
Monitoring Report
FINAL VERSION
Horne Creek Tributaries Mitigation Project
Monitoring Year 2
Calendar Year of Data Collection: 2021

NCDEQ DMS Project Identification # 100026
NCDEQ DMS Contract # 7181
Yadkin River Basin (Cataloging Unit 03040101)
USACE Action ID Number: SAW-2017-01510
NCDEQ DWR Project # 2017-1156
Surry County, NC
Contracted Under RFP # 16-006993
Data Collection Period: October 2021
Submission Date: December 2021

Prepared for:



North Carolina Department of Environmental Quality
Division of Mitigation Services
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Prepared by:



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December 23, 2021

NC Department of Environmental Quality

Division of Mitigation Services

Attn: Matthew Reid, Project Manager

5 Ravenscroft Drive, Suite 102

Asheville, NC 28801

RE: WLS Responses to NCDEQ DMS Review Comments for Task 8 Submittal, Monitoring Year 2 Report for the Horne Creek Tributaries Mitigation Project, DMS Full-Delivery Project ID #100026, Contract #7181, Yadkin River Basin, Cataloging Unit 03040101, Surry County, NC

Dear Mr. Reid:

Water & Land Solutions, LLC (WLS) is pleased to present the Final Monitoring Year 2 Report for the Horne Creek Tributaries Mitigation Project to the North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services (DMS). Per the DMS review comments, WLS has updated the Monitoring Year 2 Report and associated deliverables accordingly. The electronic deliverables are organized under the following folder structure as required under the digital submission requirements:

1. Report PDF
2. Support Files
 - 1_ Background Tables
 - 2_Visual
 - 3_Veg Data
 - 4_Geomorphology
 - 5_Hydro
 - 6_Other Data

We are providing our written responses to DMS' review comments on the Draft Monitoring Year 2 Report below. Each of the DMS review comments is copied below in **bold** text, followed by the appropriate response from WLS in regular text:

- **Page 3 – Please add the following additional statement to the Streambed Material Condition and Stability discussion: *The IRT reserves the right to request pebble count data/particle distributions if deemed necessary during the monitoring period.*** Response: The above language was added to the Streambed Material Condition and Stability Section.
- **Page 5 – SPA1 and SPA2 discussions indicate that areas have stabilized in MY2. Are these areas still considered problem areas? If the areas have stabilized and are no longer considered stream problem areas, they can be removed from the list and the CCPV. If the two areas still require additional monitoring, consider revising the area description to indicate further monitoring is required.** Response: As noted in the report, both areas were planted with additional livestakes during MY2. There was language in the report to continue monitoring during MY3, but this has been clarified and



revised to: “WLS will monitor this area closely in MY3 and remove as a problem area if stabilized.”
If these areas are stable during MY3 they will no longer be considered problem areas and will be removed from the report and CCPV.

- **Many of the SPAs received live stake planting in February 2021. Please add a table or short discussion regarding the approximate number of live stakes and species planted. Please also include if the species planted were a departure from the approved mitigation plan.** Response: A table with number and species of live stakes planted is included in Section 3.1.1. Black willow was the only species planted and was approved for planting in the mitigation plan.
- **Thank you for providing an update to all the SPAs from the previous monitoring year. Please continue to update future monitoring reports with this information as WLS addresses these issues.** Response: Thank you, WLS will continue to provide this information.
- **3.1.2 Stream Horizontal Dimension: Report indicates WLS will resurvey XS10 and XS12 in Spring 2022. Please consider having this information available for the 2022 credit release meeting that will likely be held in April 2022.** Response: WLS will resurvey these cross-sections and have the data for the credit release meeting.
- **3.3 Vegetation: MY2 average density is listed as 441 stems/ac on page 7. Tables 6a and 6b show slightly different total stems/ac (449 vs 441). Please review and revise for consistency.** Response: The MY2 average stem density is 441 stems/acre. Table 6 includes all woody stems found in the plots during surveying, including those not in approved planting list. For example, two red maple stems were found in Plot 1. The average stem density including all stems is 449, including those that are not counted toward meeting success criteria (red maple). In Table 6a, only stems that can be counted toward success criteria are tallied, resulting in 441 stems/acre. WLS has added a note to Table 6a that stem count only includes species in approved mitigation plan. If DMS would rather we only report species that can be counted toward success criteria in Table 6, WLS will do so to prevent any confusion in discrepancies.
- **3.3 Vegetation: Add short discussion regarding plots 9 and 10. These plots fail to meet the interim success criteria, but with the addition of the black willow (approved mit plan species), both plots meet.** Response: The following language was added to section 3.3, “Plots 9 and 10 did not meet interim success criteria with planted stems, but both plots do meet criteria with the addition of volunteer stems (black willow). Both plots are in the old channel area, have increased hydrology, and dense herbaceous vegetation. Volunteer black willow is doing well in these areas”
- **Table 2: Please add two lines directly under the Year 2 Monitoring line. The listed activity for one line should be Vegetation Monitoring, and the second line should be Stream Survey. Under the data collection column please include the date that each of these activities was completed. Please include this information in future monitoring reports. See example below:**



Activity or Report	Data Collection Complete	Actual Completion or Delivery
Mitigation Plan		May 2017
Final Design - Construction Plans		March 8, 2017
Construction Grading Completed		March 28, 2018
Planting Completed		April 6, 2018
Baseline Monitoring Report	April 2018	May 2018
Vegetation Monitoring	April 16, 2018	
Stream Survey	April 11, 2018	
Year 1 Monitoring	January 2019	January 2019
Vegetation Monitoring	November 5, 2018	
Stream Survey	January 14, 2019	

Response: Rows were added to the table to include this information.

- **Table 2: Add “Livestake Planting/Maintenance – Feb 2021” to table.** Response: A row was added to capture this information.
- **CCPV: Consider adding reach breaks. It is difficult to know where R2, R4 and R5 transition between each other.** Response: Labels were added for reach breaks on the CCPV.
- **Table 5 and 5a: Please add dates to the tables to indicate when the field assessment was completed for the Stream Stability Assessment and Vegetation Assessment. This information was requested by the IRT at the 2021 Credit Release Meeting.** Response: Dates of the field assessments were added to Table 5 and 5a.
- **Table 5: There is one grade control structure listed as not performing as intended. Please use a call out or symbol for this structure on the CCPV.** Response: This area is called out on the CCPV as SPA8.
- **Table 6 and 6a: Add a note indicating Plots 9 and 10 meet interim success criteria when black willow is included in the plot data. This species is an approved mitigation plan species.** Response: This language was added to Table 6 and 6a.
- **Please ensure the Monitoring Phase Performance Bond has been updated and approved by Kristie Corson before invoicing for Task 8.** Response: WLS will make sure the bond is updated and approved before invoicing.

Electronic Deliverable:

- **Please submit features characterizing the existing wetlands displayed on the CCPV.** Response: The existing wetlands shapefile is included in the e-data.
- **The length of the scoured/eroding segment is 91 feet according to the submitted feature. Please review and revise Table 5 or feature for consistency.** Response: Table 5 was revised to match the submitted feature.
- **Please submit a feature characterizing SPA-8’s cross section and include this feature on the CCPV.** Response: A cross-section feature was added to SPA-8 and is included in the e-data.



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Please contact me if you have any questions or comments.

Sincerely,

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	MY1/MY2 Regulatory Meeting Minutes
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1 Project Summary

1.1 Project Location and Description

The Horne Creek Tributaries Mitigation Project (“Project”) is a North Carolina Department of Environmental Quality (NCDEQ), Division of Mitigation Services (DMS) full-delivery mitigation project contracted with Water & Land Solutions, LLC (WLS) in response to RFP 16-006993. The Project construction and planting was completed in April 2020. The Project was built as documented in the approved mitigation plan and record drawings. The Project provides warm stream mitigation credits in the Yadkin River Basin (Cataloging Unit 03040101). The Project is located in Surry County approximately seven miles southwest of the Town of Pilot Mountain at 36.282582° and -80.509153°.

The Project restored, enhanced, and permanently protected seven stream reaches (R1, R2, R3, R4, R4a, R4b, and R5) and their riparian buffers, totaling approximately 5,428 linear feet of stream channel. The Project provides significant ecological improvements and functional uplift through stream and aquatic habitat restoration and through decreasing nutrient and sediment loads within the watershed. The mitigation plan provides a detailed project summary and Table 1 provides a summary of project assets.

Monitoring Year 2 (MY2) activities occurred during the last week of October 2021. This report presents the data for MY2. The Project meets the MY2 success criteria for stream hydrology, stream horizontal and vertical stability, streambed condition and stability. Nine of the ten vegetation plots are meeting interim success criteria. Based on these results, the Project is on trajectory to meet interim and final success criteria. For more information on the chronology of the project history and activity, refer to Appendix A, Table 2. Relevant project contact information is presented in the appendices in Table 3 and project background information is presented in Table 4.

1.2 Project Goals and Objectives

The Project is on track to meet the goals and objectives described in the Horne Creek Tributaries Final Approved Mitigation Plan and will address general restoration goals and opportunities outlined in the North Carolina Division of Mitigation Services (DMS) Upper Yadkin River Basin Restoration Priority Plan (RBRP) (DEQ 2009). More specifically, watershed goals and management strategies described in the Upper Yadkin Local Watershed Plan (LWP) will be met by:

- Reducing sediment, soil erosion, turbidity, and nutrient inputs such as fecal coliform bacteria, nitrogen, and phosphorus to the Horne Creek Watershed.
- Restoring, enhancing, and protecting headwater streams, wetlands, riparian buffers, and aquatic habitat functions.
- Improving riparian corridor management and targeting restoration of impacted streams and riparian buffer areas.
- Promoting agronomic farm management techniques and implementing agricultural BMPs and water quality features such as livestock exclusion fencing, alternative watering systems, and nutrient management devices.

To accomplish these project-specific goals, the following objectives will be measured to document overall project success:



- Provide a floodplain connection to the incised Project stream reaches by lowering bank height ratios (BHRs) to less than 1.2, thereby promoting more natural or overbank flood flows,
- Improve bedform diversity by increasing scour pool spacing and depth variability,
- Increase native species riparian buffer and vegetation density/composition along streambank and floodplain areas that meet requirements of a minimum 30-foot-wide and 210 stems/acre after the monitoring period,
- Improve aquatic habitat and fish species diversity and migration through the addition of in-stream cover and native woody debris,
- Site protection through an 11.87-acre conservation easement in excess of 30 feet from the top of the restored streambanks, that will protect all streams, wetlands and aquatic resources in perpetuity.

1.3 Project Success Criteria

The success criteria for the Project follows the approved performance standards and monitoring protocols from the final approved mitigation plan; which was developed in compliance with the USACE October 2016 Guidance, USACE Stream Mitigation Guidelines (April 2003 and October 2005), and 2008 Compensatory Mitigation Final Rule. Cross-section and vegetation plot data will be collected in Years 0, 1, 2, 3, 5, and 7. Stream hydrology data and visual monitoring will be reported annually. Specific success criteria components and evaluation methods are described below.

1.3.1 Streams

Stream Hydrology: Four separate bankfull or over bank events must be documented within the seven-year monitoring period and the stream hydrology monitoring will continue until four bankfull events have been documented in separate years. Stream hydrology monitoring will be accomplished with pressure transducers installed in pools and correlating sensor depth to top of bank elevation (Figure 4). Recorded water depth above the top of bank elevation will document a bankfull event.

Stream Profiles, Vertical Stability, and Floodplain Access: Stream profiles, as a measure of vertical stability and floodplain access will be evaluated by looking at Bank Height Ratios (BHR). In addition, observed bedforms should be consistent with those observed for channels of the design stream type(s). The BHR shall not exceed 1.2 along the restored Project stream reaches. This standard only applies to restored reaches of the channel where BHRs were corrected through design and construction. Vertical stability will be evaluated with visual assessment, cross-sections and, if directed by the IRT, longitudinal profile.

Stream Horizontal Stability: Cross-sections will be used to evaluate horizontal stream stability on restored streams. There should be little change expected from as-built restoration cross-sections. If measurable changes do occur, they should be evaluated to determine if the changes represent a movement toward a more unstable condition (e.g., downcutting, erosion) or a movement towards increased stability (e.g., settling, vegetation establishment, deposition along the streambanks, decrease in width/depth ratio). Cross-sections shall be classified using the Rosgen Stream Classification method and all monitored cross-sections should fall within the quantitative parameters defined for channels of the design stream type.



Streambed Material Condition and Stability: Pebble counts or streambed material samples will not be collected per the DMS Pebble Count Data Requirements memo sent on October 19, 2021. The IRT reserves the right to request pebble count data/particle distributions if deemed necessary during the monitoring period.

