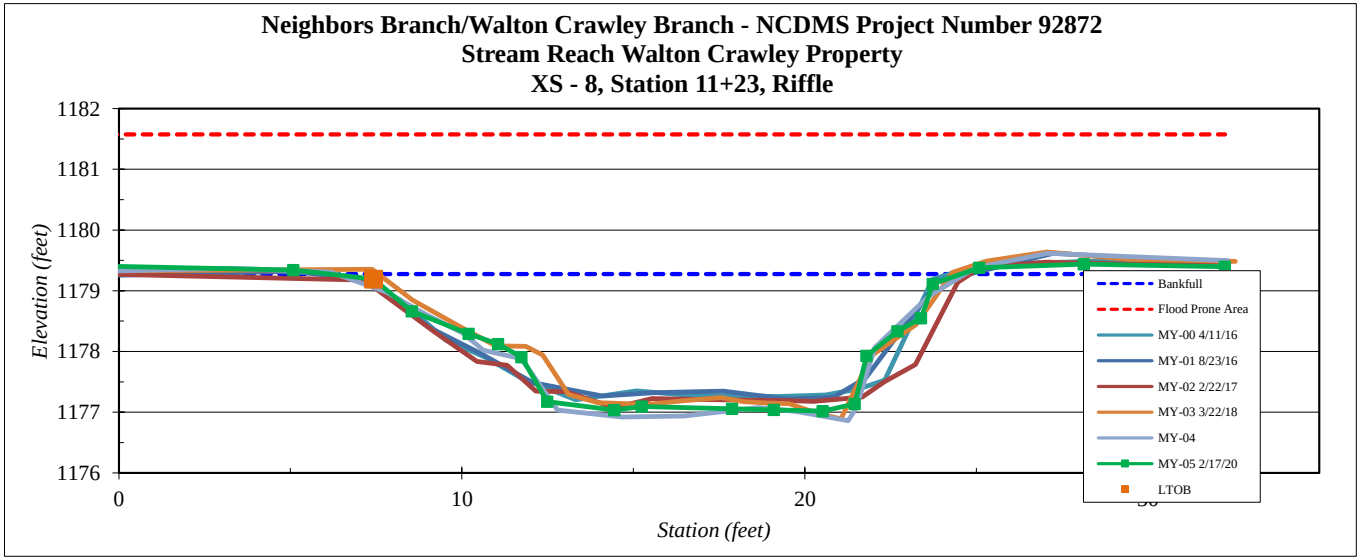
Site	Neighbors Br./Walton Crawley Br.
Project Number:	92872
XS ID	XS - 8, Riffle
Reach	Walton Crawley Branch
Date:	2/17/2020
Field Crew:	Perkinson, Keith

Station	Elevation
-0.30	1179.40
5.08	1179.34
7.42	1179.19
8.54	1178.66
10.20	1178.29
11.06	1178.12
11.73	1177.91
12.49	1177.17
14.45	1177.03
15.24	1177.10
17.88	1177.06
19.10	1177.04
20.53	1177.02
21.46	1177.14
21.80	1177.93
22.70	1178.33
23.4	1178.55
23.7	1179.11
25.1	1179.38
28.1	1179.44
32.3	1179.40

SUMMARY DATA	
Bankfull Elevation:	1179.3
LTOB Elevation:	1179.2
Bankfull Cross-Sectional Area:	27.0
Bankfull Width:	18.4
Flood Prone Area Elevation:	1181.6
Flood Prone Width:	100.0
Max Depth at Bankfull:	2.3
Low Bank Height:	2.2
Mean Depth at Bankfull:	1.5
W / D Ratio:	12.5
Entrenchment Ratio:	5.4
Bank Height Ratio:	1.0

XS 8 Looking Upstream

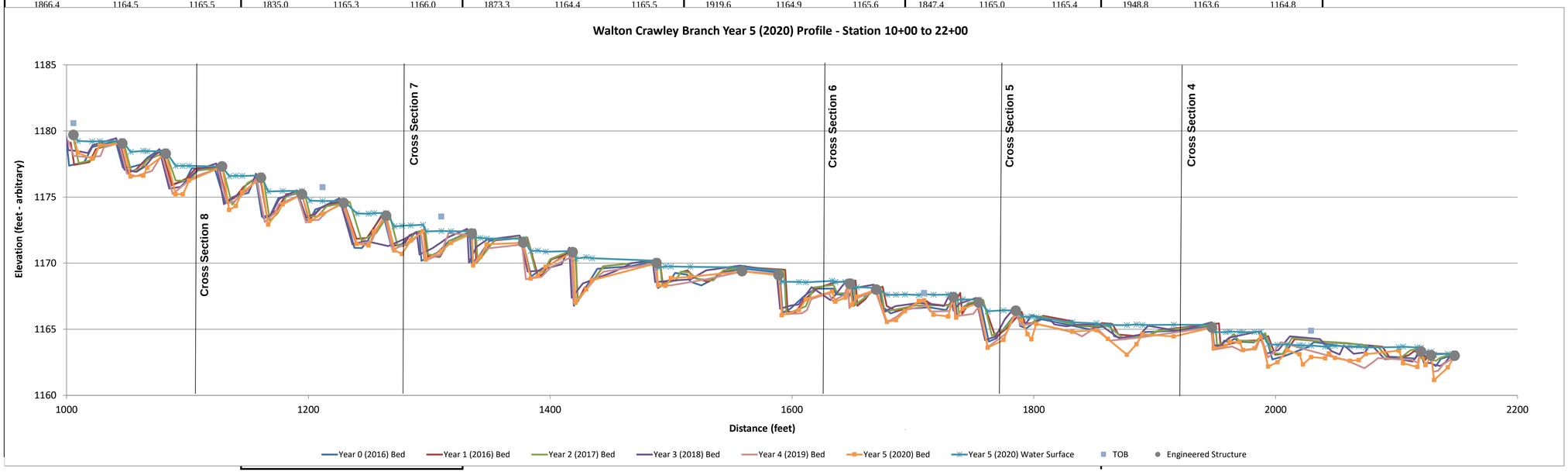
Stream Type	E



Project Name	Neighbors Branch/Walton Crawley Branch - Profile
Reach	Walton Crawley Branch, Station 10+00 - 22+00
Feature	Profile
Date	2/17/20
Crew	Perkinson, Keith

2016 Year 0 Monitoring \Survey			2016 Year 1 Monitoring \Survey			2017 Year 2 Monitoring \Survey			2018 Year 3 Monitoring \Survey			2019 Year 4 Monitoring \Survey			2020 Year 5 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
2147.7	1163.1	1163.3	2147.7	1163.1	1163.4	2146.6	1163.2	1163.3	2146.6	1163.3	1163.5	2148.1	1162.9	1163.1	2148.1	1163.0	1163.2
2136.7	1162.8	1163.4	2127.6	1163.2	1163.6	2135.8	1162.8	1163.3	2140.5	1162.5	1163.5	2138.6	1162.4	1163.1	2142.4	1162.1	1163.1
2132.5	1162.2	1163.3	2123.9	1162.7	1163.6	2132.9	1162.6	1163.2	2136.4	1162.2	1163.5	2134.3	1161.9	1163.1	2131.0	1161.2	1163.1
2128.3	1162.5	1163.3	2121.6	1163.4	1163.7	2127.3	1162.7	1163.3	2129.5	1162.3	1163.5	2130.2	1161.8	1163.1	2128.7	1163.0	1163.3
2122.8	1162.4	1163.5	2114.1	1163.3	1163.9	2125.3	1163.1	1163.5	2126.2	1163.3	1163.7	2128.4	1163.2	1163.3	2124.0	1162.3	1163.3
2119.2	1163.5	1163.7	2109.9	1163.0	1163.9	2122.6	1162.7	1163.5	2124.8	1162.9	1163.7	2119.8	1163.3	1163.6	2120.3	1163.3	1163.6
2115.3	1162.8	1163.7	2101.0	1162.9	1163.9	2120.6	1162.8	1163.6	2121.8	1163.1	1163.7	2117.4	1162.5	1163.6	2117.2	1162.1	1163.6
2104.0	1162.9	1163.8	2094.9	1162.8	1163.8	2119.4	1163.6	1163.7	2120.0	1163.3	1163.8	2111.7	1162.7	1163.6	2105.3	1162.4	1163.7
2091.7	1162.9	1163.8	2088.3	1163.7	1164.1	2111.5	1163.4	1163.8	2113.2	1162.6	1163.9	2102.8	1162.7	1163.6	2102.1	1163.4	1163.7
2085.1	1163.6	1163.9	2060.8	1163.9	1164.4	2103.9	1162.9	1163.7	2097.8	1162.8	1163.9	2084.8	1162.8	1163.6	2074.5	1163.1	1163.6
2057.2	1163.7	1164.3	2048.0	1164.0	1164.4	2092.7	1162.7	1163.8	2090.3	1162.7	1163.9	2080.8	1162.5	1163.6	2068.8	1162.7	1163.7
2031.9	1164.0	1164.5	2015.6	1164.3	1164.8	2085.5	1163.7	1163.9	2080.4	1163.7	1164.2	2073.5	1162.0	1163.6	2061.5	1162.6	1163.7
2026.5	1163.7	1164.6	2007.5	1163.1	1164.8	2058.9	1164.0	1164.3	2077.4	1163.8	1164.3	2057.6	1162.7	1163.6	2049.2	1162.8	1163.8
2007.1	1163.0	1164.6	1999.5	1163.1	1164.8	2037.4	1164.1	1164.5	2073.9	1163.3	1164.2	2046.8	1162.9	1163.6	2044.1	1163.2	1163.7
1997.2	1162.7	1164.6	1993.9	1164.5	1165.0	2013.4	1164.3	1164.7	2064.6	1163.1	1164.2	2026.4	1163.4	1163.9	2041.0	1162.8	1163.7
1991.6	1164.6	1165.0	1986.7	1164.2	1165.0	2005.8	1163.1	1164.7	2056.5	1163.8	1164.5	2004.3	1164.0	1164.4	2029.4	1162.9	1163.8
1981.9	1164.0	1164.9	1972.6	1164.1	1165.0	1996.8	1163.2	1164.7	2052.9	1163.1	1164.5	1997.4	1163.2	1164.5	2022.6	1162.3	1163.8
1969.8	1164.1	1164.9	1954.3	1163.7	1165.1	1991.4	1164.7	1164.9	2046.1	1163.4	1164.4	1993.7	1162.9	1164.4	2019.6	1163.1	1163.8
1966.1	1164.3	1164.9	1953.1	1165.4	1165.6	1983.0	1164.1	1164.9	2036.5	1164.3	1164.6	1987.8	1164.5	1164.7	2009.9	1163.4	1163.9
1961.1	1164.0	1165.0	1916.9	1165.1	1165.6	1969.1	1164.2	1165.0	2011.7	1164.5	1165.0	1983.8	1163.5	1164.7	2001.5	1162.5	1163.8
1957.7	1164.1	1164.9	1903.5	1164.9	1165.6	1965.6	1164.6	1164.9	2002.3	1163.4	1165.0	1971.6	1163.4	1164.8	1993.7	1162.2	1163.9
1951.6	1163.6	1165.0	1895.6	1164.5	1165.6	1960.0	1164.2	1164.9	1992.1	1163.1	1164.9	1963.9	1163.7	1164.7	1987.9	1164.5	1164.8
1950.3	1165.3	1165.4	1881.5	1164.5	1165.6	1951.5	1163.8	1164.9	1985.7	1164.8	1165.1	1948.3	1163.4	1164.7	1982.5	1163.6	1164.8
1916.9	1164.9	1165.5	1870.0	1164.6	1165.6	1950.2	1165.4	1165.5	1961.6	1164.4	1165.1	1946.6	1165.1	1165.3	1973.0	1163.4	1164.8
1892.2	1164.8	1165.5	1864.9	1165.4	1165.8	1901.2	1164.9	1165.5	1953.9	1163.7	1165.1	1885.1	1164.3	1165.3	1970.2	1164.0	1164.8
1886.9	1164.5	1165.5	1856.2	1165.5	1165.9	1893.4	1164.5	1165.5	1949.0	1163.8	1165.1	1862.7	1164.1	1165.3	1962.2	1164.0	1164.8
1875.7	1164.2	1165.5	1851.4	1165.2	1165.9	1881.7	1164.5	1165.5	1947.3	1165.5	1165.6	1853.9	1164.9	1165.4	1958.8	1163.8	1164.8
1866.4	1164.5	1165.5	1835.0	1165.3	1166.0	1873.3	1164.4	1165.5	1919.6	1164.9	1165.6	1847.4	1165.0	1165.4	1948.8	1163.6	1164.8