Jurisdictional Stream Flow: Monitoring of stream flow will be conducted to demonstrate that the restored stream systems classified as intermittent exhibit surface flow for a minimum of 30 consecutive days throughout some portion of the year during a year with normal or below normal rainfall conditions. Stream flow monitoring will be accomplished with pressure transducers installed in pools and correlating sensor depth to the downstream top of riffle elevation (diagram in Appendix E). If the pool water depth is at or above the top of riffle elevation, then the channel will be assumed to have surface flow.

1.3.2 Vegetation

Vegetation monitoring will occur in the fall each required monitoring year, typically prior to leaf drop. Plots will be monitored in years 1, 2, 3, 5, and 7. Vegetative success for the Project during the intermediate monitoring years will be based on the survival of at least 320, three-year-old trees per acre at the end of Year 3 of the monitoring period; and at least 260, five-year-old, trees per acre that must average six feet in height at the end of Year 5 of the monitoring period. The final vegetative restoration success criteria will be achieving a density of no less than 210, seven-year-old stems per acre that must average eight feet in height in Year 7 of monitoring. Volunteer species on the approved planting list that meet success criteria standards will be counted towards success criteria.

1.3.3 Visual Assessment

WLS will conduct visual assessments in support of mitigation performance monitoring. Visual assessments of all stream reaches will be conducted twice per monitoring year with at least five months in between each site visit for each of the seven years of monitoring. Photographs will be used to visually document system performance and any areas of concern related to streambank and bed stability, condition of in-stream structures, channel migration, active headcuts, live stake mortality, invasive plant species or animal browsing, easement boundary encroachments, cattle exclusion fence damage, and general streambed conditions. Permanent photo points will be located at cross-sections, culvert crossings, and Enhancement II reaches.



2 Project Mitigation Components

2.1 Project Components

The Project mitigation components include a combination of Stream Restoration and Enhancement activities, as summarized in the table below.

Table 1. Mitigation Plan Stream Mitigation Credits (SMCs)

Project Component	Existing Footage or Acreage	Proposed Reach Stationing	Restored Footage, Acreage, or SF	Creditable Footage, Acreage or SF	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Credits
R1	1,397	10+00 – 23+40	1,320	1,320	R	PI/PII	1	1,320
R2	286	10+17 – 13+13	296	296	R	PII	1	296
R3	75	11+80 – 12+55	76	76	R	PII	1	76
R4	1,191	13+13 – 25+19	1,167	1,167	R	PI/PII	1	1,167
R4a	124	10+98 – 11+54	57	57	EII	-	2.5	23
R4a	-	11+55 – 12+65	111	111	R	PI	1	111
R4b	89	10+72 – 10+99	27	27	EII	-	2.5	11
R4b	-	10+99 – 12+24	125	125	R	PI	1	125
R5	2,519	25+19 – 48+12	2,249	2,249	R	PI	1	2,249
Totals	5,681		5,428	5,428				5,378
						Credit Loss in Required Buffer		-300
						Credit Gain for Additional Buffer		325
						Net Change in Credit from Buffers		+25
						Total Credits per Buffer Calculator		5,403
						Total Adjusted SMCs		5,389

3 Monitoring Year 2 Assessment and Results

The dates of Year 2 monitoring activities are detailed in Appendix A, Table 2. All Year 2 monitoring data is presented in this report and in the appendices. The Project is on track for meeting stream interim success criteria. Nine of the ten vegetation plots are meeting interim success criteria. All monitoring device locations are depicted on the CCPV (Figure 1).

3.1 Morphological Assessment

3.1.1 Stream Horizontal Pattern & Longitudinal Profile

Visual assessment and cross-section surveys were utilized for assessment of MY2 horizontal and vertical stream stability. The visual assessments for each stream reach concluded that the MY2 stream channel pattern and longitudinal profiles, and in-stream structure location/function, still closely match the profile



design parameters and MY0/baseline conditions (Appendix D). The MY2 planform geometry and dimensions fall within acceptable ranges of the design parameters for all restored reaches. Minor channel adjustments in riffle slopes, pool depths and pattern were observed based on natural sediment migration and stream bank vegetation establishment but did not present a stability concern or indicate a need for remedial action.

During the fall visual assessment for MY1, WLS staff noted seven potential problem areas outside the channel. One additional in-channel problem area was noted during MY2. These areas are called out on the CCPV (Figures 1a-1c) and photos can be found in Appendix B and the E-Data Submission included with this report.

- **SPA1-** On R1, adjacent to the right bank at approximate station 10+25: minor slumping is occurring where drainage from the adjacent pasture enters the stream buffer.
 - **MY2 Action:** Planted livestakes to stabilize soils in February 2021. The area has stabilized during MY2. WLS will monitor this area closely during MY3 and remove as a problem area if still stabilized.
- **SPA2-** On R1, below the culvert crossing at approximate station 17+00: minor floodplain erosion in the stream buffer is occurring adjacent to an area of coir matting.
 - **MY2 Action:** Planted livestakes to stabilize soils in February 2021. The area has stabilized during MY2. WLS will monitor this area closely in MY3 and remove as a problem area if stabilized.
- **SPA3-** On R1, along the left floodplain from approximate station 20+25 – 21+60: floodplain erosion is occurring due to concentrated flow during out-of-bank events and from toe of slope seepage.
 - **MY2 Action:** In February 2021 installed coir logs and straw bales to slow and spread floodplain flows, seeded with permanent and temporary seed, and planted livestakes. During MY3 additional straw bales will be installed. The area is improving and becoming more stable with increased vegetation and the addition of coir logs/straw bales. WLS will monitor this area closely in MY3.
- **SPA4-** On R2, minor erosion was observed on both the right and left bank side slopes at approximate station 15+75, above the culvert crossing.
 - **MY2 Action:** Planted livestakes to stabilize soils in February 2021. Vegetation cover is improving in these areas and WLS will continue to monitor them closely in MY3.
- **SPA5-** On R5, in the left floodplain area: minor erosion is occurring adjacent to station 32+60.
 - **MY2 Action:** During August 2021 installed straw bales and coir logs to slow and spread the flow of water coming off the farm field, planted livestakes, and re-seeded. The installation of coir logs/straw bales in the farm field and increased vegetation cover has reduced erosion in this area. WLS will continue to monitor this area closely in MY3.
- **SPA6-** On R5, adjacent to vegetation plot 10 near station 43+50: a small secondary channel has formed in the right floodplain between the floodplain depressions.
 - **MY2 Action:** In February 2021 installed straw bales within secondary channel to prohibit water flows and planted livestakes to disperse flows. The addition of straw bales and livestakes has reduced the formation of the secondary channel and allowed herbaceous vegetation cover to increase. WLS will continue to monitor closely in MY3.



- **SPA7-** On R5, at the meander bend located at station 47+00: the left bank is at risk of eroding. The bank is currently functioning.
 - **MY2 Action:** In February 2021 planted livestakes to stabilize meander. During MY2 the bank has increased vegetation cover and is at less risk from erosion. WLS will continue to monitor closely in MY3.
- **SPA8-** On R4, just below two log vanes from approximate station 20+75 to 21+75 an area of the stream has dropped elevation and has some eroding banks. Coarse riffle substrate is still present, the log vanes directly upstream are stable and functional, and the culvert immediately downstream is holding grade. Supplemental cross-section data was collected from a riffle in this area and the data is located in Appendix D. No remedial action is required at this time, and this area will continue to be monitored closely in MY3.

Problem Area Planting Table MY2

Problem Area	Species (Approved)	Number of Livestakes
SPA1	<i>Salix nigra</i>	15
SPA2	<i>Salix nigra</i>	15
SPA3	<i>Salix nigra</i>	100
SPA4	<i>Salix nigra</i>	20
SPA5	<i>Salix nigra</i>	50
SPA6	<i>Salix nigra</i>	80
SPA7	<i>Salix nigra</i>	20

3.1.2 Stream Horizontal Dimension

The MY2 channel dimensions generally match the design parameters and are within acceptable and stable ranges of tolerance. Data for the 16 cross-sections (eight riffle and eight pool) can be found in Appendix D. It is expected over time that some pools may accumulate fine sediment and organic matter, however, this is not an indicator of channel instability. Maximum riffle depths are also expected to fluctuate throughout the monitoring period as the channels adjust to the new flow regime. Of the eight riffle cross-sections, five experienced minor changes in bank height ratio (BHR) from MY0 to MY2. Two riffle cross-sections, XS-8 on R4 and XS-15 on R5, experienced minor aggradation due to sediment migration and thick herbaceous vegetation occurring during MY2. Both cross-sections are stable and show minimal change from MY1. Riffle cross-section XS-5 on R4 experienced minor degradation due to bed material entrainment from storm events. XS-5 experienced minimal change when compared to MY1 and is in stable condition. Two riffle cross sections, XS-10 and XS-12 on R5, experienced degradation due to bed material entrainment from the riffles during MY2 storm events. Both riffles adjusted to be shorter and migrated slightly downstream, resulting in apparent degradation. R5 is stable above and below both cross-sections and WLS will re-survey XS-10 and XS-12 in Spring 2022 during visual assessments. Visual surveys indicate the areas affected through aggradation and degradation are functioning and stable. WLS will closely monitor any changes to all stream reaches during MY3.

3.2 Stream Hydrology

3.2.1 Stream Flow

Two flow gauges (FG-1 and FG-3), installed in May 2020 on R1 and R4 respectively, documented that the stream exhibited surface flow for a minimum of 30 consecutive days throughout the monitoring year



(Appendix E). FG-1 (R1) exhibited 299 days of consecutive flow beginning on January 1st and ending on October 26th. FG-1 exhibited 299 days of cumulative flow and zero days of no flow. FG-3 (R2) exhibited 117 days of consecutive flow beginning on July 4th and ending on October 26th. FG-3 exhibited 286 days of cumulative flow and 13 days of no flow. One additional flow gauge (FG-2) was installed during MY1 more upstream on Reach R2 on September 18th, 2020 in response to IRT comments received during the September 15th, 2020 site visit. FG-2 (R2) exhibited 41 consecutive days of flow for MY2, beginning January 25th and ending on March 7th. FG-2 exhibited 84 days of cumulative flow and 215 days of no flow. Additionally, to determine if rainfall amounts are normal for the given year, precipitation data was obtained from Pilot Mountain Weather Station (CBTN7), approximately five miles north of the site.

3.2.2 Bankfull Events

During MY2 bankfull events were recorded on both pressure transducer crest gauges. CG-1 (R1) recorded eleven events with a maximum event of 0.71' above bankfull. CG-2 (R5) recorded six events with a maximum event of 1.6' above bankfull. Additionally, the cork crest gauge located adjacent to CG-1 on R1 recorded two bankfull events and the cork crest gauge adjacent to CG-2 located on R5 recorded two bankfull events. The associated data and photographs are located in Appendix E.

3.3 Vegetation

Monitoring of the 10 permanent vegetation plots was completed during the last week of October 2021. Vegetation data can be found in Appendix C with the associated photos located in Appendix B. The MY2 average density is 441 stems per acre, which exceeds the interim measure of vegetative success of at least 320 stems per acre at the end of the third monitoring year. One of the ten plots is below the interim success criteria due to wetness and thick herbaceous cover. Plot 6 is one stem below interim success criteria. No remedial actions are proposed at this time. The permanent vegetation plots had 242 to 566 stems per acre. Volunteer persimmon (*Diospyros virginiana*) and black willow (*Salix nigra*) were noted in MY2, and more are expected to establish in upcoming years. Black willow and persimmon are on the approved mitigation plan planting list and are counted towards success criteria, with no one tree species being counted more than 50 percent. Plots 9 and 10 did not meet interim success criteria with planted stems, but both plots do meet criteria with the addition of volunteer stems (black willow). Volunteer black willow is doing well in these areas. Both plots are in the old channel area, have increased hydrology, and dense herbaceous vegetation.

Visual assessment of vegetation outside of the monitoring plots indicates that the herbaceous vegetation is becoming well established throughout the project. An area of concern noted during the IRT as-built site visit on lower R1 (approximate station 23+50 right floodplain hillside) lacked well-established herbaceous vegetation. In MY2 the vegetation on the slopes has continued to establish. WLS will monitor this area closely during MY3 for further vegetation establishment. Another area was noted on R4 having low herbaceous growth (approximate station 16+50 right floodplain hillside). Herbaceous growth on the hillside has increased during MY2. This area has coir matting and has maintained stability during MY2. Both areas lacking vegetation are not on the CCPV as they are below the mapping threshold of one acre.