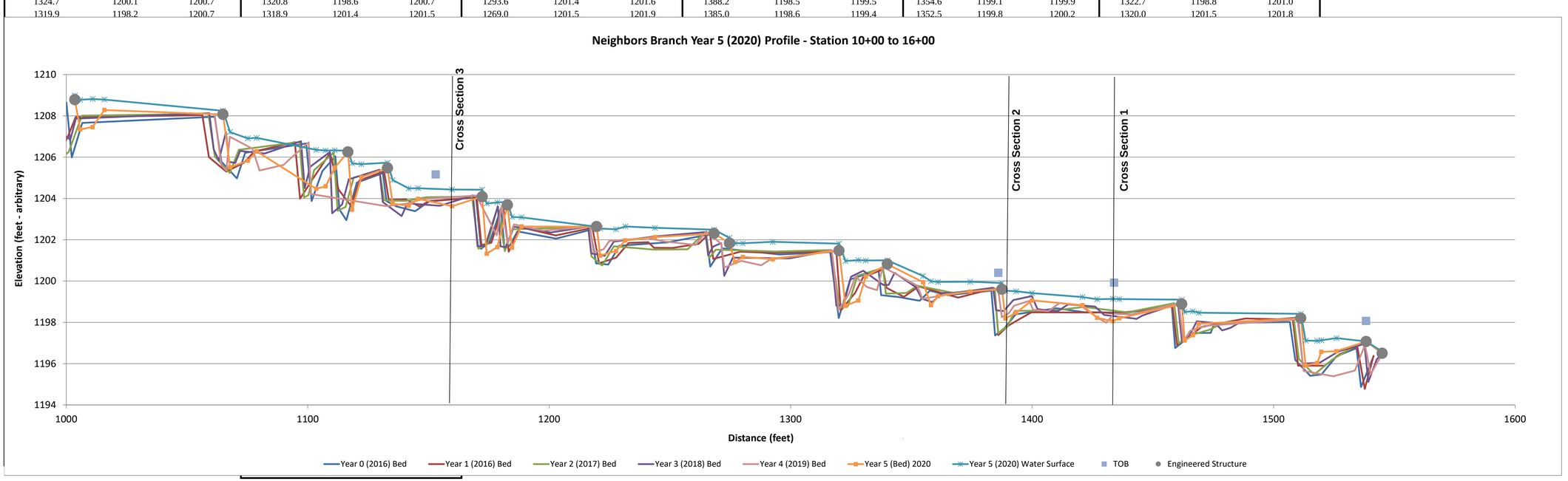
	2016	2016	2017	2018	2019	2020
Avg. Water Surface	0.0145	0.0143	0.0146	0.0145	0.0144	0.0145
Riffle Length	24	24	25	20	22	26
Avg. Riffle Slope	0.0032	0.0055	0.0030	0.0087	0.0055	0.0018
Pool Length	25	23	22	27	26	21
Pool to Pool Spacin	43	42	41	41	47	40



Project Name Neighbors Branch/Walton Crawley Branch - Profile
Reach Neighbors Branch, Station 10+00 - 16+00
Feature Profile
Date 2/17/20
Crew Perkinson, Keith

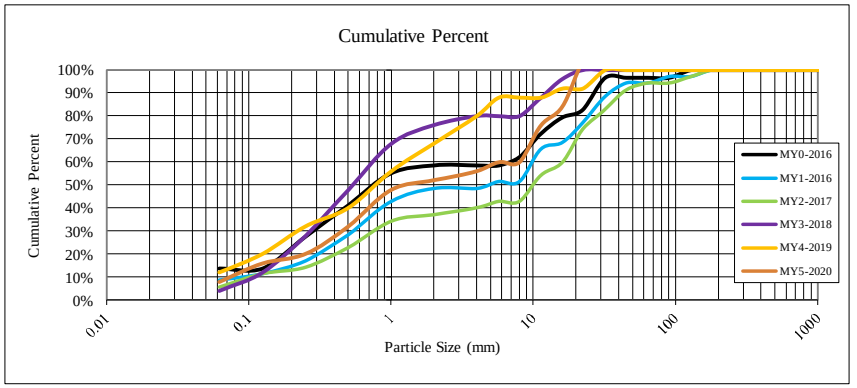
2016 Year 0 Monitoring \Survey			2016 Year 1 Monitoring \Survey			2017 Year 2 Monitoring \Survey			2018 Year 3 Monitoring \Survey			2019 Year 4 Monitoring \Survey			2020 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
1541.4	1196.4	1196.4	1541.4	1196.4	1196.4	1535.4	1197.0	1196.9	1545.0	1196.5	1196.6	1545.0	1196.5	1196.6	1545.0	1196.5	1196.6
1536.2	1194.9	1196.4	1537.7	1194.8	1196.4	1524.5	1196.2	1196.9	1542.7	1196.2	1196.6	1540.2	1195.5	1196.6	1538.3	1197.1	1197.1
1534.4	1196.7	1196.9	1534.6	1196.8	1196.9	1516.8	1195.5	1196.9	1539.2	1195.1	1196.5	1537.8	1196.9	1197.1	1526.0	1196.6	1197.2
1526.1	1196.4	1196.9	1527.5	1196.5	1196.9	1510.4	1196.2	1196.9	1537.6	1197.0	1197.0	1533.6	1195.7	1197.0	1519.7	1196.6	1197.1
1519.8	1195.5	1196.9	1521.1	1195.9	1196.9	1508.3	1198.2	1198.2	1526.8	1196.6	1197.0	1524.8	1195.4	1197.1	1518.1	1196.0	1197.1
1515.2	1195.4	1196.9	1510.1	1195.9	1197.0	1478.7	1197.9	1198.3	1519.1	1196.0	1197.1	1512.5	1195.6	1197.1	1513.3	1195.9	1197.1
1508.9	1196.2	1197.0	1507.9	1198.1	1198.3	1473.5	1197.6	1198.3	1512.1	1196.0	1197.1	1509.9	1198.1	1198.4	1511.3	1198.2	1198.4
1506.7	1198.0	1198.2	1488.4	1198.2	1198.3	1465.3	1197.4	1198.4	1510.1	1198.2	1198.3	1471.4	1197.8	1198.5	1469.0	1197.9	1198.5
1475.6	1198.0	1198.3	1475.6	1197.9	1198.3	1460.7	1197.0	1198.3	1486.0	1198.0	1198.4	1465.4	1197.6	1198.5	1466.6	1197.4	1198.5
1473.9	1197.5	1198.3	1470.3	1197.8	1198.3	1458.8	1198.9	1198.9	1482.1	1197.7	1198.4	1462.6	1197.1	1198.4	1463.2	1197.1	1198.5
1467.1	1197.5	1198.3	1460.0	1196.9	1198.3	1439.4	1198.5	1198.9	1478.8	1197.6	1198.4	1460.8	1198.9	1199.1	1462.0	1198.9	1199.1
1459.3	1196.8	1198.4	1458.2	1198.8	1199.0	1421.4	1198.7	1199.0	1475.7	1198.0	1198.4	1441.2	1198.4	1199.0	1436.1	1198.2	1199.1
1457.8	1198.8	1198.9	1434.3	1198.4	1199.0	1408.3	1198.6	1199.0	1468.2	1198.1	1198.4	1433.9	1198.4	1199.1	1433.4	1198.1	1199.1
1439.1	1198.5	1199.0	1429.2	1198.5	1199.0	1392.8	1198.6	1199.0	1465.0	1197.3	1198.5	1430.7	1198.0	1199.1	1427.0	1198.2	1199.1
1421.5	1198.5	1199.0	1399.7	1198.5	1199.1	1389.8	1197.8	1199.0	1462.1	1197.1	1198.5	1426.5	1198.3	1199.1	1420.8	1198.8	1199.2
1410.0	1198.7	1199.0	1395.0	1198.2	1199.1	1386.0	1197.5	1199.0	1460.4	1198.9	1199.1	1419.7	1198.8	1199.2	1400.0	1199.1	1199.4
1393.1	1198.4	1199.1	1390.1	1197.8	1199.1	1384.4	1199.6	1199.7	1445.7	1198.3	1199.0	1411.4	1198.9	1199.3	1393.4	1198.5	1199.5
1388.5	1197.7	1199.0	1386.0	1197.4	1199.1	1367.0	1199.4	1199.7	1443.0	1198.2	1199.1	1406.6	1198.5	1199.3	1388.9	1198.2	1199.5
1384.7	1197.4	1199.0	1384.5	1199.7	1199.7	1352.5	1199.8	1199.9	1442.8	1198.2	1199.1	1400.3	1198.6	1199.3	1387.5	1199.6	1199.9
1383.2	1199.5	1199.7	1369.3	1199.2	1199.8	1348.0	1199.4	1199.9	1429.8	1198.4	1199.1	1398.8	1199.0	1199.3	1374.4	1199.5	1200.0
1364.9	1199.3	1199.8	1353.1	1199.7	1199.9	1339.4	1199.4	1200.1	1426.0	1198.8	1199.0	1392.6	1198.8	1199.4	1361.0	1199.3	1200.0
1357.6	1199.5	1199.9	1346.9	1199.2	1200.0	1338.2	1200.6	1200.7	1414.9	1198.9	1199.4	1390.4	1198.4	1199.4	1358.1	1198.8	1200.0
1353.4	1199.0	1199.9	1339.7	1199.7	1200.2	1327.7	1200.3	1200.6	1410.5	1198.5	1199.3	1387.4	1198.2	1199.4	1354.8	1199.9	1200.2
1344.8	1199.2	1199.9	1338.2	1200.6	1200.7	1323.7	1198.8	1200.6	1402.2	1198.6	1199.4	1385.9	1199.6	1199.8	1340.1	1200.8	1201.0
1337.5	1199.3	1200.3	1330.0	1200.2	1200.7	1320.3	1198.7	1200.7	1399.9	1199.3	1199.4	1364.3	1199.4	1199.9	1331.1	1200.2	1201.0
1336.4	1200.5	1200.7	1326.7	1199.4	1200.8	1316.8	1201.5	1201.5	1392.3	1199.1	1199.5	1361.1	1199.3	1200.0	1328.0	1199.1	1201.0
1324.7	1200.1	1200.7	1320.8	1198.6	1200.7	1293.6	1201.4	1201.6	1388.2	1198.5	1199.5	1354.6	1199.1	1199.9	1322.7	1198.8	1201.0
1319.9	1198.2	1200.7	1318.9	1201.4	1201.5	1269.0	1201.5	1201.9	1385.0	1198.6	1199.4	1352.5	1199.8	1200.2	1320.0	1201.5	1201.8

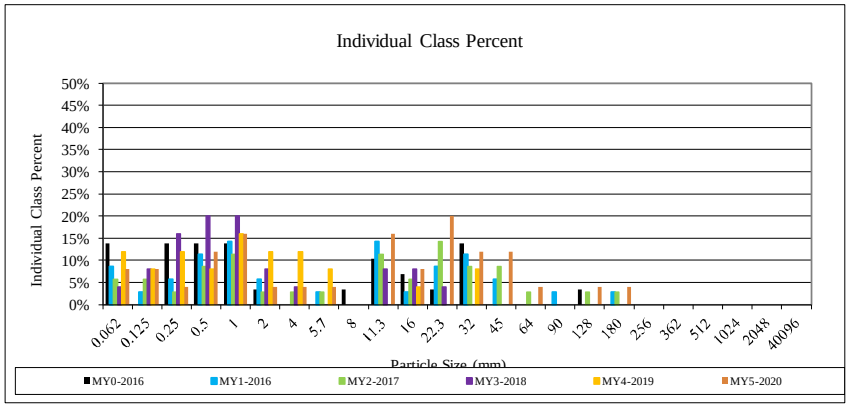
	2016	2016	2017	2018	2019	2020
Avg. Water Surface	0.0222	0.0220	0.0221	0.0225	0.0240	0.0229
Riffle Length	28	26	31	19	18	28
Avg. Riffle Slope	0.0043	0.0046	0.0041	0.0082	0.0140	0.0086
Pool Length	12	15	12	9	17	12
Pool to Pool Spacing	36	34	38	26	30	36



Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site					
Cross-Section: 1					
Feature: Riffle					
			2020		
Description	Material	Size (mm)	Total #	Item %	Cum %
Silt/Clay	silt/clay	0.062	2	4%	4%
Sand	very fine sand	0.125	2	8%	12%
	fine sand	0.250	1	16%	28%
	medium sand	0.50	3	20%	48%
	coarse sand	1.00	4	20%	68%
	very coarse sand	2.0	1	8%	76%
Gravel	very fine gravel	4.0	1	4%	80%
	fine gravel	5.7	1	0%	80%
	fine gravel	8.0	0	0%	80%
	medium gravel	11.3	4	8%	88%
	medium gravel	16.0	2	8%	96%
	course gravel	22.3	5	4%	100%
	course gravel	32.0	3	0%	100%
	very coarse gravel	45	3	0%	100%
	very coarse gravel	64	1	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	1	0%	100%
	large cobble	180	1	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			35	100%	100%

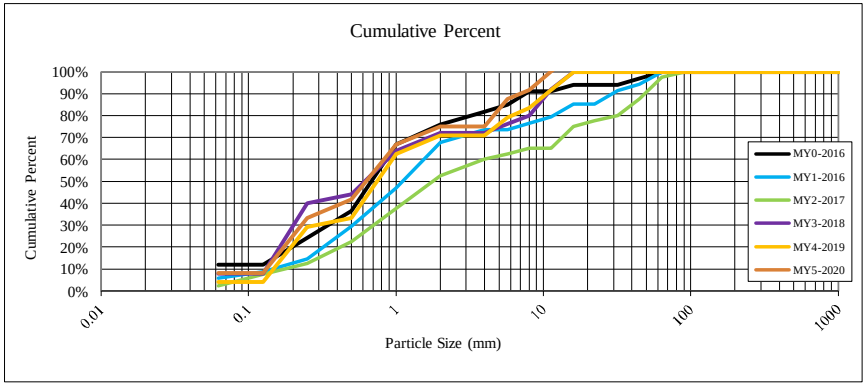
Summary Data	
D50	9.8
D84	33
D95	98

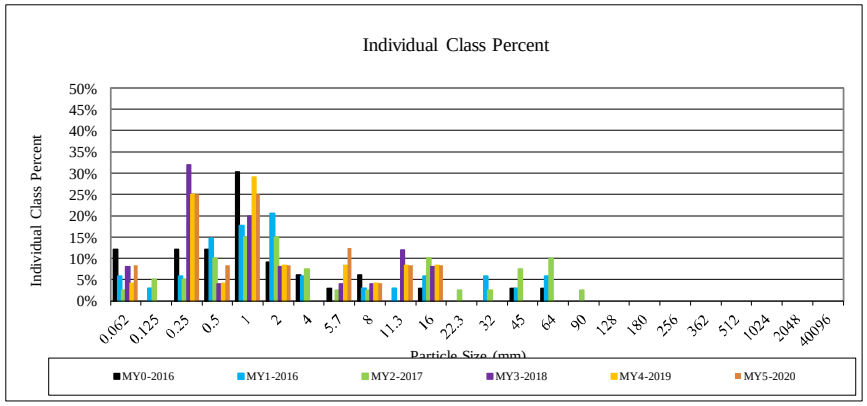




Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site					
Cross-Section: 3					
Feature: Riffle					
			2020		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	2	8%	8%
Sand	very fine sand	0.125	0	0%	8%
	fine sand	0.250	6	32%	40%
	medium sand	0.50	2	4%	44%
	coarse sand	1.00	6	20%	64%
	very coarse sand	2.0	2	8%	72%
Gravel	very fine gravel	4.0	0	0%	72%
	fine gravel	5.7	3	4%	76%
	fine gravel	8.0	1	4%	80%
	medium gravel	11.3	2	12%	92%
	medium gravel	16.0	2	8%	100%
	course gravel	22.3	0	0%	100%
	course gravel	32.0	0	0%	100%
	very coarse gravel	45	0	0%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			24	100%	100%

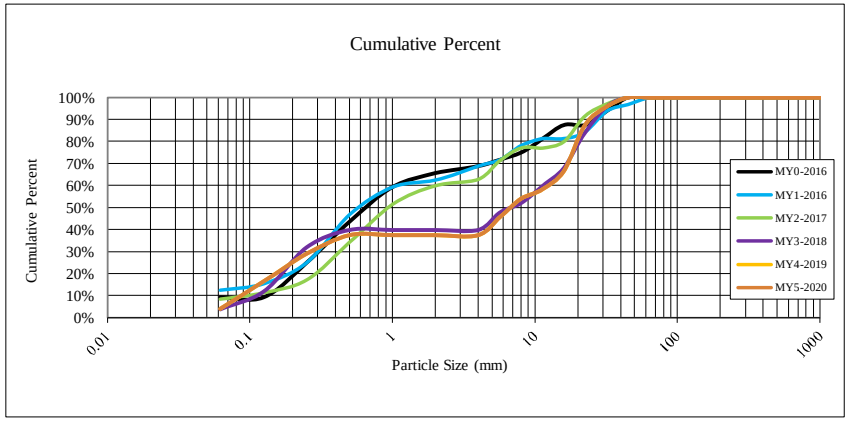
Summary Data	
D50	0.7
D84	8
D95	13

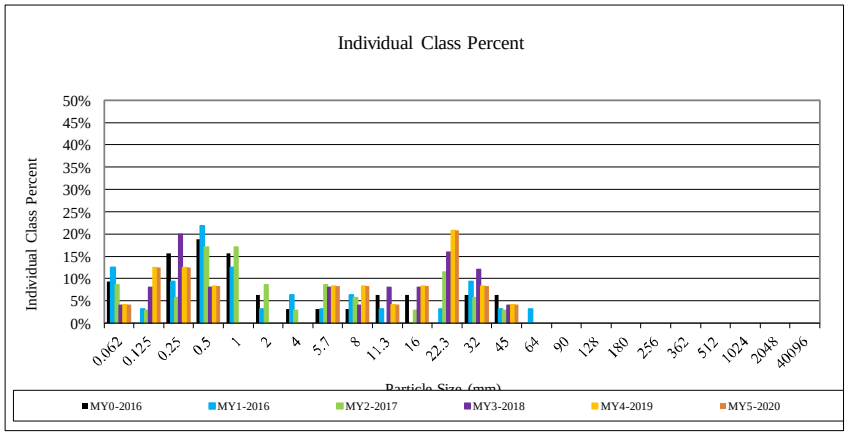




Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site					
Cross-Section: 4					
Feature: Riffle					
			2020		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	1	4%	4%
Sand	very fine sand	0.125	3	8%	12%
	fine sand	0.250	3	20%	32%
	medium sand	0.50	2	8%	40%
	coarse sand	1.00	0	0%	40%
	very coarse sand	2.0	0	0%	40%
Gravel	very fine gravel	4.0	0	0%	40%
	fine gravel	5.7	2	8%	48%
	fine gravel	8.0	2	4%	52%
	medium gravel	11.3	1	8%	60%
	medium gravel	16.0	2	8%	68%
	course gravel	22.3	5	16%	84%
	course gravel	32.0	2	12%	96%
	very coarse gravel	45	0	4%	100%
	very coarse gravel	64	0	0%	100%
Cobble	small cobble	90	0	0%	100%
	medium cobble	128	0	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			25	100%	100%