No areas of significant invasive plant species were observed during monitoring year 2. The site will be monitored closely, and any invasive plant species will be treated as needed. Small populations of narrow-leaved cattail (*Typha latifolia*) are present in some saturated floodplain areas; however, none were observed causing issues within the channels.



An area of minor easement encroachment, along upper R2, was noted during the July 2020 IRT site visit. The landowner was contacted, and his responsibilities and limitations were explained. Horse tape was installed to demarcate the line and prevent further mowing activities inside of the conservation easement. As of November 2021, encroachment activities have improved, and the horse tape has been removed. To further demarcate the line, a supplemental row of trees was immediately inside of the easement on February 4th, 2021. There are no plans for additional fencing or bollards at this time. This area will be monitored closely, and any actions will be detailed in the MY3 report.

4 Methods

Stream cross-section monitoring was conducted using a Topcon Total Station. Survey data was imported into Microsoft Excel® for data processing and analysis. The stage recorders include an automatic pressure transducer (HOBO Water Level (13 ft) Logger) set in PVC piping in the channel. The elevation of the bed and top of bank at each stage recorder location was recorded to be able to document presence of water in the channel and out of bank events. Visual observations (i.e. wrack or debris lines) and traditional cork crest gauges will also be used to document out of bank events.

Vegetation success is being monitored at a total of 10 permanent vegetation plots. Vegetation plot monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008) and includes analysis of species composition and density of planted and volunteer species. Data are processed using the CVS data entry tool. In the field, the four corners of each plot were permanently marked with PVC at the origin and rebar at the other corners. Tree species and height will be recorded for each planted stem and photos of each plot are to be taken from the origin each monitoring year.



Appendix A:

Background Tables

Table 1: Project Mitigation Components

Table 2: Project Activity and Reporting History

Table 3: Project Contacts

Table 4: Project Information and Attributes

Table 1. Horne Creek Tributaries (ID-100026) - Mitigation Assets and Components							As-Built Footage or Acreage	Comments
Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)		
R1	1,397	1,320	Warm	R	PI/PII	1.00000	1,342	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, Permanent Conservation Easement
R2	286	296	Warm	R	PII	1.00000	289	Full Channel Restoration, Planted Buffer, Permanent Conservation Easement
R3	75	76	Warm	R	PII	1.00000	73	Full Channel Restoration, Planted Buffer, Permanent Conservation Easement
R4	1,191	1,167	Warm	R	PI/PII	1.00000	1,181	Full Channel Restoration, Planted Buffer, Permanent Conservation Easement
R4A	124	57	Warm	EII	PI	2.50000	57	Supplemental Planting of Buffer, Livestock Exclusion, Permanent Easement
R4A	-	111	Warm	R	PI	1.00000	105	Full Channel Restoration, Planted Buffer, Permanent Conservation Easement
R4B	89	27	Warm	EII	PI	2.50000	27	Supplemental Planting of Buffer, Livestock Exclusion, Permanent Easement
R4B	-	125	Warm	R	PI	1.00000	123	Full Channel Restoration, Planted Buffer, Permanent Conservation Easement
R5	2,519	2,249	Warm	R	PI	1.00000	2,270	Full Channel Restoration, Planted Buffer, Permanent Conservation Easement.

Project Credits

Restoration Level	Stream			Riparian Wetland		Non-Rip Wetland	Coastal Marsh
	Warm	Cool	Cold	Riverine	Non-Riv		
Restoration	5344.000						
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I							
Enhancement II	33.600						
Creation							
Preservation							
Totals	5377.600			0.000	0.000	0.000	

Overall Assets Summary	
Asset Category	Overall Credits
Stream	5,378
RP Wetland	NA
NR Wetland	NA
Buffer	NA
Buffer Loss SMC	-300
Buffer Gain SMC	325
Total SMU	5,403
Total Adjusted SMCs	5,389

Table 2. Project Activity and Reporting History
Horne Creek Tributaries Mitigation Project #100026

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Institution Date	N/A	05/22/17
404 permit date	N/A	01/15/20
Mitigation Plan	N/A	07/29/19
Final Design – Construction Plans	N/A	07/29/19
Construction	N/A	04/30/20
Containerized, bare root and B&B plantings for reach/segments 1&2	N/A	04/30/20
As-built (Year 0 Monitoring – baseline)	5/20/2020	7/1/2020
Year 1 Monitoring	11/10/2020	11/20/2020
Year 2 Monitoring	10/27/2021	12/23/2021
Vegetation Monitoring	10/27/2021	N/A
Stream Survey	10/27/2021	N/A
Year 3 Monitoring		
Vegetation Monitoring		
Stream Survey		
Year 4 Monitoring		
Vegetation Monitoring		
Stream Survey		
Year 5 Monitoring		
Vegetation Monitoring		
Stream Survey		
Year 6 Monitoring		
Vegetation Monitoring		
Stream Survey		
Year 7 Monitoring/ Close Out		
Vegetation Monitoring		
Stream Survey		
Encroachment Planting	N/A	2/4/2021
Livestake Planting and Maintenance	N/A	February 2021

Table 3. Project Contacts
Horne Creek Tributaries Mitigation Project #100026

Designer	Water & Land Solutions, LLC
	7721 Six Forks Rd, Ste. 130, Raleigh, NC 27615
Primary project design POC	Christopher Tomsic - (828) 493-3287
Construction Contractor	North State Environmental, Inc.
	2889 Lowery Street, Winston-Salem, NC 27101
Construction contractor POC	Andrew Roten - (336) 406-9078
Survey Contractor	Ascension Land Surveying
	116 Williams Road, Mocksville, NC 27028
Survey contractor POC	Christopher Cole - (704) 579-7197
Planting Contractor	Ripple EcoSolutions, LLC
	215 Moonridge Rd, Chapel Hill, NC 27516
Planting contractor POC	George Morris - (919) 818-3984
Seeding Contractor	North State Environmental, Inc.
	2889 Lowery Street, Winston-Salem, NC 27101
Contractor point of contact	Andrew Roten - (336) 406-9078
Seed Mix Sources	Green Resource
	(336) 588-6363
Nursery Stock Suppliers (Bare Roots)	Native Forest Nursery
	(704) 483-3397
Nursery Stock Suppliers (Bare Roots/plugs)	Mellow Marsh Farm
	(919) 742-1200
Nursery Stock Suppliers (Live Stakes)	Foggy Mountain Nursery
	(336) 384-5323
Monitoring Performers	Water & Land Solutions, LLC
	7721 Six Forks Rd, Ste. 130, Raleigh, NC 27615
Stream Monitoring POC	Emily Dunnigan - (269) 908-6306
Vegetation Monitoring POC	Emily Dunnigan - (269) 908-6306
Wetland Monitoring POC	N/A; Emily Dunnigan - (269) 908-6306

Table 4. Project Background Information							
Project Name	Horne Creek Tributaries						
County	Surry						
Project Area (acres)	11.87						
Project Coordinates (latitude and longitude)	36.2851950° N, -80.5032100° W						
Planted Acreage (Acres of Woody Stems Planted)	10.2						
Project Watershed Summary Information							
Physiographic Province	Piedmont						
River Basin	Yadkin						
USGS Hydrologic Unit 8-digit	03040101	USGS Hydrologic Unit 14-digit	03040101110070				
DWR Sub-basin	03-07-02						
Project Drainage Area (Acres and Square Miles)	0.06 (R1) and 0.26 (R5)						
Project Drainage Area Percentage of Impervious Area	<1%						
CGIA Land Use Classification	2.01.03, 2.01.01, 3.02 (46% pasture/hay, 24% row crop, 16% mixed forest)						
Reach Summary Information							
Parameters	Reach 1	Reach 2	Reach 3	Reach 4	Reach 4A	Reach 4B	Reach 5
Length of reach (linear feet)	1,320	296	76	1,167	168	152	2,249
Valley confinement (Confined, moderately confined, unconfined)	mod confined	mod confined	mod confined	unconfined	unconfined	unconfined	unconfined
Drainage area (Acres and Square Miles)	38 and 0.06	41 and 0.06	29 and 0.05	83 and 0.13	29 and 0.05	2 and 0.003	166 and 0.26
Perennial, Intermittent, Ephemeral	Perennial	Intermittent	Intermittent	Perennial	Perennial/Intermittent	Perennial/Intermittent	Perennial
NCDWR Water Quality Classification	C	C, WS-IV	C	C, WS-IV	C	C	C, WS-IV
Stream Classification (existing)	E5b/F5b (incised)	G4 (incised)	E6b (incised)	B4 (incised)	B4c (incised)	G5	B4c/G4c (incised)
Stream Classification (proposed)	B4	B4	B4a	B4/C4b	B4	B4	C4
Evolutionary trend (Simon)	III/IV	III	III	IV/V	I	I	IV/V
FEMA classification	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Regulatory Considerations							
Parameters	Applicable?	Resolved?	Supporting Docs?				
Water of the United States - Section 404	Yes	Yes	PCN				
Water of the United States - Section 401	Yes	Yes	PCN				
Endangered Species Act	Yes	Yes	Categorical Exclusion				
Historic Preservation Act	Yes	Yes	Categorical Exclusion				
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A				
FEMA Floodplain Compliance	No	N/A	N/A				
Essential Fisheries Habitat	No	N/A	Categorical Exclusion				

Appendix B:

Visual Assessment Data

Figure 1: Current Condition Plan View (CCPV)





Table 5: Visual Stream Morphology Stability Assessment

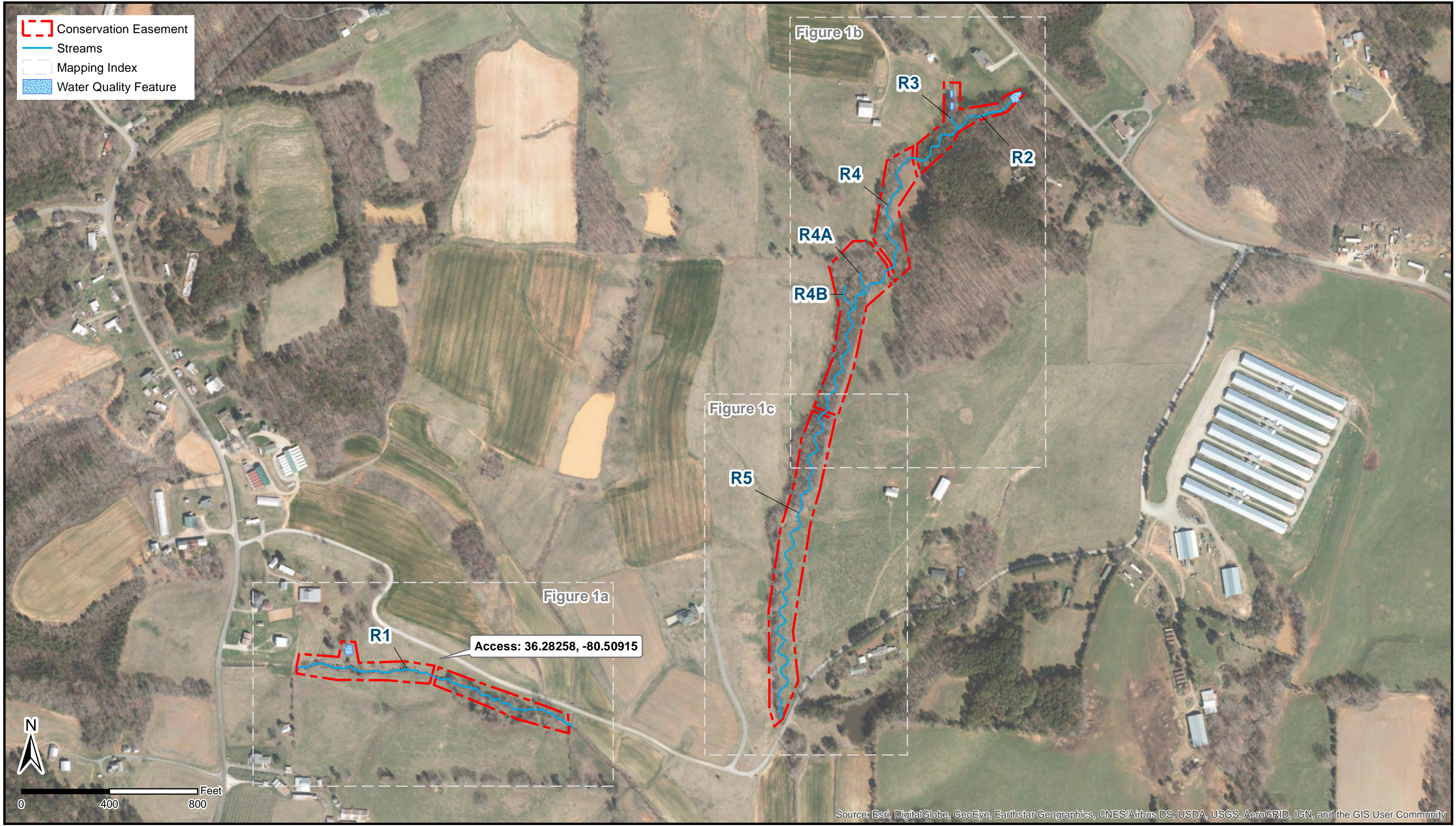
Table 5a: Vegetation Condition Assessment

Stream Photo Points (Cross-Sections, Culvert Crossings, EII Reaches)

Vegetation Plot Photographs

Potential Problem Area Photographs

-  Conservation Easement
-  Streams
-  Mapping Index
-  Water Quality Feature



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



**Horne Creek Tributaries Mitigation Project
Surry County, North Carolina**

USACE Action ID Number: SAW-2017-01510
DMS project number: 100026
December 2021
MY2

Current Conditions
Plan View
Monitoring Year 2

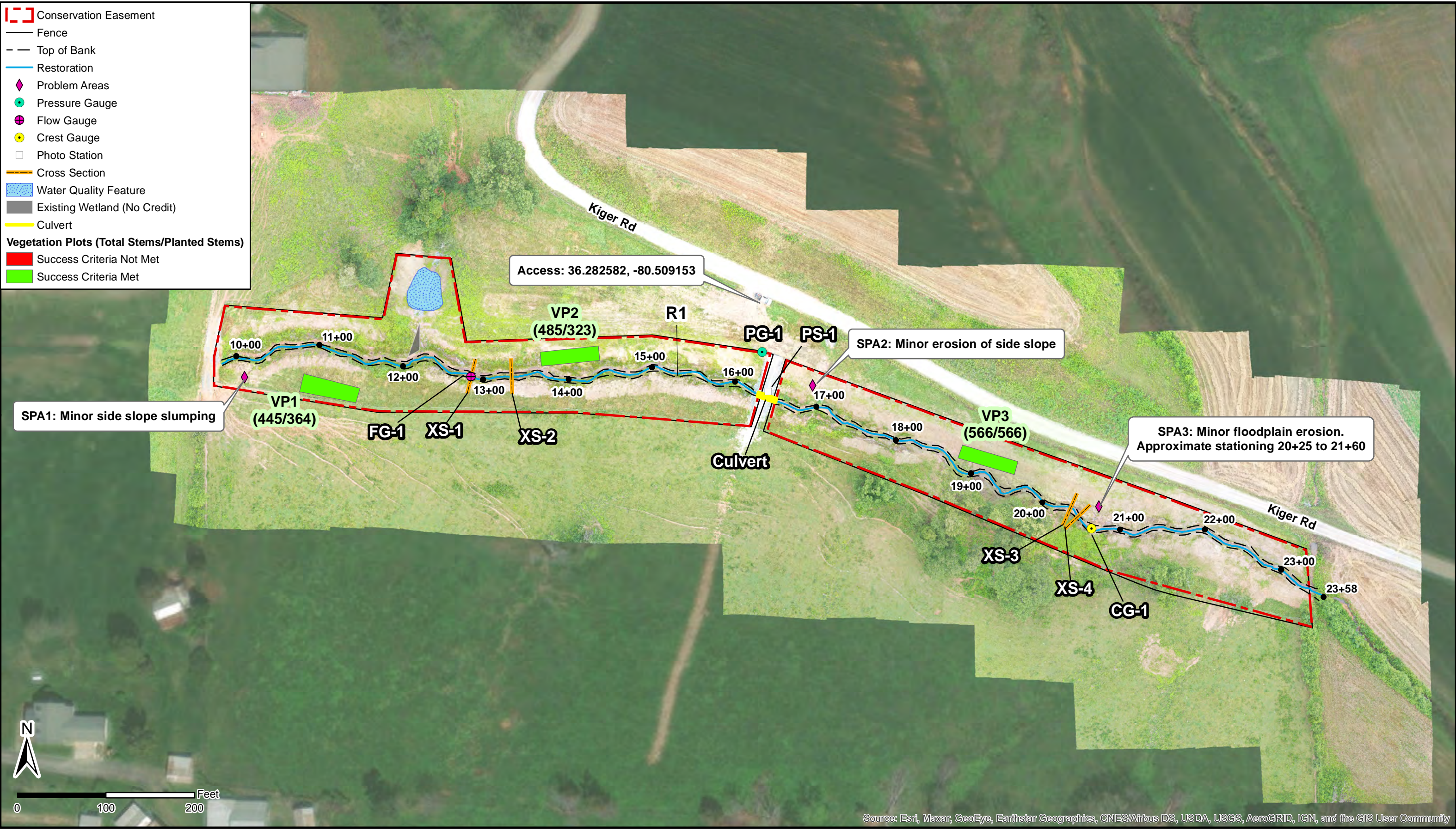
NAD 1983 2011 State Plane
North Carolina FIPS 3200 FT US

**FIGURE
1**

- Conservation Easement
- Fence
- Top of Bank
- Restoration
- ◆ Problem Areas
- Pressure Gauge
- ⊕ Flow Gauge
- Crest Gauge
- Photo Station
- Cross Section
- Water Quality Feature
- Existing Wetland (No Credit)
- Culvert

Vegetation Plots (Total Stems/Planted Stems)

- Success Criteria Not Met
- Success Criteria Met



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



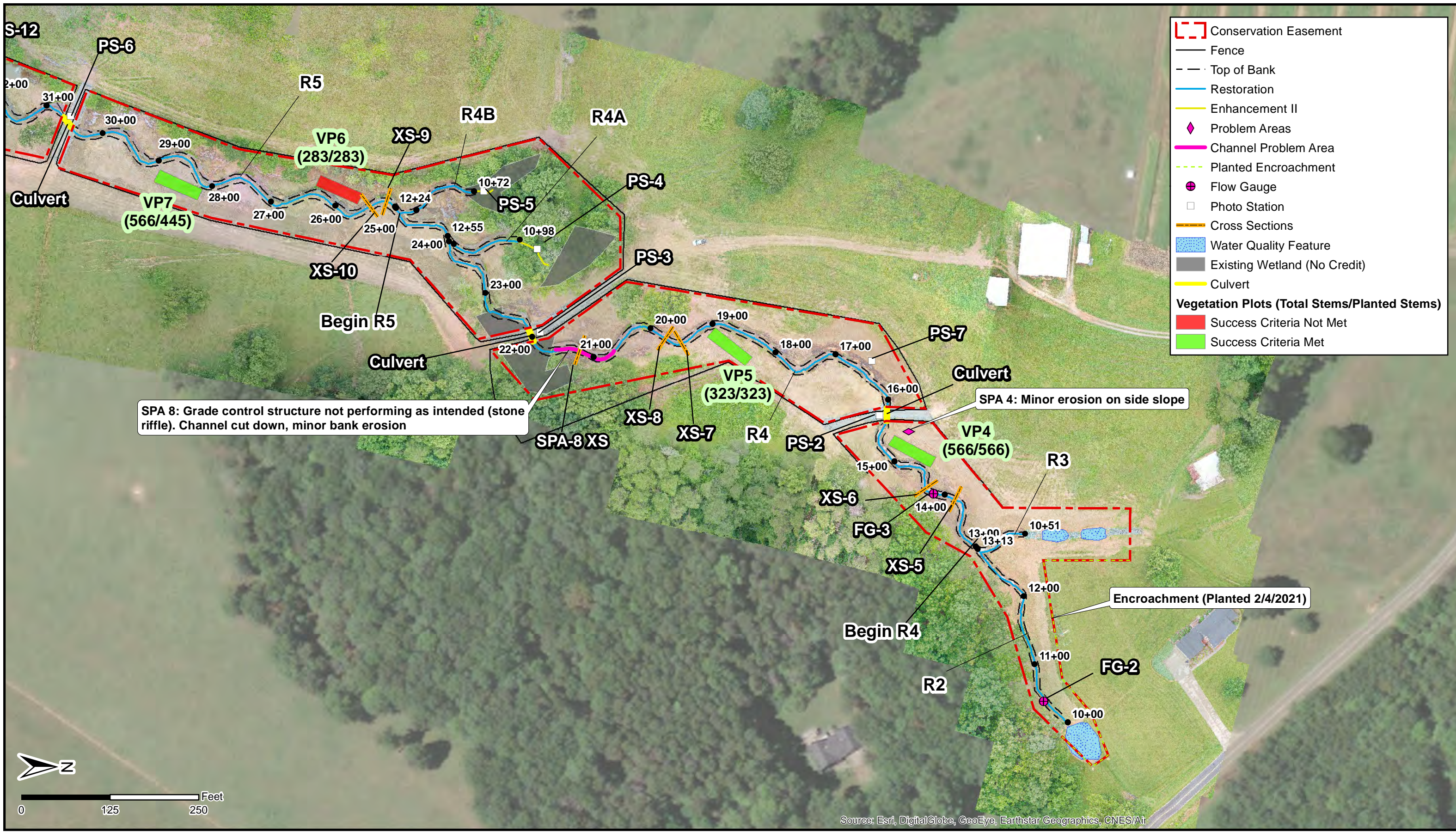
Horne Creek Tributaries Mitigation Project
 Surry County, North Carolina

USACE Action ID Number: SAW-2017-01510
 DMS project number: 100026
 December 2021
 MY2

Current Conditions
 Plan View
 Monitoring Year 2

NAD 1983 2011 State Plane
 North Carolina FIPS 3200 FT US

FIGURE
 1a



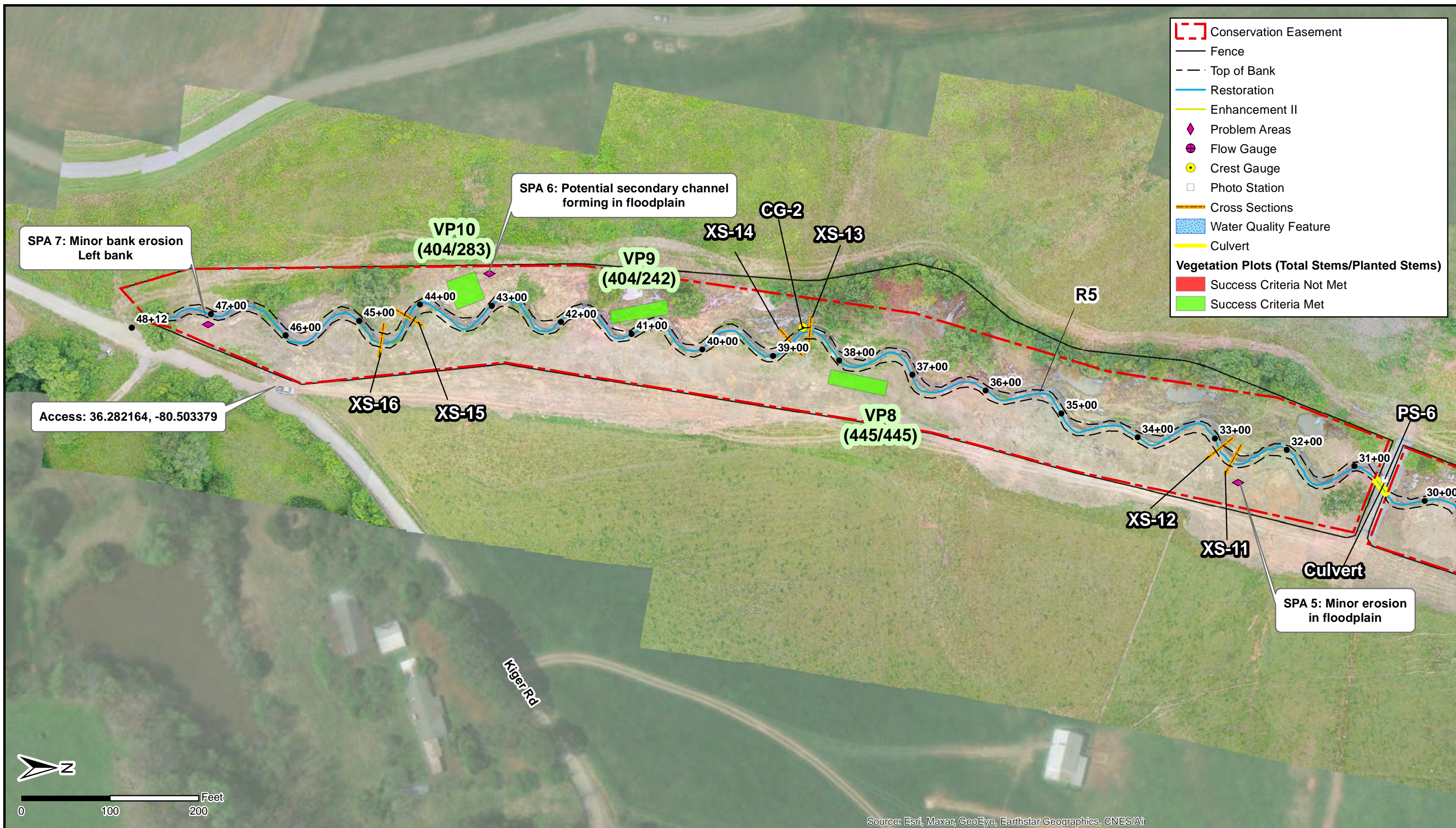
**Horne Creek Tributaries Mitigation Project
Surry County, North Carolina**