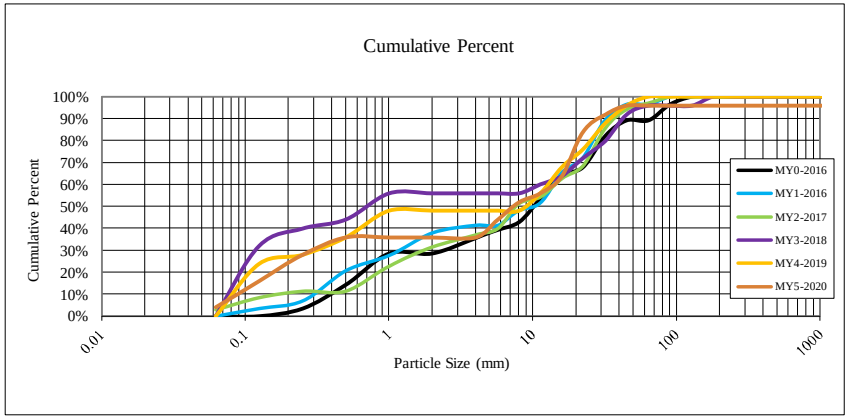
Summary Data	
D50	6.9
D84	21
D95	31

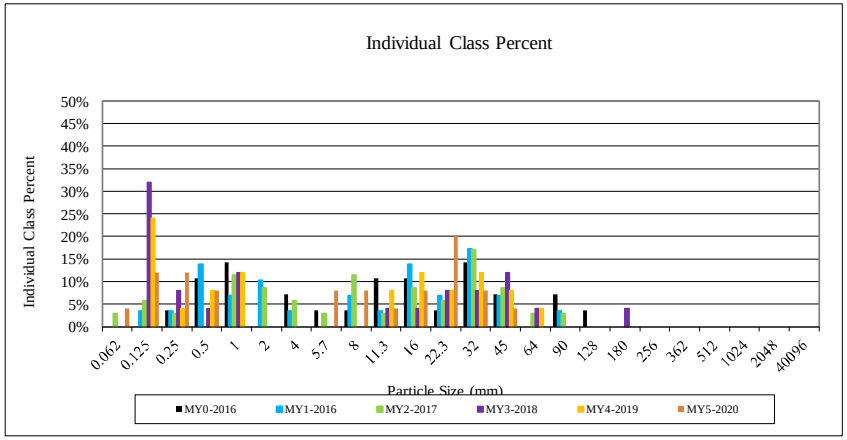




Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site					
Cross-Section: 6					
Feature: Riffle					
			2020		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	1	0%	0%
Sand	very fine sand	0.125	3	32%	32%
	fine sand	0.250	3	8%	40%
	medium sand	0.50	2	4%	44%
	coarse sand	1.00	0	12%	56%
	very coarse sand	2.0	0	0%	56%
Gravel	very fine gravel	4.0	0	0%	56%
	fine gravel	5.7	2	0%	56%
	fine gravel	8.0	2	0%	56%
	medium gravel	11.3	1	4%	60%
	medium gravel	16.0	2	4%	64%
	course gravel	22.3	5	8%	72%
	course gravel	32.0	2	8%	80%
	very coarse gravel	45	1	12%	92%
	very coarse gravel	64	0	4%	96%
Cobble	small cobble	90	0	0%	96%
	medium cobble	128	0	0%	96%
	large cobble	180	0	4%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			24	100%	100%

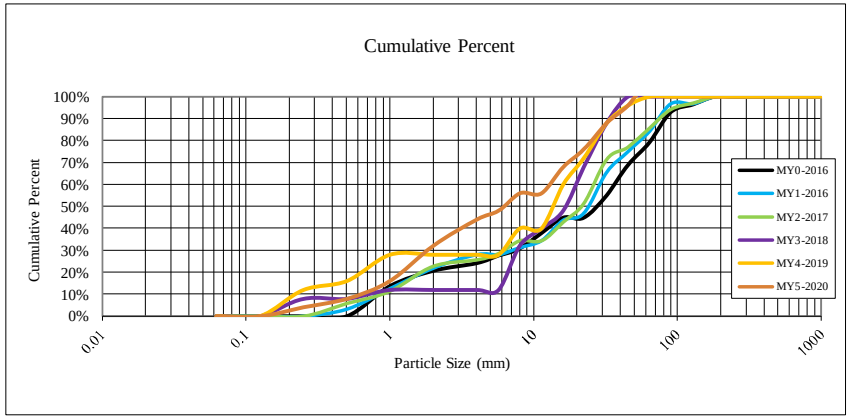
Summary Data	
D50	6.9
D84	21
D95	31





Project Name: Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site					
Cross-Section: 8					
Feature: Riffle					
			2020		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	0	0%	0%
Sand	very fine sand	0.125	0	0%	0%
	fine sand	0.250	1	8%	8%
	medium sand	0.50	1	0%	8%
	coarse sand	1.00	2	4%	12%
	very coarse sand	2.0	4	0%	12%
Gravel	very fine gravel	4.0	3	0%	12%
	fine gravel	5.7	1	0%	12%
	fine gravel	8.0	2	20%	32%
	medium gravel	11.3	0	8%	40%
	medium gravel	16.0	3	8%	48%
	course gravel	22.3	2	20%	68%
	course gravel	32.0	3	20%	88%
	very coarse gravel	45	2	12%	100%
	very coarse gravel	64	3	0%	100%
Cobble	small cobble	90	1	0%	100%
	medium cobble	128	1	0%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			29	100%	100%

Summary Data	
D50	11.7
D84	47
D95	77



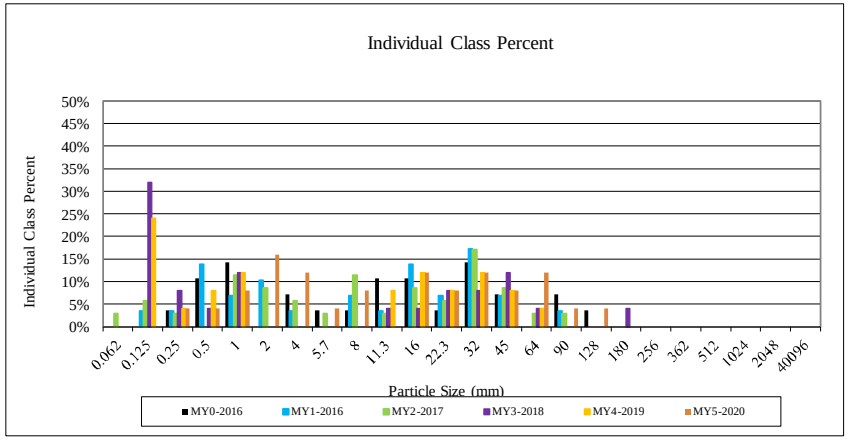


Table 10a. Baseline Stream Data Summary (Neighbors Creek)
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Gauge	Regional Curve			Pre-Existing Condition (Neighbors Cr)					Reference Reach(es) Data					Design (Neighbors Cr)			Monitoring Baseline (Neighbors Cr)					
Dimension and Substrate - Riffle Only		**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Max**	**Med**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
BF Width (ft)					5.4			5.9			12.7						11.0	9.6		11.1	12.5		2
Floodprone Width (ft)					7.4			17.1			150						70			100			2
BF Mean Depth (ft)					0.9			1.1			0.9						0.8	0.8		0.8	0.8		2
BF Max Depth (ft)					1.2			1.5			1.2						1.1	1.5		1.7	1.8		2
BF Cross Sectional Area (ft^2)					4.9			6.5			11.4						8.3	8.0		9.0	9.9		2
Width/Depth Ratio					5.3			5.8			14.1						14.0	12.0		13.8	15.6		2
Entrenchment Ratio					1.4			2.9			11.8						6.4	8.0		9.2	10.4		2
Bank Height Ratio					1.6			2.6			1.0						1.0			1.0			2
Profile																							
Riffle length (ft)																		5.4	28.3	25.5	64.7	18.2	13
Riffle slope (ft/ft)					0.025			0.035			0.0344						0.0120	0.0000	0.0043	0.0022	0.0121	0.0046	13
Pool length (ft)																		6.5	11.9	10.4	21.3	5.2	15
Pool Max depth (ft)					1.7			1.8			2.2						2.0	2.8		2.8	2.8		1
Pool spacing (ft)					16.4			99.2		38.8			64.7		33.0	56.1		7.0	36.1	37.9	74.7	19.8	15
Pattern																							
Channel Beltwidth (ft)					8			22		30.5			32		27.5	66		27.5			66		2
Radius of Curvature (ft)					5			22		14.5			20		22	44		22			44		2
Rc:Bankfull width (ft/ft)					0.9			1.5		1.1			1.6		2	4		2			4		2
Meander Wavelength (ft)					30			128		95			98		44	110		44			110		2
Meander Width ratio					1.5			4.1		2.4			2.5		4	10		4			10		2
Transport parameters																							
Reach Shear Stress (competency) lbs/ft^2																							
Max part size (mm) mobilized at bankfull																							
Stream Power (transport capacity) W/m^2																							
Additional Reach Parameters																							
Rosgen Classification					G5/4 - E5/4					C					C			E/C					
Bankfull Velocity (fps)					3.86 - 5.09																		
Bankfull Discharge (cfs)					25																		
Valley Length (ft)					----					----													
Channel Thalweg Length (ft)					----					----					----			541					
Sinuosity					1.01 - 1.21					1.22					1.18			1.18					
Water Surface Slope (ft/ft)					0.019 - 0.0204					0.0205					0.008			0.0222					
BF slope (ft/ft)					----					----					----			----					
Bankfull Floodplain Area (acres)					----					----					----			----					
% of Reach with Eroding Banks					----					----													
Channel Stability or Habitat Metric					----					----													
Biological or Other					----					----													

Table 10b. Baseline Stream Data Summary (Walton Crawley Property)
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Gauge	Regional Curve			Pre-Existing Condition (WC Property)					Reference Reach(es) Data					Design (WC Property)			Monitoring Baseline (WC Property)					
Dimension and Substrate - Riffle Only		**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Max**	**Med**	**Min**	**Mean**	**Med**	**Max**	**SD**	**n**
BF Width (ft)					7.9			9.4			12.7						15.5	13.2		14.3	16.8		3
Floodprone Width (ft)					12.9			16.8			150				55	90				100			3
BF Mean Depth (ft)					0.8			0.9			0.9						1.1	1.3		1.4	1.5		3
BF Max Depth (ft)					0.9			1.1			1.2						1.4	1.9		2.0	2.0		3
BF Cross Sectional Area (ft^2)					6.2			8.4			11.4						16.6	17.6		19.4	25.0		3
Width/Depth Ratio					10.2			10.4			14.1						14.0	10.2		10.2	11.2		3
Entrenchment Ratio					1.6			1.8			11.8						4.5	6.0		7.0	7.6		3
Bank Height Ratio					1.0			2.8			1.0						1.0			1.0			3
Profile																							
Riffle length (ft)																		6.7	23.9	16.2	58.1	18	20
Riffle slope (ft/ft)					0.024			0.030			0.0344						0.0077	0.0000	0.0032	0.0018	0.0113	0.0036	20
Pool length (ft)																		7.9	24.8	24.8	63.1	10.8	27
Pool Max depth (ft)					1.9			2.1			2.2						2.4	1.3		1.4	1.5		2
Pool spacing (ft)					6.0			40.8		38.8			64.7		15.5	79.2		14.9	42.5	36.4	93.6	21.3	27
Pattern																							
Channel Beltwidth (ft)					16			25		30.5			32		38.8	93		38.8			93		2
Radius of Curvature (ft)					5			14		14.5			20		31	62		31			62		2
Rc:Bankfull width (ft/ft)					0.5			1.5		1.1			1.6		2	4		2			4		2
Meander Wavelength (ft)					103			121		95			98		77.5	155		77.5			155		2
Meander Width ratio					11			12.9		2.4			2.5		5	10		5			10		2
Transport parameters																							
Reach Shear Stress (competency) lbs/ft^2																							
Max part size (mm) mobilized at bankfull																							
Stream Power (transport capacity) W/m^2																							
Additional Reach Parameters																							
Rosgen Classification					B/G					C					C			E/C					
Bankfull Velocity (fps)					3.9-7.5																		
Bankfull Discharge (cfs)					24-63																		
Valley Length (ft)					----					----													
Channel Thalweg Length (ft)					----					----					----			1148					
Sinuosity					1.01-1.2					1.22					1.1			1.1					
Water Surface Slope (ft/ft)					0.0135-0.0340					0.0205					0.0045			0.0145					
BF slope (ft/ft)					----					----					----			----					
Bankfull Floodplain Area (acres)					----					----					----			----					
% of Reach with Eroding Banks					----					----													
Channel Stability or Habitat Metric					----					----													
Biological or Other					----					----													