USACE Action ID Number: SAW-2017-01510
DMS project number: 100026
December 2021
MY2

Current Conditions
Plan View
Monitoring Year 2

NAD 1983 2011 State Plane
North Carolina FIPS 3200 FT US

FIGURE
1b



SPA 7: Minor bank erosion
Left bank

Access: 36.282164, -80.503379

SPA 6: Potential secondary channel
forming in floodplain

SPA 5: Minor erosion
in floodplain

Legend

- Conservation Easement
- Fence
- Top of Bank
- Restoration
- Enhancement II
- ◆ Problem Areas
- Flow Gauge
- Crest Gauge
- Photo Station
- Cross Sections
- Water Quality Feature
- Culvert

Vegetation Plots (Total Stems/Planted Stems)

- Success Criteria Not Met
- Success Criteria Met



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Air



Horne Creek Tributaries Mitigation Project
Surry County, North Carolina

USACE Action ID Number: SAW-2017-01510
DMS project number: 100026
December 2021
MY2

Current Conditions
Plan View
Monitoring Year 2

NAD 1983 2011 State Plane
North Carolina FIPS 3200 FT US

FIGURE
1C

Table 5										
Visual Stream Morphology Stability Assessment										
Project: Horne Creek Tributaries Mitigation Project (DMS ID #100026)										
Reach ID: R1, R2, R3, R4, R4a, R4b, R5										
Assessed Length: 5428										
Date of Survey: 4/30/2021 and 10/27/2021										
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. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	91	99%	0	0	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
Totals					1	91	99%	0	0	99%
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	257	257			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	110	111			99%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	117	117			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	42	42			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	42	42			100%			

Table 5a. Vegetation Condition Assessment		Date of Survey: 4/30/2021 and 10/27/2021				
Project:	Horne Creek Tributaries Mitigation Project (DMS ID #100026)					
Planted Acreage ¹ :	10.2					
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	1 acre	Solid light blue	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Transparent light green	0	0.00	0.0%
Total				0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
Cumulative Total				0	0.00	0.0%

Easement Acreage ² :		11.9				
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern ⁴	Areas or points (if too small to render as polygons at map scale).	1000 SF	orange hatched	0	0.00	0.0%
5. Easement Encroachment Areas ³	Areas or points (if too small to render as polygons at map scale).	none	Green dotted line	1	0.00	0.0%



May 6, 2020

R1, XS1, Upstream, (MY-00)



R1, XS1, Upstream (MY-02)



May 6, 2020

R1, XS1, Downstream (MY-00)



R1, XS1, Downstream (MY-02)



R1, XS1, Left Bank (MY-00)



R1, XS1, Left Bank (MY-02)



R1, XS1, Right Bank (MY-00)



R1, XS1, Right Bank (MY-02)



May 6, 2020

R1, XS2, Upstream (MY-00)



10/26/21, 2:57 PM
Surry County

R1, XS2, Upstream (MY-02)



May 6, 2020

R1, XS2, Downstream (MY-00)



10/26/21, 2:56 PM
Surry County

R1, XS2, Downstream (MY-02)



R1, XS2, Left Bank (MY-00)



R1, XS2, Left Bank (MY-02)



R1, XS2, Right Bank (MY-00)



R1, XS2, Right Bank (MY-02)



May 6, 2020

R1, XS3, Upstream (MY-00)



10/26/21, 3:51 PM
Surry County

R1, XS3, Upstream (MY-02)



May 6, 2020

R1, XS3, Downstream (MY-00)



10/26/21, 3:51 PM
Surry County

R1, XS3, Downstream (MY-02)



R1, XS3, Left Bank (MY-00)



R1, XS3, Left Bank (MY-02)



R1, XS3, Right Bank (MY-00)



R1, XS3, Right Bank (MY-02)



May 6, 2020

R1, XS4, Upstream (MY-00)



10/26/21, 3:53 PM
Surry County

R1, XS4, Upstream (MY-02)



May 6, 2020

R1, XS4, Downstream (MY-00)



10/26/21, 3:53 PM
Surry County

R1, XS4, Downstream (MY-02)



May 6, 2020

R1, XS4, Left Bank (MY-00)



10/26/21, 3:53 PM
Surry County

R1, XS4, Left Bank (MY-02)



May 6, 2020

R1, XS4, Right Bank (MY-00)



10/26/21, 3:53 PM
Surry County

R1, XS4, Right Bank (MY-02)



May 6, 2020

R2, XS5, Upstream (MY-00)



10/27/21 8:30 AM
Surry County

R2, XS5, Upstream (MY-02)



May 6, 2020

R2, XS5, Downstream (MY-00)



10/27/21 8:31 AM
Surry County

R2, XS5, Downstream (MY-02)



May 6, 2020

R2, XS5, Left Bank (MY-00)



10/27/21 8:30 AM
Surry County

R2, XS5, Left Bank (MY-02)



May 6, 2020

R2, XS5, Right Bank (MY-00)



10/27/21 8:30 AM
Surry County

R2, XS5, Right Bank (MY-02)



R2, XS6, Upstream (MY-00)



10/27/21 8:32 AM
Surry County

R2, XS6, Upstream (MY-02)



R2, XS6, Downstream (MY-00)



10/27/21 8:33 AM
Surry County

R2, XS6, Downstream (MY-02)



R2, XS6, Left Bank (MY-00)



R2, XS6, Left Bank (MY-02)



R2, XS6, Right Bank (MY-00)



R2, XS6, Right Bank (MY-02)



R4, XS7, Upstream (MY-00)



R4, XS7, Upstream (MY-02)



R4, XS7, Downstream (MY-00)



R4, XS7, Downstream (MY-02)



R4, XS7, Left Bank (MY-00)



10/27/21 9:27 AM
Surry County

R4, XS7, Left Bank (MY-02)



R4, XS7, Right Bank (MY-00)



10/27/21 9:27 AM
Surry County

R4, XS7, Right Bank (MY-02)



R4, XS8, Upstream (MY-00)



R4, XS8, Upstream (MY-02)



R4, XS8, Downstream (MY-00)



R4, XS8, Downstream (MY-02)



R4, XS8, Left Bank (MY-00)



R4, XS8, Left Bank (MY-02)



R4, XS8, Right Bank (MY-00)



R4, XS8, Right Bank (MY-02)



R4, XS9, Upstream (MY-00)



R4, XS9, Upstream (MY-02)



R4, XS9, Downstream (MY-00)



R4, XS9, Downstream (MY-02)



May 6, 2020

R4, XS9, Left Bank (MY-00)



10/27/21 10:01 AM

R4, XS9, Left Bank (MY-02)



May 6, 2020

R4, XS9, Right Bank (MY-00)



10/27/21 10:01 AM

R4, XS9, Right Bank (MY-02)



R4, XS10, Upstream (MY-00)



R4, XS10, Upstream (MY-02)



R4, XS10, Downstream (MY-00)



R4, XS10, Downstream (MY-02)



May 6, 2020

R4, XS10, Left Bank (MY-00)



10/27/21 9:57 AM

R4, XS10, Left Bank (MY-02)



May 6, 2020

R4, XS10, Right Bank (MY-00)



10/27/21 9:58 AM
Surry County

R4, XS10, Right Bank (MY-02)



R5, XS11, Upstream (MY-00)



R5, XS11, Upstream (MY-02)



R5, XS11, Downstream (MY-00)



R5, XS11, Downstream (MY-02)



R5, XS11, Left Bank (MY-00)



R5, XS11, Left Bank (MY-02)



R5, XS11, Right Bank (MY-00)



R5, XS11, Right Bank (MY-02)



R5, XS12, Upstream (MY-00)



R5, XS12, Upstream (MY-02)



R5, XS12, Downstream (MY-00)



R5, XS12, Downstream (MY-02)



May 6, 2020

R5, XS12, Left Bank (MY-00)



10/27/21 10:47 AM

R5, XS12, Left Bank (MY-02)



May 6, 2020

R5, XS12, Right Bank (MY-00)



10/27/21 10:47 AM

R5, XS12, Right Bank (MY-02)



R5, XS13, Upstream (MY-00)



R5, XS13, Upstream (MY-02)



R5, XS13, Downstream (MY-00)



R5, XS13, Downstream (MY-02)



R5, XS13, Left Bank (MY-00)



R5, XS13, Left Bank (MY-02)



R5, XS13, Right Bank (MY-00)



R5, XS13, Right Bank (MY-02)



R5, XS14, Upstream (MY-00)



10/27/21, 10:43 AM
Surry County



R5, XS14, Upstream (MY-02)



R5, XS14, Downstream (MY-00)



10/27/21, 10:42 AM
Surry County

R5, XS14, Downstream (MY-02)



R5, XS14, Left Bank (MY-00)



R5, XS14, Left Bank (MY-02)



R5, XS14, Right Bank (MY-00)



R5, XS14, Right Bank (MY-02)



R5, XS15, Upstream (MY-00)



R5, XS15, Upstream (MY-02)



R5, XS15, Downstream (MY-00)



R5, XS15, Downstream (MY-02)



R5, XS15, Left Bank (MY-00)



R5, XS15, Left Bank (MY-02)



R5, XS15, Right Bank (MY-00)



R5, XS15, Right Bank (MY-02)



R5, XS16, Upstream (MY-00)



R5, XS16, Upstream (MY-02)



R5, XS16, Downstream (MY-00)



R5, XS16, Downstream (MY-02)



R5, XS16, Left Bank (MY-00)



10/27/21, 10:12 AM
Surry County

R5, XS16, Left Bank (MY-02)



May 6, 2020

R5, XS16, Right Bank (MY-00)



10/27/21, 10:10 AM

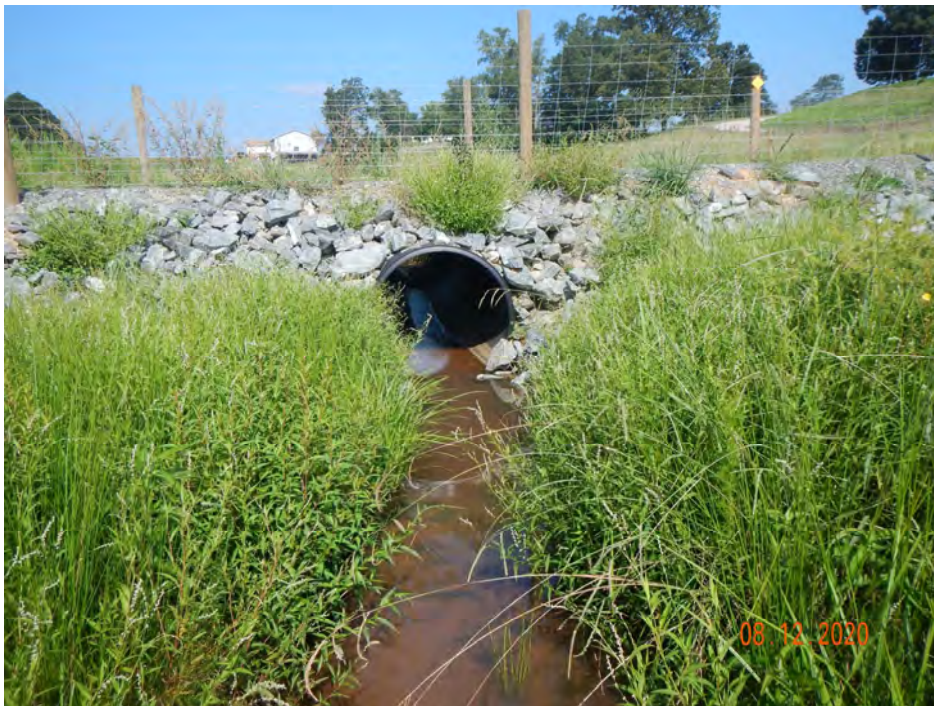
R5, XS16, Right Bank (MY-02)



PS-1, R1, Culvert Crossing, Downstream (MY-00)