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Cross Section 1 (Neighbors Branch) Riffle							Cross Section 2 (Neighbors Branch) Pool							Cross Section 3 (Neighbors Branch) Riffle						
Dimension*	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	12.5	11.1	11.9	9.5	9.8	11.9		8.5	10.4	9.7	12.8	11.7	11.2		9.6	8.7	8.9	8.2	8.5	8.0	
Floodprone Width (ft) (approx)	100.0	100.0	100.0	100.0	100.0	100.0		NA	NA	NA	NA	NA	NA		100.0	100.0	100.0	100.0	100.0	100.0	
BF Mean Depth (ft)	0.8	0.9	0.8	1.0	1.0	0.8		1.6	1.4	1.4	1.1	1.2	1.3		0.8	0.9	0.9	1.0	1.0	1.0	
BF Max Depth (ft)	1.8	1.6	1.8	1.7	1.9	1.8		2.8	2.9	3.0	2.2	2.2	2.5		1.5	1.5	1.6	1.7	1.8	1.8	
Low Bank Height (ft)	1.8	1.6	1.8	1.7	1.9	1.8		2.8	2.9	3.0	2.2	2.2	2.5		1.5	1.5	1.6	1.8	1.8	1.8	
BF Cross Sectional Area (ft^2)	9.9	9.6	9.5	9.5	9.5	9.5		13.6	14.1	14.0	14.0	14.0	14.0		8.0	8.1	8.1	8.1	8.1	8.1	
Width/Depth Ratio	15.8	12.8	14.9	9.5	10.1	14.9		NA	NA	NA	NA	NA	NA		11.5	9.3	9.8	8.3	8.9	7.9	
Entrenchment Ratio	8.0	9.0	8.4	10.5	10.2	8.4		NA	NA	NA	NA	NA	NA		10.4	11.5	11.2	12.2	11.8	12.5	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.1	1.0	1.0	
d50 (mm)	0.8	4.9	9.8	0.8	0.8	9.8		----	----	----	----	----	----		0.7	1.1	1.8	0.8	0.8	0.7	

*Beginning in Year 3 (2018), the bankfull elevation and channel cross section dimensions are calculated using a fixed Abkf as described in the Standard Measurement of the BHR Monitoring Parameter provided by NCIRT and NCDMS (9/2018).

Table 11b. Monitoring Data - Stream Reach Data Summary
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Baseline (Neighbors Branch)						MY-1 (Neighbors Branch)						MY-2 (Neighbors Branch)						MY-3 (Neighbors Branch)						MY-4 (Neighbors Branch)						MY-5 (Neighbors Branch)					
Dimension and Substrate - Riffle Only	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	9.6		11.1	12.5		2	8.7		9.9	11.1		2	8.9		10.4	11.9		2	8.2		9.0	9.7		2	8.5		9.2	9.8		2						
Floodprone Width (ft)			100			2			100			2			100			2			100			2			100			2						
BF Mean Depth (ft)	0.8		0.8	0.8		2	0.9		0.9	0.9		2	0.8		0.9	0.9		2	1.0		1.0	1.0		2	1.0		1.0	1.0		2						
BF Max Depth (ft)	1.5		1.7	1.8		2	1.5		1.6	1.6		2	1.6		1.7	1.8		2	1.7		1.7	1.7		2	1.8		1.9	1.9		2						
BF Cross Sectional Area (ft^2)	8.0		9.0	9.9		2	8.1		8.9	9.6		2	8.1		8.8	9.5		2	8.1		8.8	9.5		2	8.1		8.8	9.5		2						
Width/Depth Ratio	12.0		13.8	15.6		2	9.7		11.0	12.3		2	9.9		12.4	14.9		2	8.3		9.1	9.9		2	8.9		9.5	10.1		2						
Entrenchment Ratio	8.0		9.2	10.4		2	9.0		10.3	11.5		2	8.4		9.8	11.2		2	10.3		11.3	12.2		2	10.2		11.0	11.8		2						
Bank Height Ratio			1.0			2			1.0			2			1.0			2	1.0		1.0	1.1		2	1.0		1.0	1.0		2						
Profile																																				
Riffle length (ft)	5.4	28.3	25.5	64.7	18.2	13	7.2	26.2	24.9	58.5	17.6	12	8	31	30	66	18	12	2	19	13	55	15	19	6.2	18.1	15.9	38.5	10.5	13						
Riffle slope (ft/ft)	0.0000	0.0043	0.0022	0.0121	0.0046	13	0.0000	0.0046	0.0035	0.0157	0.0046	12	0.0000	0.0041	0.0028	0.0143	0.0042	12	0.0000	0.0082	0.0026	0.0482	0.0127	19	0.0000	0.0140	0.0057	0.0657	0.0204	13.0000						
Pool length (ft)	7	12	10	21	5	15	7	15	15	26	5	16	4	12	11	27	6	14	3	9	8	20	4	21	5	17	12	48	13	16						
Pool Max depth (ft)	2.8		2.8	2.8		1	2.9		2.9	2.9		1	3.0		3.0	3.0		1	2.2		2.2	2.2		1.0	2.2		2.2	2.2		1						
Pool spacing (ft)	7	36	38	75	20	15	7	34	32	74	19	16	11	38	38	74	19	14	7	26	26	63	15	21	10	30	26	70	17	15						
Pattern																																				
Channel Beltwidth (ft)	27.5			66		2																														
Radius of Curvature (ft)	22			44		2																														
Rc:Bankfull width (ft/ft)	2			4		2																														
Meander Wavelength (ft)	44			110		2																														
Meander Width ratio	4			10		2																														
Additional Reach Parameters																																				
Rosgen Classification	E/C-type						E/C-type						E/C-type						E/C-type						E/C-type											
Channel Thalweg Length (ft)	541						547						538						548						484											
Sinuosity	1.18						1.18						1.18						1.18						1.18											
Water Surface Slope (Channel) (ft/ft)	0.0222						0.022						0.0221						0.0225						0.24											
BF slope (ft/ft)	-----						-----						-----						-----						-----											
Ri%/RU%P%G%/S%																																				
SC%/SA%/G%/C%/B%BE%																																				
d16/d35/d50/d84/d95																																				
% of Reach with Eroding Banks	0						0						0						0																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Table 11c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Cross Section 4 (Walton Crawley Br) Riffle							Cross Section 5 (Walton Crawley Br) Pool							Cross Section 6 (Walton Crawley Br) Riffle							Cross Section 7 (Walton Crawley Br) Pool							Cross Section 8 (Walton Crawley Br) Riffle						
Dimension*	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	13.2	13.1	13.0	13.0	12.7	12.6		11.9	11.7	11.9	12.2	11.4	11.8		14.3	14.5	14.2	13.2	14.6	14.4		12.2	13.0	12.6	13.0	12.5	13.2		16.8	16.9	17.4	17.2	17.9	18.4	
Floodprone Width (ft) (approx)	100.0	100.0	100.0	100.0	100.0	100.0		NA	NA	NA	NA	NA	NA		100.0	100.0	100.0	100.0	100.0	100.0		NA	NA	NA	NA	NA	NA		100.0	100.0	100.0	100.0	100.0	100.0	
BF Mean Depth (ft)	1.3	1.4	1.4	1.4	1.4	1.4		2.8	3.0	2.9	2.9	3.1	3.0		1.4	1.3	1.4	1.5	1.4	1.4		2.7	2.8	2.7	2.6	2.7	2.6		1.5	1.4	1.6	1.6	1.5	1.5	
BF Max Depth (ft)	1.9	2.0	2.0	2.0	2.2	2.2		3.7	4.0	4.1	3.6	3.9	3.7		2.0	1.9	2.0	2.5	2.4	2.3		3.4	3.2	3.3	3.0	3.5	3.0		2.0	2.0	2.1	2.5	2.4	2.3	
Low Bank Height (ft)	1.9	2.0	2.0	2.1	2.5	2.4		3.7	4.0	4.1	4.1	4.1	4.1		2.0	1.9	2.0	2.5	2.4	2.4		3.4	3.2	3.3	3.1	3.1	3.2		2.0	2.0	2.1	2.5	2.4	2.2	
BF Cross Sectional Area (ft^2)	17.6	18.2	17.9	17.9	17.9	17.9		32.9	35.2	35.1	35.1	35.1	35.1		19.4	19.5	20.2	20.2	20.2	20.2		33.0	35.9	34.1	34.1	34.1	34.1		25.0	24.4	27.0	27.0	27.0	27.0	
Width/Depth Ratio	9.9	9.4	9.4	9.4	9.0	8.9		NA	NA	NA	NA	NA	NA		10.5	10.8	10.0	8.6	10.6	10.3		NA	NA	NA	NA	NA	NA		11.3	11.7	11.2	11.0	11.9	12.5	
Entrenchment Ratio	7.6	7.6	7.7	7.7	7.9	7.9		NA	NA	NA	NA	NA	NA		7.0	6.9	7.0	7.6	6.8	6.9		NA	NA	NA	NA	NA	NA		6.0	5.9	5.7	5.8	5.6	5.4	
Bank Height Ratio	1.0	1.0	1.0	1.1	1.1	1.1		1.0	1.0	1.0	1.1	1.1	1.1		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	0.9	1.1		1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	0.7	0.6	0.9	7.0	7.0	6.9		----	----	----	----	----	----		9.9	9.4	7.7	0.8	0.8	6.9		----	----	----	----	----	----		26.5	23.4	20.9	18.0	18.0	11.7	

*Beginning in Year 3 (2018), the bankfull elevation and channel cross section dimensions are calculated using a fixed bankfull Area as described in the Standard Measurement of the BHR Monitoring Parameter provided by NCIRT and NCDMS (9/2018).

Table 11d. Monitoring Data - Stream Reach Data Summary
Neighbors Branch/Walton Crawley Branch Stream and Wetland Restoration Site - NCDMS Project Number 92872

Parameter	Baseline (Walton Crawley Br)						MY-1 (Walton Crawley Br)						MY-2 (Walton Crawley Br)						MY-3 (Walton Crawley Br)						MY-4 (Walton Crawley Br)						MY-5 (Walton Crawley Br)					
Dimension and Substrate - Riffle Only	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n	Min	Mean	Med	Max	SD	n
BF Width (ft)	13.2		14.3	16.8		3	13.1		14.5	16.9		3	13.0		14.2	17.4		3	13.0		13.2	17		3	12.7		14.6	17.9		3						
Floodprone Width (ft)			100			3			100			3			100			3			100			3			100			3						
BF Mean Depth (ft)	1.3		1.4	1.5		3	1.3		1.4	1.4		3	1.4		1.4	1.5		3	1.4		1.5	1.6		3	1.4		1.4	1.5		3						
BF Max Depth (ft)	1.9		2.0	2.0		3	1.9		2.0	2.0		3	2.0		2.0	2.1		3	2.0		2.4	2.5		3	2.2		2.4	2.4		3						
BF Cross Sectional Area (ft^2)	17.6		19.4	25.0		3	18.2		19.5	24.4		3	17.9		20.2	27.0		3	17.9		20.2	26.4		3	17.9		20.2	27.0		3						
Width/Depth Ratio	10.2		10.2	11.2		3	9.4		11.2	12.1		3	9.3		10.1	11.6		3	8.6		9.4	10.9		3	9.0		10.6	11.9		3						
Entrenchment Ratio	6.0		7.0	7.6		3	5.9		6.9	7.6		3	5.7		7.0	7.7		3	5.9		7.6	7.7		3	5.6		6.8	7.9		3						
Bank Height Ratio			1.0			3			1.0			3			1.0			3	1.0		1.0	1.1		3	1.0		1.0	1.1		3						
Profile																																				
Riffle length (ft)	6.7	23.9	16.2	58.1	18	20	6	24	20	73	17	22	7	25	19	72	19	21	3	20	16	58	14	19	6.1	22.1	16.6	61.5	16.9	19						
Riffle slope (ft/ft)	0.0000	0.0032	0.0018	0.0113	0.0036	20	0.0000	0.0055	0.0015	0.0241	0.0071	21	0.0000	0.0030	0.0013	0.0124	0.0041	21	0.0000	0.0087	0.0040	0.0481	0.0131	19.00	0.0000	0.0055	0.0021	0.0303	0.0082	18						
Pool length (ft)	8	25	25	63	11	27	6	23	22	41	9	27	6	22	20	57	10	28	5	27	25	63	14	28	9	26	25	58	12	28						
Pool Max depth (ft)	1.3		1.4	1.5		2	3.2		3.6	4.0		2	3.3		3.7	4.1		2	3.0		3.3	3.6		2.0	3.5	3.7	3.7	3.9		2.0						
Pool spacing (ft)	15	43	36	94	21	27	20	42	35	94	19	27	6	41	35	94	22	28	6	41	37	102	21	28	20	47	42	113	24	28						
Pattern																																				
Channel Beltwidth (ft)	38.8			93		2																														
Radius of Curvature (ft)	31			62		2																														
Rc:Bankfull width (ft/ft)	2			4		2																														
Meander Wavelength (ft)	77.5			155		2																														
Meander Width ratio	5			10		2																														
Additional Reach Parameters																																				
Rosgen Classification	E/C-type						E/C-type						E/C-type						E/C-type						E/C-type											
Channel Thalweg Length (ft)	1148						1144						1141						1147						1147											
Sinuosity	1.1						1.1						1.1						1.1						1.1											
Water Surface Slope (Channel) (ft/ft)	0.0145						0.0143						0.0146						0.0145						0.0144											
BF slope (ft/ft)	-----						-----						-----						-----						-----											
Ri%/RU%P%G%/S%																																				
SC%/SA%/G%/C%/B%BE%																																				
d16/d35/d50/d84/d95																																				
% of Reach with Eroding Banks	0						0						0						0																	
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Appendix E.
Hydrology Data

Table 12. Verification of Bankfull Events
Table 13. Wetland Hydrology Criteria Attainment Summary
Figure E1. 30-70 Percentile Graph for Rainfall
Groundwater Gauge Graphs

Table 12. Verification of Bankfull Events
Neighbors Branch/Walton Crawley Branch Site (DMS Project Number 92872)

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
August 19, 2016	July 4, 2016	Crest gauge data indicates a bankfull event after approximately 1.88 inches of rain documented* in one day.	---
May 18, 2017	April 23, 2017	Crest gauge data indicates a bankfull event after approximately 1.76 inches of rain documented* in one day.	---
May 9, 2018	April 24, 2018	Crest gauge data along with wrack observed on the floodplains of both Neighbors Branch and Walton Crawley Branch indicate a bankfull event after 3.89 inches of rain documented** over two days.	1-2
September 25, 2018	September 16, 2018	Crest gauge data indicates a bankfull event after 2.42 inches of rain** resulting from the remnants of Hurricane Florence.	--
November 8, 2018	October 11, 2018	Crest gauge data along with wrack, sediment, and laid-back vegetation indicate a bankfull event after 2.79 inches of rain** resulting from Hurricane Michael.	3
November 13, 2019	October 31, 2019	Crest gauge data along with visual evidence throughout the site indicate an overbank event occurred after approximately 3.15 inches of rain***	4
February 17, 2020	January 12, 2020	Crest gauge data along with wrack and laid-back vegetation indicate a bankfull event after 1.79 inches of rain**	5
May 28, 2020	May 20, 2020	Wrack observed on TOB and in floodplain of Walton-Crawley Branch after approximately 5.90 inches of rain documented^ over 2 days	6

*Weather Underground 2017
**Weather Underground 2018
*** National Weather Service
^ NRCC ACIS 2020

Photo 1: Wrack on TOB of Neighbors Branch

Photo 2: Wrack in the floodplain of Walton Crawley Branch

Photo 3: Wrack, sediment, and laid-back vegetation in the floodplain of Neighbors Branch

Photo 4: Reclining vegetation in the floodplain of Neighbors Branch

Photo 5: Wrack and laid-back vegetation in the floodplain of Neighbors Branch

Photo 6: Wrack on the top of bank of Walton-Crawley Branch

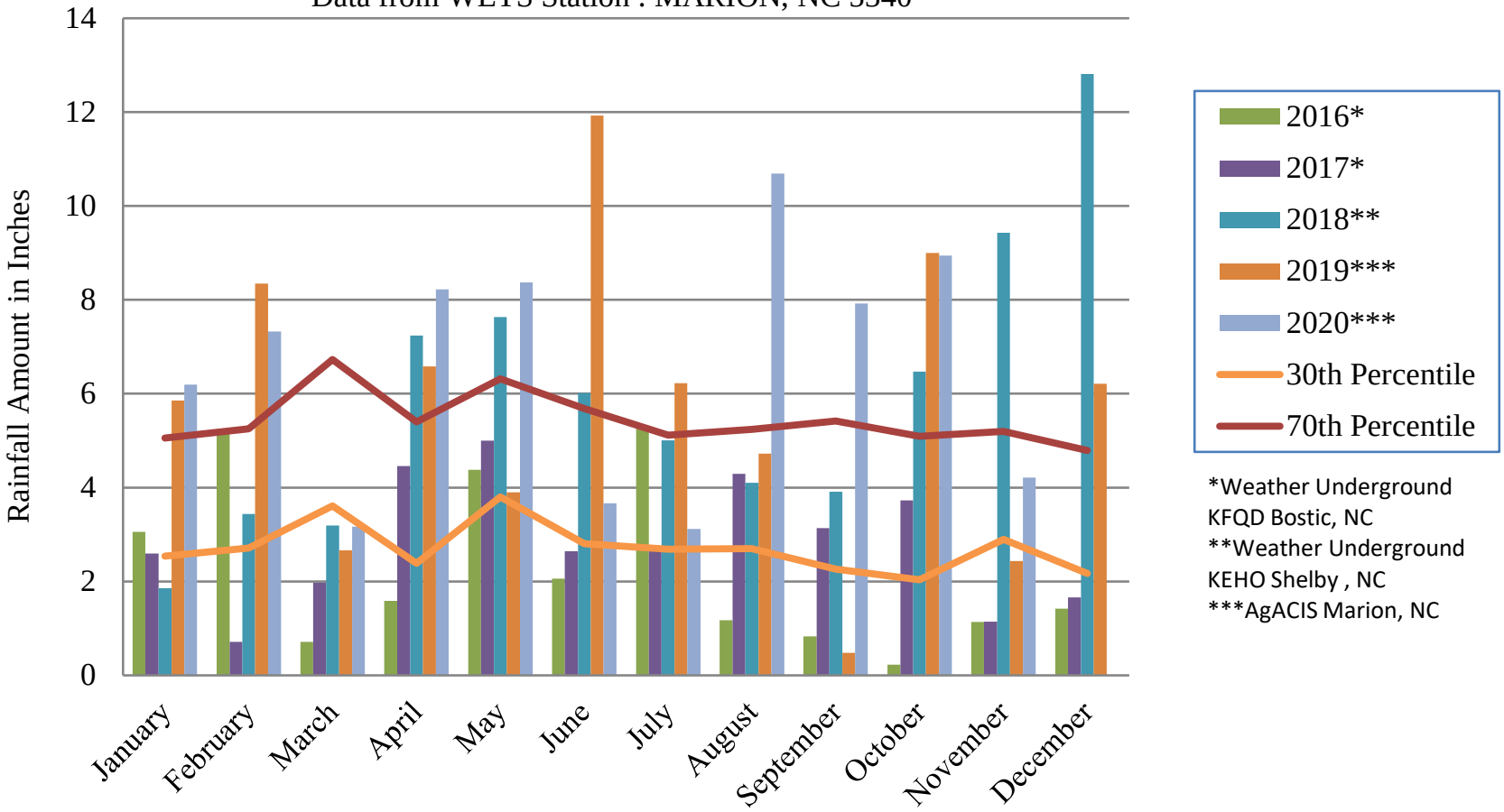
Table 13. Wetland Hydrology Criteria Attainment Summary
Neighbors Branch/Walton Crawley Branch Site (DMS Project Number 92872)

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2016)	**Year 2 (2017)**	**Year 3 (2018)**	**Year 4 (2019)**	**Year 5 (2020)**
1	Yes/208 Days (92.4%)	Yes/225 Days* (100%)	Yes/225 Days** (100%)	Yes/181 Days (80%)	Yes/208 Days (92.4%)
2	Yes/164 Days (72.9%)	Yes/225 Days (100%)	Yes/225 Days^ (100%)	Yes/181 Days (80%)	Yes/208 Days (92.4%)

*Gauge 1 malfunctioned for 6 days (July 29 to August 3, 2017); however, based on precipitation data as well as data from Gauge 2, it is expected that this gauge would have continued to be saturated/inundated during this 6 day period.
**Gauge 1 batteries died several time throughout the growing season due to excessive inundation resulting in data loss; however, groundwater was at or near the soil surface for the entire 2018 growing season.
^Gauge 2 missed several days of data collection due to a malfunction caused by excessive inundation during the remnants of Hurricane Florence. It began collecting points again once overbank flow receded.