PS-1, R1, Culvert Crossing, Downstream (MY-02)



PS-1, R1, Culvert Crossing, Upstream (MY-00)



PS-1, R1, Culvert Crossing, Upstream (MY-02)



PS-2, R2, Culvert Crossing, Downstream (MY-00)



PS-2, R2, Culvert Crossing, Downstream (MY-02)



PS-2, R2 Culvert Crossing, Upstream (MY-00)



PS-2, R2, Culvert Crossing, Upstream (MY-02)



PS-3, R4, Culvert Crossing, Downstream (MY-00)



PS-3, R4, Culvert Crossing, Downstream (MY-02)



PS-3, R4, Culvert Crossing, Upstream (MY-00)



PS-3, R4, Culvert Crossing, Upstream (MY-02)



PS-4, R4A, Downstream (MY-00)



PS-4, R4A, Downstream (MY-02)



PS-4, R4A, Upstream (MY-00)



PS-4, R4A, Upstream (MY-02)



PS-5, R4B, Downstream (MY-00)



PS-5, R4B, Downstream (MY-02)



PS-5, R4B, Upstream (MY-00)



PS-5, R4B, Upstream (MY-02)



PS-6, R5, Culvert Crossing, Downstream (MY-00)



PS-6, R5, Culvert Crossing, Downstream (MY-02)



PS-6, R5, Culvert Crossing, Upstream (MY-00)



PS-6, R5, Culvert Crossing, Upstream (MY-02)



PS-7, R4, Right Floodplain Slope (MY-01)



PS-7, R4, Right Floodplain Slope (MY-02)



Veg Plot 1 (MY-00)



Veg Plot 1 (MY-02)



Veg Plot 2 (MY-00)



Veg Plot 2 (MY-02)



Veg Plot 3 (MY-00)



Veg Plot 3 (MY-02)



Veg Plot 4 (MY-00)



Veg Plot 4 (MY-02)



Veg Plot 5 (MY-00)



Veg Plot 5 (MY-02)



Veg Plot 6 (MY-00)



Veg Plot 6 (MY-02)



May 27, 2020 at 12:35:20 PM
Pinnacle NC 27043
United States

Veg Plot 7 (MY-00)



10/27/21, 9:31 AM

Veg Plot 7 (MY-02)



May 27, 2020 at 11:46:27 AM
East Bend NC 27018
United States

Veg Plot 8 (MY-00)



10/26/21 4:43 PM

Veg Plot 8 (MY-02)



Veg Plot 9 (MY-00)



Veg Plot 9 (MY-02)



Veg Plot 10 (MY-00)



Veg Plot 10 (MY-02)



SPA1, R1 Right Floodplain, Minor Slumping (MY-01)



SPA1, R1 Right Floodplain, Minor Slumping (MY-02)



SPA2, R1 Left Floodplain, Minor Erosion (MY-01)



SPA2, R1 Left Floodplain, Minor Erosion (MY-02)



SPA3, R1 Left Floodplain, Minor Erosion (MY-01)



SPA3, R1 Left Floodplain, Minor Erosion (MY-02)



SPA3, R1 Left Floodplain, Minor Erosion (MY-01)



SPA3, R1 Left Floodplain, Minor Erosion (MY-02)



SPA4, R2 Left Floodplain, Minor Erosion (MY-01)



SPA4, R2 Left Floodplain, Minor Erosion (MY-02)



SPA4, R2 Right Floodplain, Minor Erosion (MY-01)



SPA4, R2 Right Floodplain, Minor Erosion (MY-02)



SPA5, R5 Left Floodplain, Minor Erosion (MY-01)



SPA5, R5 Left Floodplain, Minor Erosion (MY-02)



SPA5, R5 Left Floodplain, Minor Erosion (MY-01)



SPA5, R5 Left Floodplain, Minor Erosion (MY-02)



SPA6, R5 Right Floodplain, VP10, Secondary Channelization (MY-01)



SPA6, R5 Right Floodplain, VP10, Secondary Channelization (MY-02)



SPA7, R5 Left Bank, Functioning at Risk (MY-01)



SPA7, R5 Left Bank, Functioning at Risk (MY-02)



10/27/21, 9:03 AM
Surry County

SPA8, R4, STA 20+75, Channel Bed Erosion (MY-02)



10/27/21, 8:59 AM
Surry County

SPA8, R4, STA 20+75, Channel Bed Erosion (MY-02)



10/27/21, 9:00 AM
Surry County

SPA8, R4, STA 20+75, Channel Bed Erosion (MY-02)



10/27/21, 9:01 AM
Surry County

SPA8, R4, STA 20+75, Channel Bed Erosion (MY-02)



Bare Area, R1, Right Floodplain (MY-01)



Bare Area, R1, Right Floodplain (MY-02)

Appendix C: Vegetation Monitoring Plot Data

Table 6: Planted and Total Stem Counts

Table 6a: Vegetation Plot Mitigation Success Summary

Table 6b: Red-line Planting List

Table 6: Planted and Total Stem Counts

Horne Creek			Current Plot Data (MY2 2021)																	
Scientific Name	Common Name	Species Type	006-01-0001			006-01-0002			006-01-0003			006-01-0004			006-01-0005			006-01-0006		
			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															
Alnus serrulata	hazel alder	Shrub							1	1	1	2	2	2				2	2	2
Asimina triloba	pawpaw	Tree							1	1	1				1	1	1	2	2	2
Betula nigra	river birch	Tree	2	2	2	1	1	1				3	3	3	3	3	3			
Carpinus caroliniana	American hornbeam	Tree							1	1	1	1	1	1	1	1	1	1	1	1
Cercis canadensis	eastern redbud	Tree				1	1	1	2	2	2									
Corylus americana	American hazelnut	Shrub	1	1	1															
Diospyros virginiana	common persimmon	Tree						3							1	1	1	1	1	1
Fraxinus pennsylvanica	green ash	Tree										1	1	1						
Hamamelis virginiana	American witchhazel	Tree							1	1	1									
Lindera benzoin	northern spicebush	Shrub	1	1	1															
Liriodendron tulipifera	tuliptree	Tree	1	1	1	3	3	3	4	4	4	3	3	3						
Nyssa sylvatica	blackgum	Tree	1	1	1	1	1	1				1	1	1						
Platanus occidentalis	American sycamore	Tree				1	1	1	2	2	2	3	3	3	1	1	1			
Quercus alba	white oak	Tree							1	1	1							1	1	1
Quercus rubra	northern red oak	Tree				1	1	1	1	1	1				1	1	1			
Salix nigra	black willow	Tree						1												
Tilia americana	American basswood	Tree	3	3	3															
Stem count			9	9	11	8	8	12	14	14	14	14	14	14	8	8	8	7	7	7
size (ares)			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			6	6	7	6	6	8	9	9	9	7	7	7	6	6	6	5	5	5
Stems per ACRE			364.2	364.2	445.2	323.7	323.7	485.6	566.6	566.6	566.6	566.6	566.6	566.6	323.7	323.7	323.7	283.3	283.3	283.3

- 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%

*All tree species found in the vegetation plots are recorded in the table. Only species that were on the approved mitigation plan planting list are counted toward success criteria.

Table 6: Planted and Total Stem Counts

Horne Creek			Current Plot Data (MY2 2021)												Annual Means									
Scientific Name	Common Name	Species Type	006-01-0007			006-01-0008			006-01-0009			006-01-0010			MY2 (2021)			MY1 (2020)			MY0 (2020)			
			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																						
Alnus serrulata	hazel alder	Shrub	3	3	3	2	2	2	2	2	2	2	1	1	1	13	13	13	14	14	14	14	14	14
Asimina triloba	pawpaw	Tree											1	1	1	5	5	5	10	10	10	18	18	18
Betula nigra	river birch	Tree	2	2	2	1	1	1								12	12	12	15	15	15	4	4	4
Carpinus caroliniana	American hornbeam	Tree							2	2	2	1	1	1	7	7	7	10	10	10	13	13	13	
Cercis canadensis	eastern redbud	Tree										1	1	1	4	4	4	5	5	5	10	10	10	
Corylus americana	American hazelnut	Shrub	1	1	1	1	1	1							3	3	3	4	4	4	12	12	12	
Diospyros virginiana	common persimmon	Tree				1	1	1							3	3	6	9	9	12	12	12	12	
Fraxinus pennsylvanica	green ash	Tree	1	1	1										2	2	2	2	2	3	4	4	4	
Hamamelis virginiana	American witchhazel	Tree													1	1	1	1	1	1	6	6	6	
Lindera benzoin	northern spicebush	Shrub				3	3	3							4	4	4	8	8	8	15	15	15	
Liriodendron tulipifera	tuliptree	Tree							1	1	1	1	1	1	13	13	13	18	18	18	29	29	29	
Nyssa sylvatica	blackgum	Tree	3	3	3	3	3	3							9	9	9	12	12	12	12	12	12	
Platanus occidentalis	American sycamore	Tree							1	1	1	1	1	1	9	9	9	9	9	9	7	7	7	
Quercus alba	white oak	Tree													2	2	2	4	4	4	4	4	4	
Quercus rubra	northern red oak	Tree													3	3	3	7	7	7	7	7	7	
Salix nigra	black willow	Tree			3						4			3			11							
Tilia americana	American basswood	Tree	1	1	1							1	1	1	5	5	5	10	10	10	5	5	5	
Stem count			11	11	14	11	11	11	6	6	10	7	7	10	95	95	111	138	138	142	172	172	172	
size (ares)			1			1			1			1			10			10			10			
size (ACRES)			0.02			0.02			0.02			0.02			0.25			0.25			0.25			
Species count			6	6	7	6	6	6	4	4	5	7	7	8	16	16	18	16	16	16	16	16	16	
Stems per ACRE			445.2	445.2	566.6	445.2	445.2	445.2	242.8	242.8	404.7	283.3	283.3	404.7	384.5	384.5	449.2	558.5	558.5	574.7	696.1	696.1	696.1	

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%

*All tree species found in the vegetation plots are recorded in the table. Only species that were on the approved mitigation plan planting list are counted toward success criteria.

**Plots 9 and 10 meet success criteria when including approved volunteer stems.

Table 6a: Vegetation Plot Mitigation Success Summary Table Horne Creek Tributaries					
Plot #	Planted Stems/Acre	Volunteers/Acre	Total Stems/Acre	Success Criteria Met	Average Stem Height (ft)
1	364	0	364	Yes	3.3
2	323	161	484	Yes	1.5
3	566	0	566	Yes	1.6
4	566	0	566	Yes	2.1
5	323	0	323	Yes	1.5
6	283	0	283	No	2.0
7	445	121	566	Yes	2.7
8	445	0	445	Yes	1.0
9	242	161	404	Yes	1.8
10	283	121	404	Yes	1.5
Project Average	384	56.4	441	Yes	1.9

*No one species accounts for more than 50% of the total species in a single plot.

** Plots 9 and 10 meet interim success criteria when volunteer black willow is included in plot data. This species is an approved mitigation plan species.

*** Total Stems/Acre only includes species from approved mitigation plan.

Table 6b: Horne Creek Tributaries Red-line Planting List				
Common Name	Species	Stems	Percent Planted	Mitigation Plan Percent
Green ash	<i>Fraxinus pensylvanica</i>	250	3.4%	3.0%
River birch	<i>Betula nigra</i>	500	6.7%	7.0%
Basswood	<i>Tilia americana</i>	500	6.7%	7.0%
Black gum	<i>Nyssa sylvatica</i>	450	6.0%	6.0%
American sycamore	<i>Platanus occidentalis</i>	500	6.7%	7.0%
Tulip poplar	<i>Liriodendron tulipifera</i>	500	6.7%	7.0%
Northern red oak	<i>Quercus rubra</i>	250	3.4%	3.0%
White oak	<i>Quercus alba</i>	450	6.0%	6.0%
Persimmon	<i>Diospyros virginiana</i>	500	6.7%	7.0%
Common serviceberry	<i>Amelanchier arborea</i>	0	0.0%	5.0%
Umbrella magnolia	<i>Magnolia tripetala</i>	0	0.0%	6.0%
Redbud	<i>Cercis canadensis</i>	400	5.4%	0.0%
American hornbeam	<i>Carpinus caroliniana</i>	450	6.0%	6.0%
Witch hazel	<i>Hamamelis virginiana</i>	450	6.0%	6.0%
Pawpaw	<i>Asimina triloba</i>	900	12.1%	6.0%
Spicebush	<i>Lindera benzoin</i>	450	6.0%	6.0%
Tag alder	<i>Alnus serrulata</i>	450	6.0%	6.0%
Hazelnut	<i>Corylus americana</i>	450	6.0%	6.0%
Total Planted		7,450	100.0%	

*changes from mitigation plan in red

Riparian Buffer Live Stake Plantings – Streambanks			
(Proposed 2'-3' Spacing @ Meander Bends and 6'-8' Spacing @ Riffle Sections)			
<i>Sambucus canadensis</i>	Elderberry	20%	FACW
<i>Salix sericea</i>	Silky Willow	30%	OBL
<i>Salix nigra</i>	Black Willow	10%	OBL
<i>Cornus amomum</i>	Silky Dogwood	40%	FACW

Appendix D:

Stream Measurement and Geomorphology Data

Figure 2: MY2 Cross-Sections
Table 7a: Baseline Stream Data Summary
Table 7b: Cross-section Morphology Data
Table 7c: Stream Reach Morphology Data

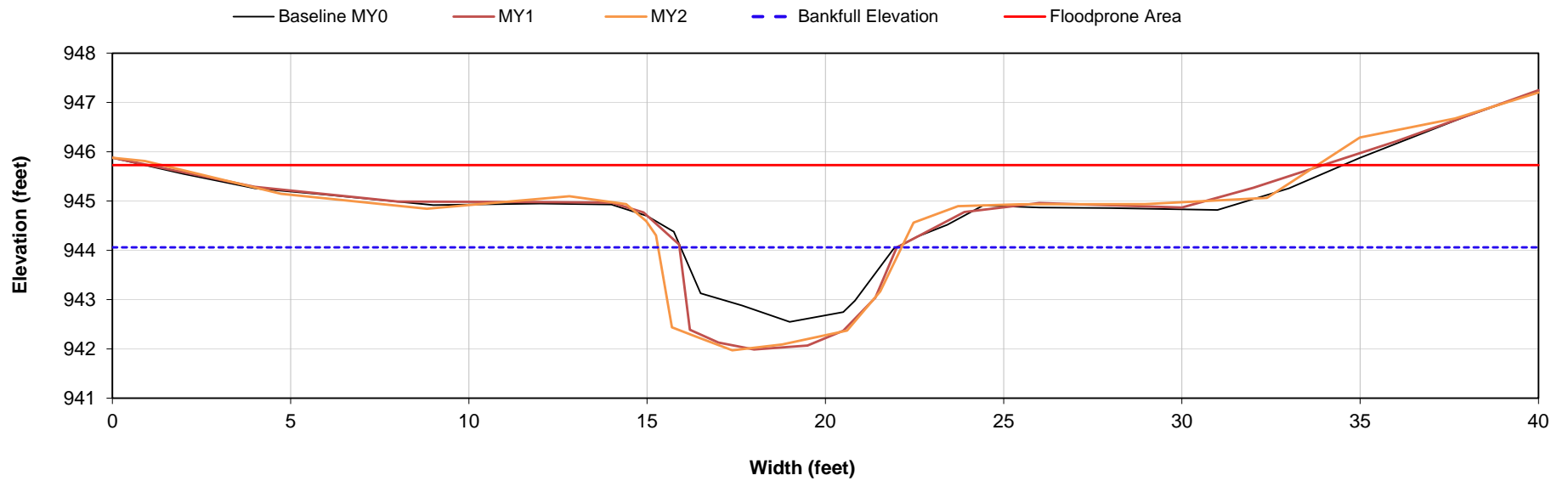
Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R1
Cross Section ID	XS-1
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	944.1
Low Bank Height Elevation (ft)	944.6
Bankfull Max Depth (ft)	2.1
Low Bank Height (ft)	2.6
Bank Height Ratio	1.24
Bankfull X-section Area (ft ²)	11.1
% Change Bank Height Ratio	24.0%



Looking Downstream

XS-1 Pool, STA 12+85

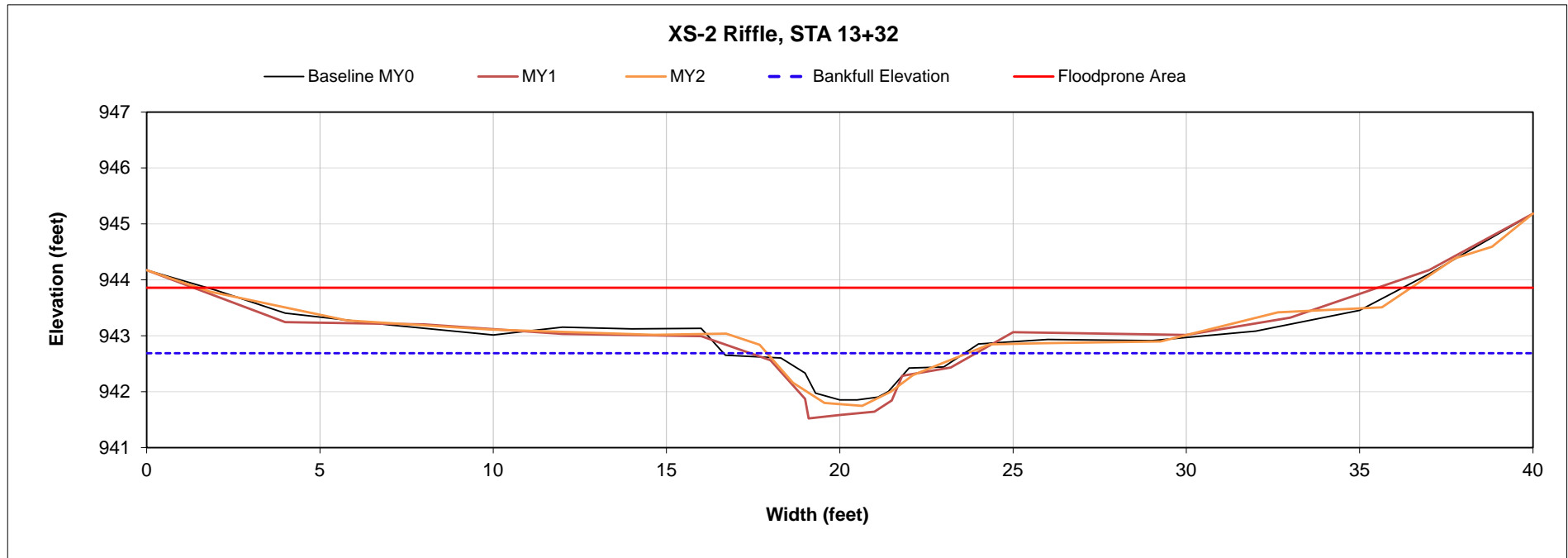


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R1
Cross Section ID	XS-2
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	942.8
Low Bank Height Elevation (ft)	942.8
Bankfull Max Depth (ft)	1.1
Low Bank Height (ft)	1.1
Bank Height Ratio	1.04
Bankfull X-section Area (ft²)	3.9
% Change Bank Height Ratio	4.0%



Looking Downstream

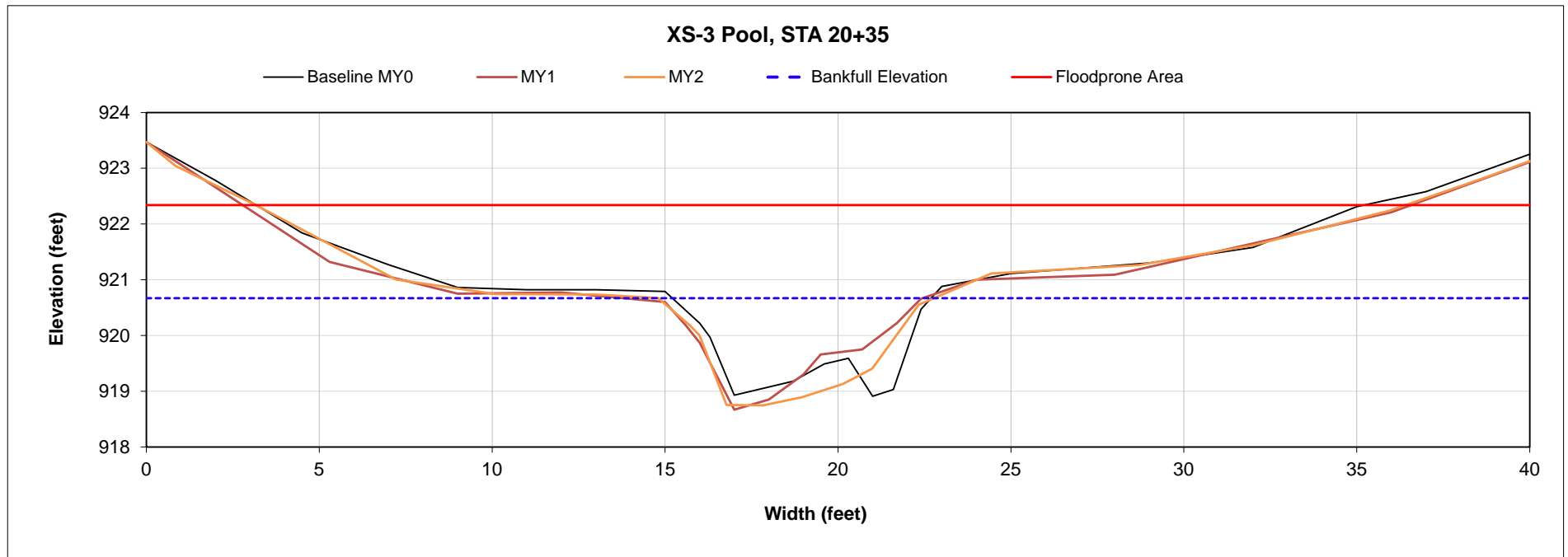


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R1
Cross Section ID	XS-3
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	920.7
Low Bank Height Elevation (ft)	920.7
Bankfull Max Depth (ft)	1.9
Low Bank Height (ft)	1.9
Bank Height Ratio	1.00
Bankfull X-section Area (ft²)	9.6
% Change Bank Height Ratio	0.0%



Looking Downstream

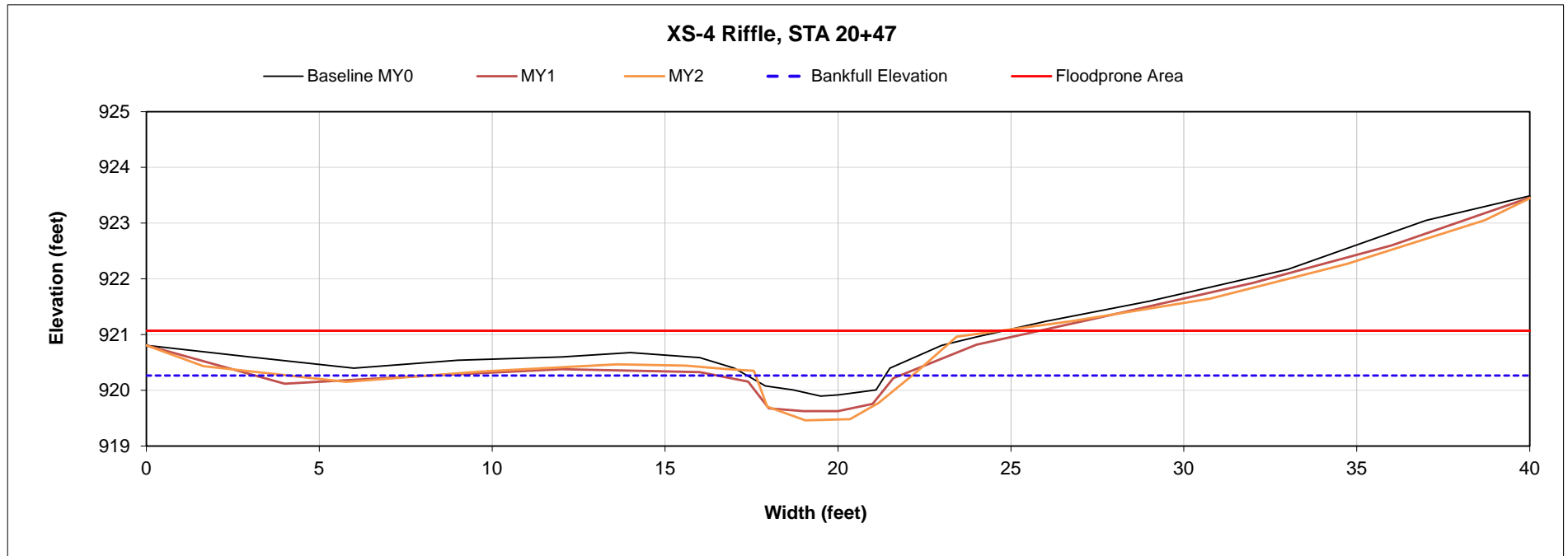


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R1
Cross Section ID	XS-4
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	920.3
Low Bank Height Elevation (ft)	920.4
Bankfull Max Depth (ft)	0.8
Low Bank Height (ft)	0.9
Bank Height Ratio	1.11
Bankfull X-section Area (ft²)	2.6
% Change Bank Height Ratio	11.0%