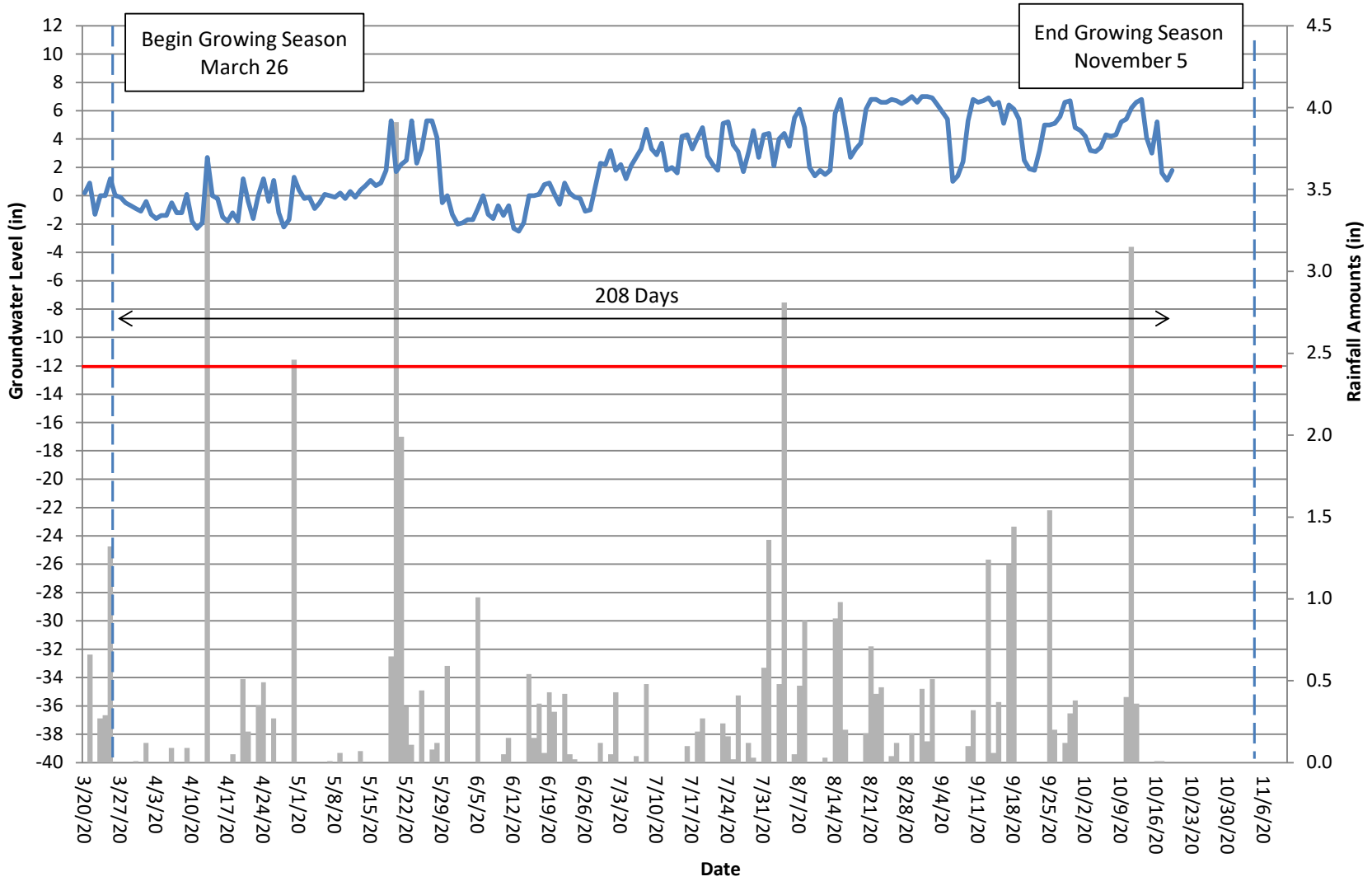
Figure E1: Neighbors Branch/Walton Crawley Branch
30-70 Percentile Graph for Rainfall

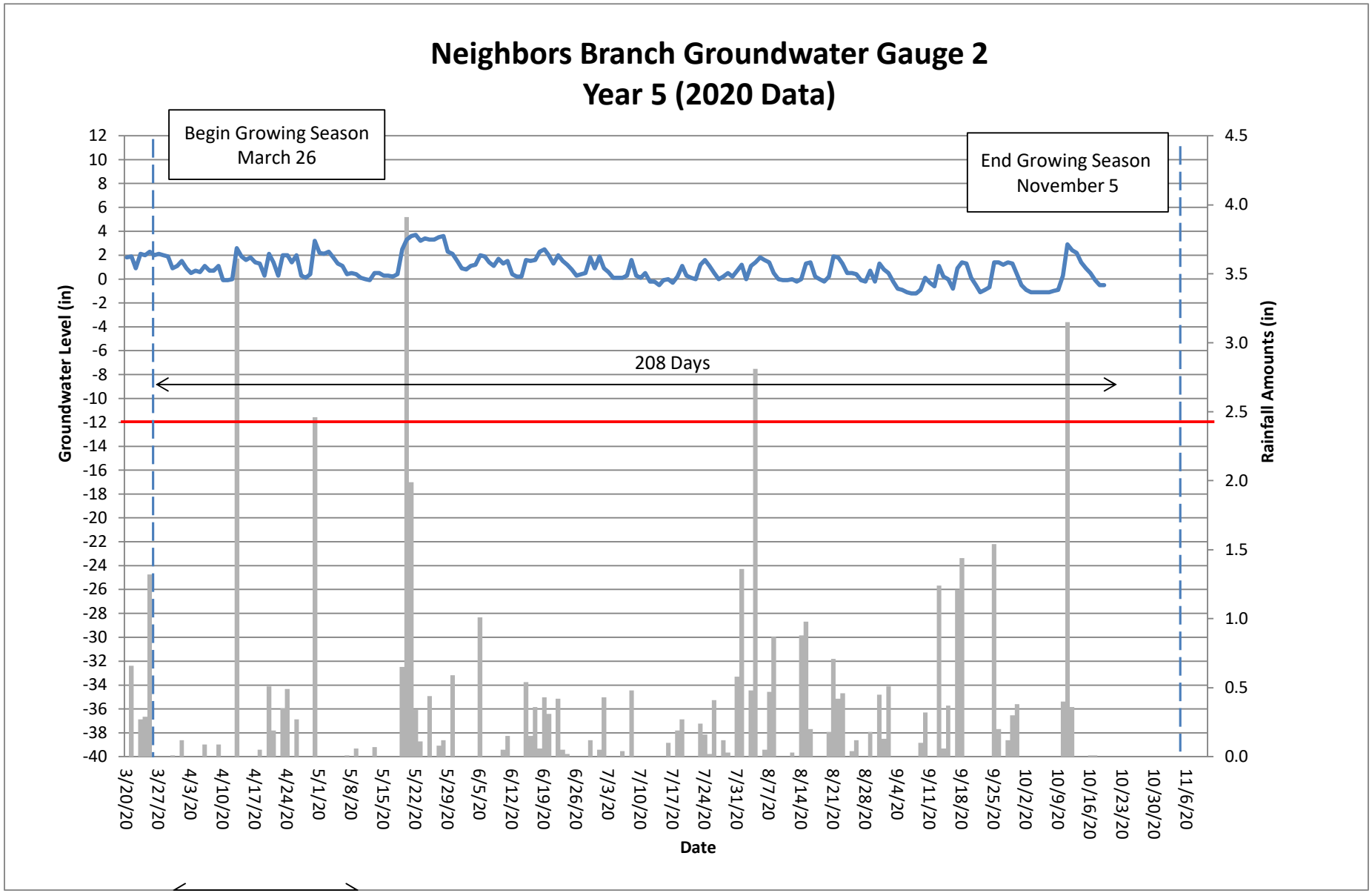
Data from WETS Station : MARION, NC 5340



*Weather Underground KFQD Bostic, NC
**Weather Underground KEHO Shelby , NC
***AgACIS Marion, NC

Neighbors Branch Groundwater Gauge 1
Year 5 (2020 Data)




Neighbors Branch Groundwater Gauge 2
Year 5 (2020 Data)
Begin Growing Season
March 26
End Growing Season
November 5
208 Days
Groundwater Level (in)
Rainfall Amounts (in)
Date
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3/20/20
3/27/20
4/3/20
4/10/20
4/17/20
4/24/20
5/1/20
5/8/20
5/15/20
5/22/20
5/29/20
6/5/20
6/12/20
6/19/20
6/26/20
7/3/20
7/10/20
7/17/20
7/24/20
7/31/20
8/7/20
8/14/20
8/21/20
8/28/20
9/4/20
9/11/20
9/18/20
9/25/20
10/2/20
10/9/20
10/16/20
10/23/20
10/30/20
11/6/20

Appendix F.
Remedial Action

Progress Report for Neighbors Branch (DMS #92872) and Bobs Creek (DMS #92879) Invasive Vegetation Management

Progress Report for Neighbors Branch (DMS #92872) and Bobs Creek (DMS #92879) Invasive Vegetation Management

15 August 2019:

Jason York worked at Bob's Creek. A foliar spray using 3% glyphosate (Rodeo) was applied to privet (*Ligustrum sp*.) and multiflora rose (*Rosa multiflora*) on the field edges and banks of Bobs Creek in polygons 3 and 4 (see attached map). A small patch of privet was found in polygon 5 along the stream bank. Stems were either hand-pulled or cut and stump treated with 50% glyphosate in an area approximately 150 sq. feet. Polygon 6 was inspected and only one stem of tree of heaven (*Ailanthus altissima*) was found and was cut and stump treated with 50% glyphosate. Polygon 9 was also inspected, and no invasive species were found. In total 4 gallons of 3% glyphosate and 12 ounces of 50% glyphosate were used.

4 September 2019:

Jason York worked at Neighbors Branch in polygon 6, where a moderately dense infestation of tree of heaven is located. Mechanical applications (cut stem and hack and squirt) were performed using 50% glyphosate. Individual stems are scattered throughout the polygon but concentrated along the stream channel and road. 84 ounces of 50% glyphosate were used.

19 September 2019:

Jason York and Holland Youngman worked at Neighbors Branch in polygons 6, 9, and 10. Foliar spray using 3% glyphosate was applied to the "vegetation problem areas" in polygon 9. This consisted of mostly privet, although one stem of tree of heaven was encountered and treated using the hack and squirt method with 50% glyphosate. Foliar spray was applied from the edges of the areas (the road and along the stream side) and a repeat treatment will be done after the initial spray has defoliated the privet and exposes stems growing in the "interior" of the dense patches. A few scattered stems of multiflora rose were also found. A small patch of kudzu (*Peuraria montana*) is located near the wetland area towards the upstream end of the first "vegetation problem area." This was foliar sprayed along with the privet; however, it will most likely need retreatment and mechanical removal as kudzu does not always respond well to glyphosate. Several small privet stems were either hand-pulled or stump treated with 50% glyphosate in the "veg problem area" on the western side of the stream channel. The infestation has

spread beyond the previously identified boundaries and will require further mechanical and chemical treatment.

A kudzu patch along the road between polygon 9 and 10 was foliar sprayed using 4% triclopyr (Element 3A). The patch extends uphill towards the private residence and was sprayed along the eastern side of the road up to the point where the easement diverges from the gravel road. Polygon 10 was inspected and only two small stems of multiflora rose were found and stump treated using 50% glyphosate.

Mechanical applications continued in polygon 6 on tree of heaven. Approximately ¾ of the stems have been treated. Some stems remain untreated towards the uphill part of the polygon.

In total 8 gallons of 3% glyphosate, 4 gallons of 4% triclopyr, and 21 ounces of 50% glyphosate were used.

25 September 2019:

Jason York and Holland Youngman worked at Bob's Creek in polygons 1, 2 (UT 8), 3, and 4. Foliar spray and mechanical applications were used on privet, multiflora rose, tree of heaven, and autumn olive (*Eleagnus umbellata*) in polygons 1 and 2. Two mature shrubs of autumn olive were found in polygon 1 and were sprayed. Follow up foliar spray and cut stem treatment were performed in polygons 3 and 4 on Privet, multiflora rose, and Ailanthus. The field edge of polygon 5 was sprayed and contained privet and multiflora rose.

14 November 2019:

Jason York and Holland Youngman worked at Neighbor's Branch in polygons 1, 2, 3, and 4. Two stems of tree of heaven were found halfway up the eastern UT in polygon 4. The stems were cut and treated with 50% glyphosate. A second population of tree of heaven was found along the easement boundary with polygon 5 and consisted of approximately three dozen stems. Privet and multiflora rose stems were scattered throughout polygon 4. All stems were cut and treated with 50% glyphosate. Polygon 2 contained several multiflora rose and privet stems. These stems were either cut and treated with 50% glyphosate or were hand-pulled and piled. No invasive plant species were found in polygons 1 and 3. 30 ounces of 50% glyphosate were used. Follow-up treatment is needed Polygon 9 and will consist of additional cut stem work on privet and foliar spray in the spring of 2020.

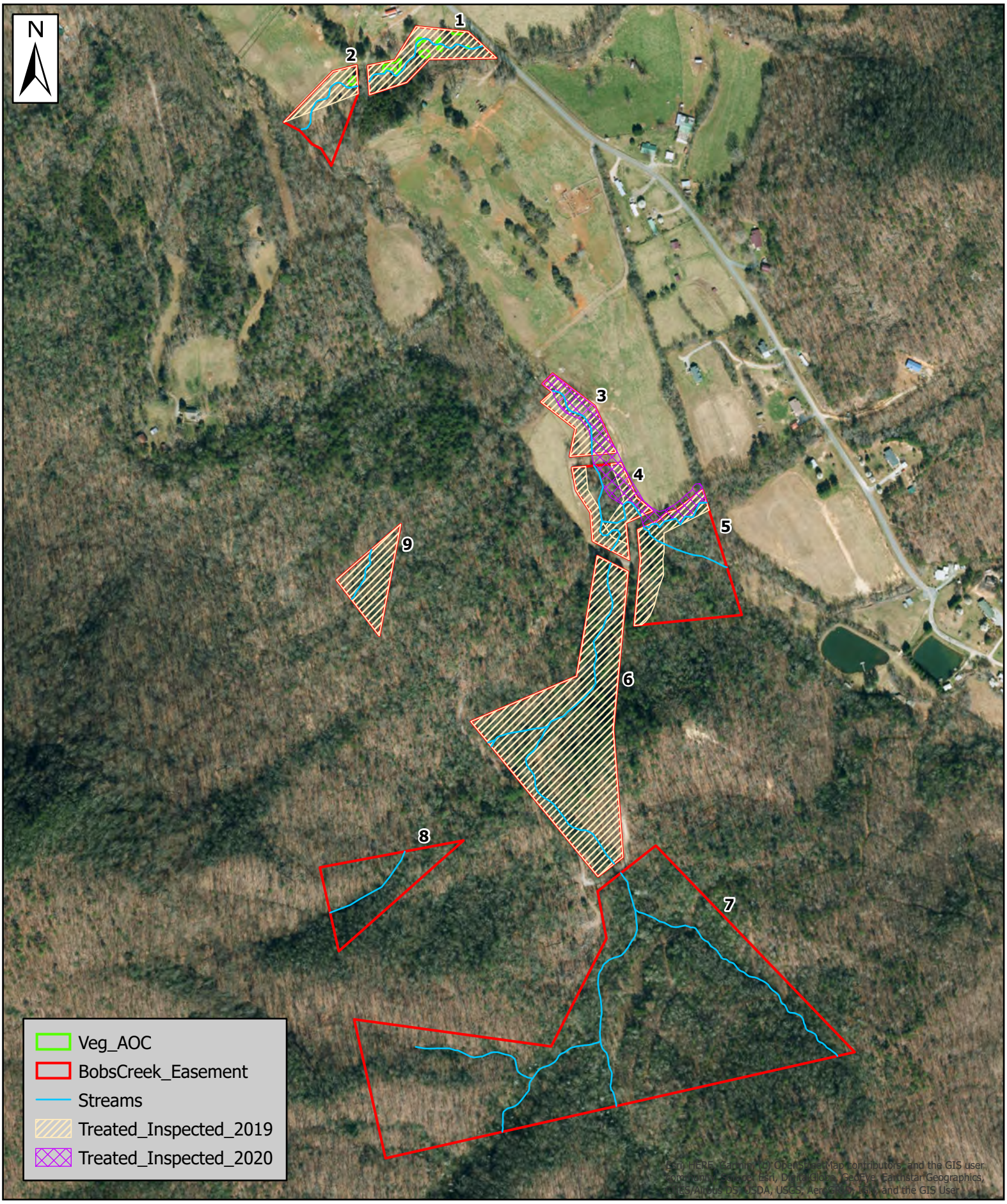
19 December 2019:

Jason York and Victoria Hoyland worked at Neighbors Branch in the northern veg problem areas of Polygon 9 between the Walton Crawley Branch and the gravel road to the east. Privet that had been previously sprayed was cut and piled to expose smaller sprouts and living shrubs previously covered by larger privet. This also allows for root sprouts to be easily found and sprayed in the spring of 2020. Living privet was cut and stems were treated with 50% glyphosate. A total of 60 ounces of 50% glyphosate were used. This concludes our work for the billing period of September – December 2019. Additional mechanical work may be done at Neighbors Branch during the winter months of 2020. Follow-up treatment with foliar spray will begin after privet stems have fully foliated in the late spring of 2020.

17 April 2020:

Jason York and Holland Youngman worked at the Neighbors Branch and Bob's Creek easements. Privet was treated with a foliar spray of 3% glyphosate in polygon 9 along the mainstem. Some larger stems were treated mechanically using the hack and squirt method. Polygon 2 was also treated with foliar spray and contained several large multi-flora rose shrubs. Some small privet stems were also treated in this polygon. Oriental bittersweet (*Celastrus orbiculatus*) was found for the first time in polygon 2 and was sprayed. 12 gallons of 3% glyphosate and 32 oz of 50% glyphosate were applied at Neighbors Branch.

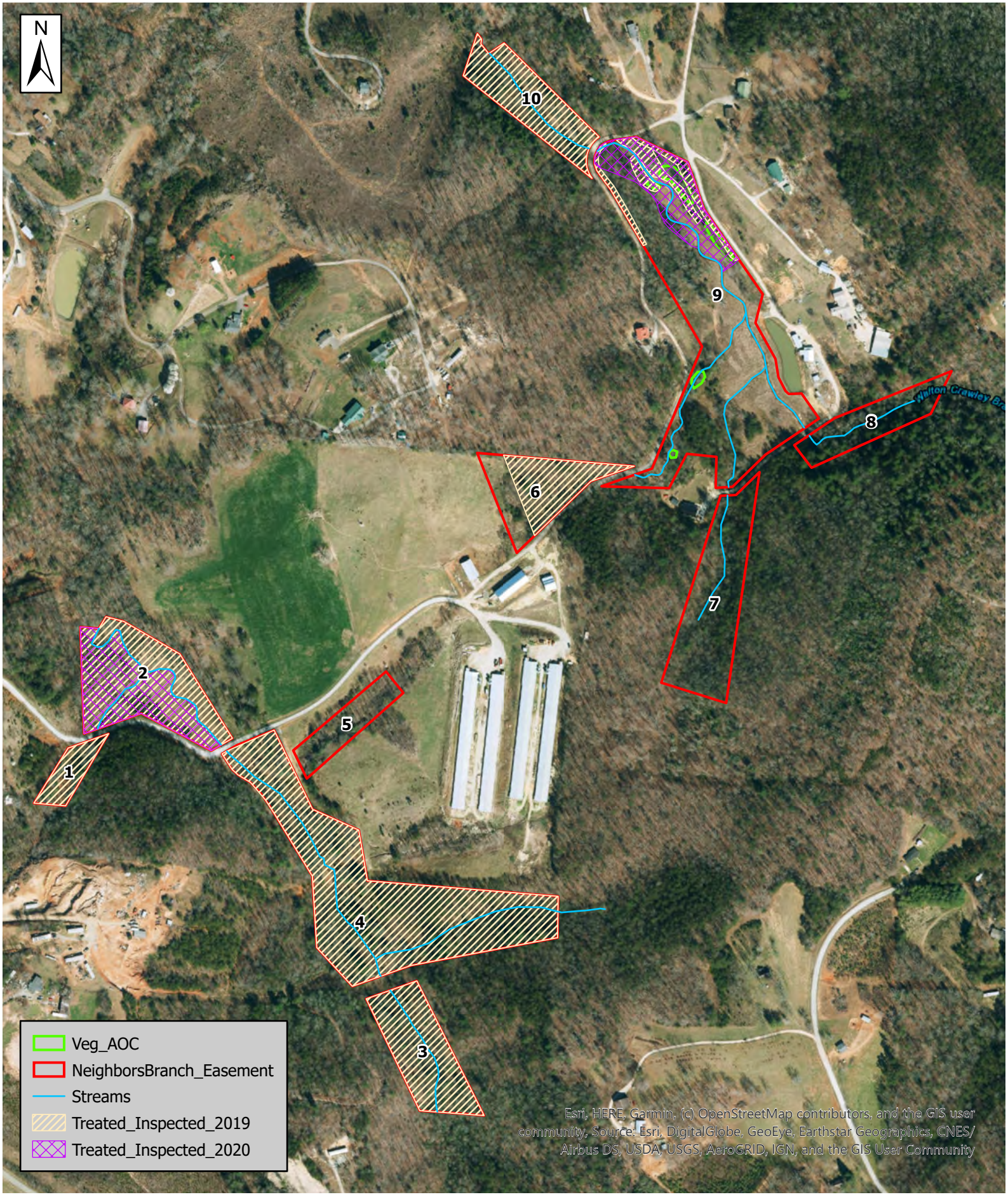
We next applied foliar spray at Bob's Creek along the mainstem and along the border of the easement in polygons 3, 4, and 5. Multi-flora rose was the main target species although some privet was encountered and sprayed. 8 gallons of 3% glyphosate was applied at Bob's Creek.



Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Bobs Creek
Invasive Vegetation Control
As of 4.17.2020



Michael Baker INTERNATIONAL

0 250 500 1,000 Feet

Neighbors Branch
Invasive Vegetation Control
As of 4.17.2020