Looking Downstream

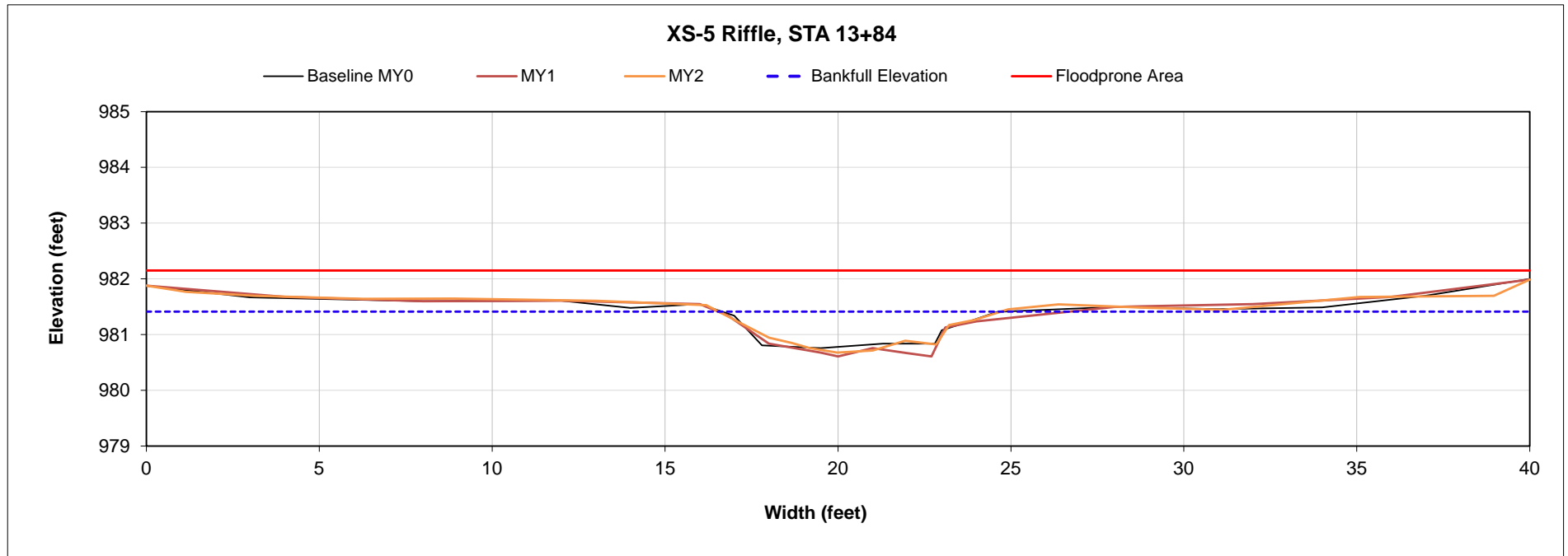


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R4
Cross Section ID	XS-5
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	981.4
Low Bank Height Elevation (ft)	981.5
Bankfull Max Depth (ft)	0.7
Low Bank Height (ft)	0.8
Bank Height Ratio	1.05
Bankfull X-section Area (ft²)	3.7
% Change Bank Height Ratio	5.0%



Looking Downstream

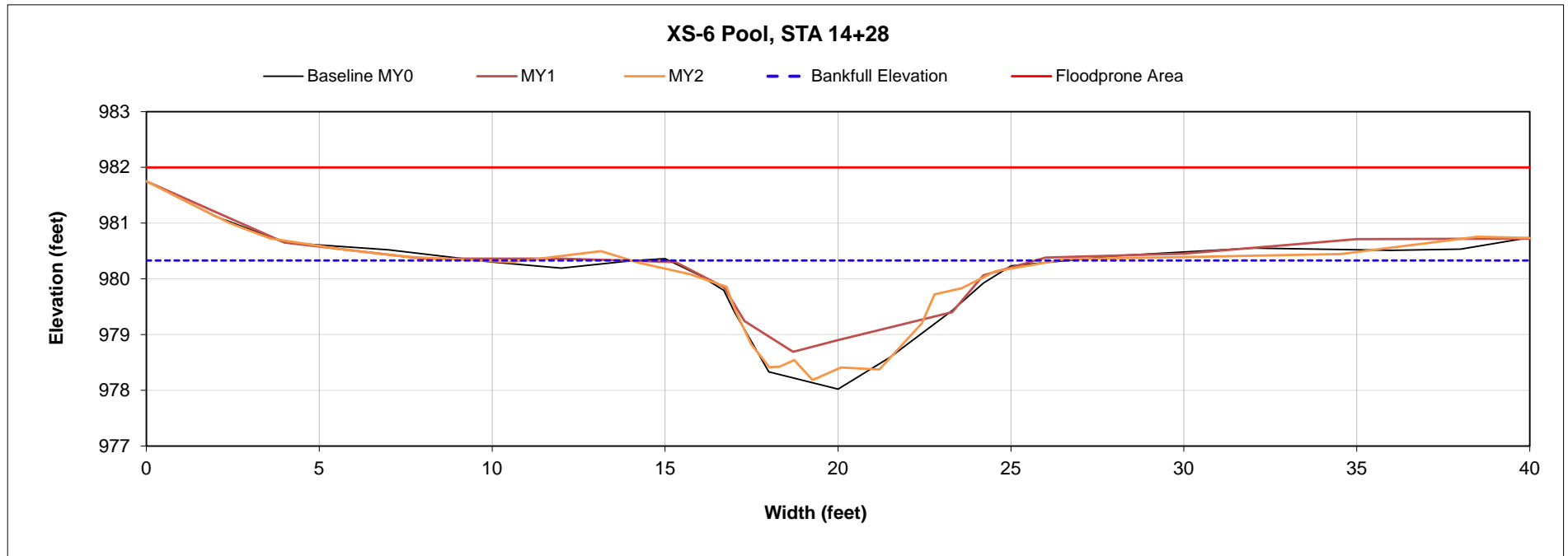


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R4
Cross Section ID	XS-6
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	980.3
Low Bank Height Elevation (ft)	980.4
Bankfull Max Depth (ft)	2.1
Low Bank Height (ft)	2.2
Bank Height Ratio	1.01
Bankfull X-section Area (ft²)	11.6
% Change Bank Height Ratio	1.0%



Looking Downstream

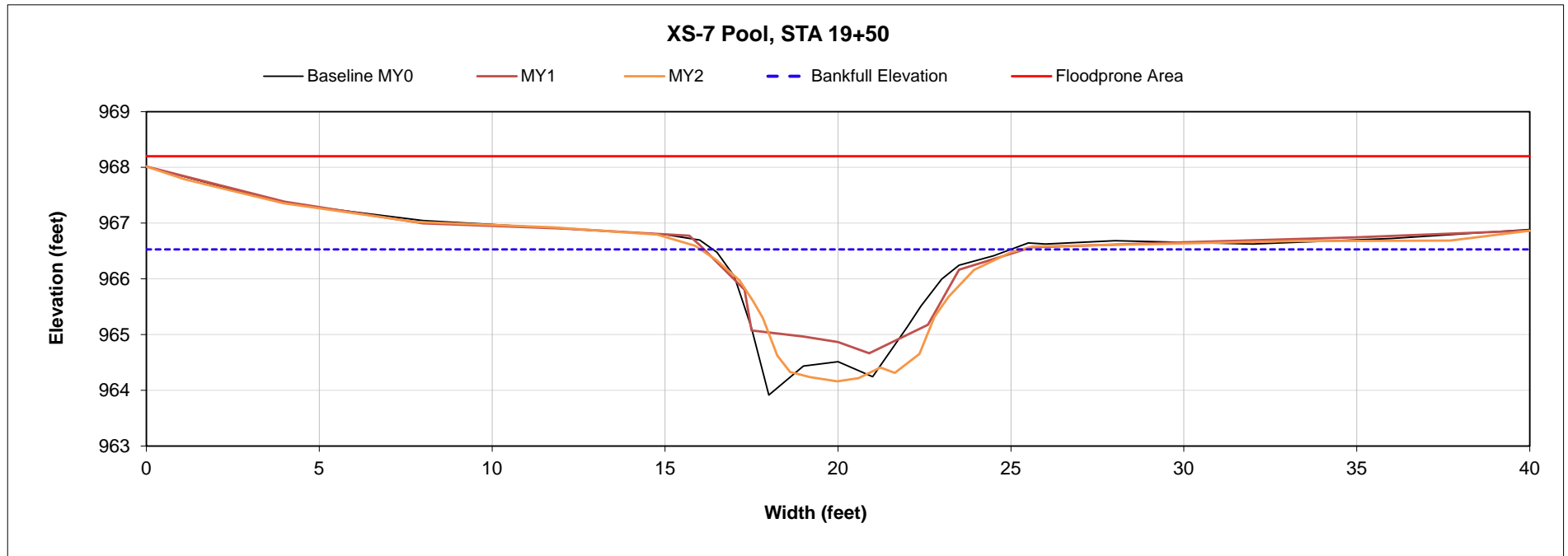


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R4
Cross Section ID	XS-7
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	966.5
Low Bank Height Elevation (ft)	966.6
Bankfull Max Depth (ft)	2.4
Low Bank Height (ft)	2.4
Bank Height Ratio	1.02
Bankfull X-section Area (ft²)	12.4
% Change Bank Height Ratio	2.0%



Looking Downstream

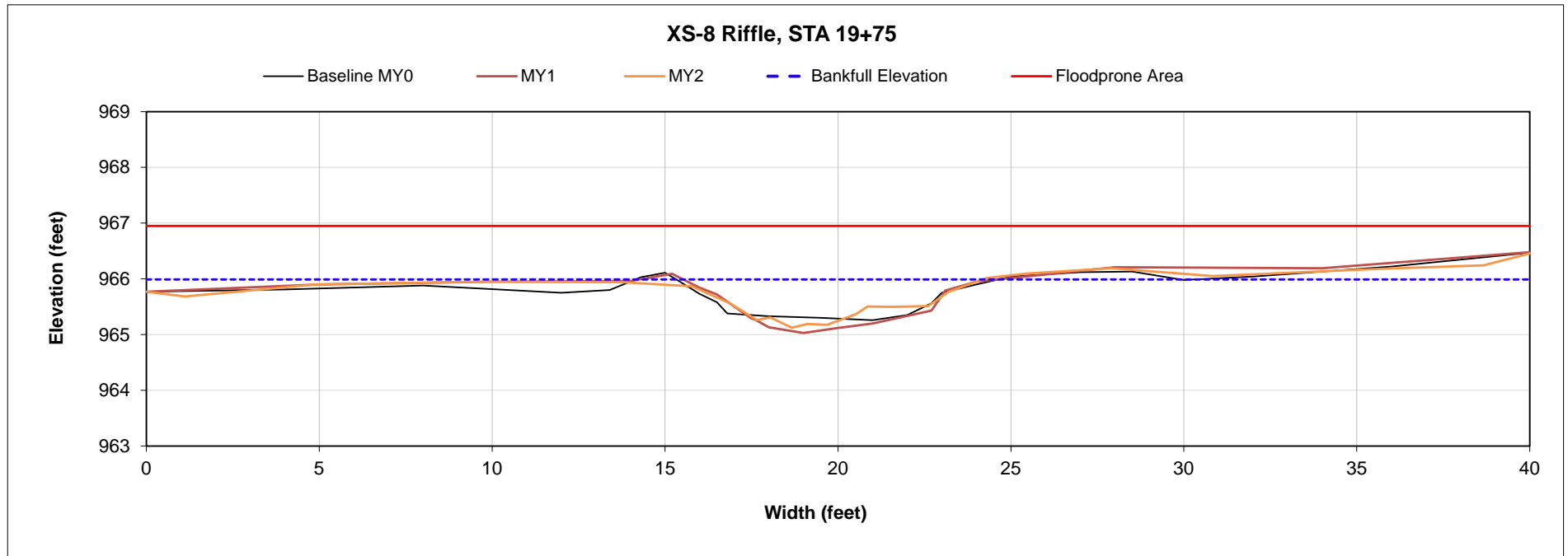


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R4
Cross Section ID	XS-8
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	966.0
Low Bank Height Elevation (ft)	965.9
Bankfull Max Depth (ft)	0.9
Low Bank Height (ft)	0.7
Bank Height Ratio	0.80
Bankfull X-section Area (ft²)	5.1
% Change Bank Height Ratio	20.0%



Looking Downstream

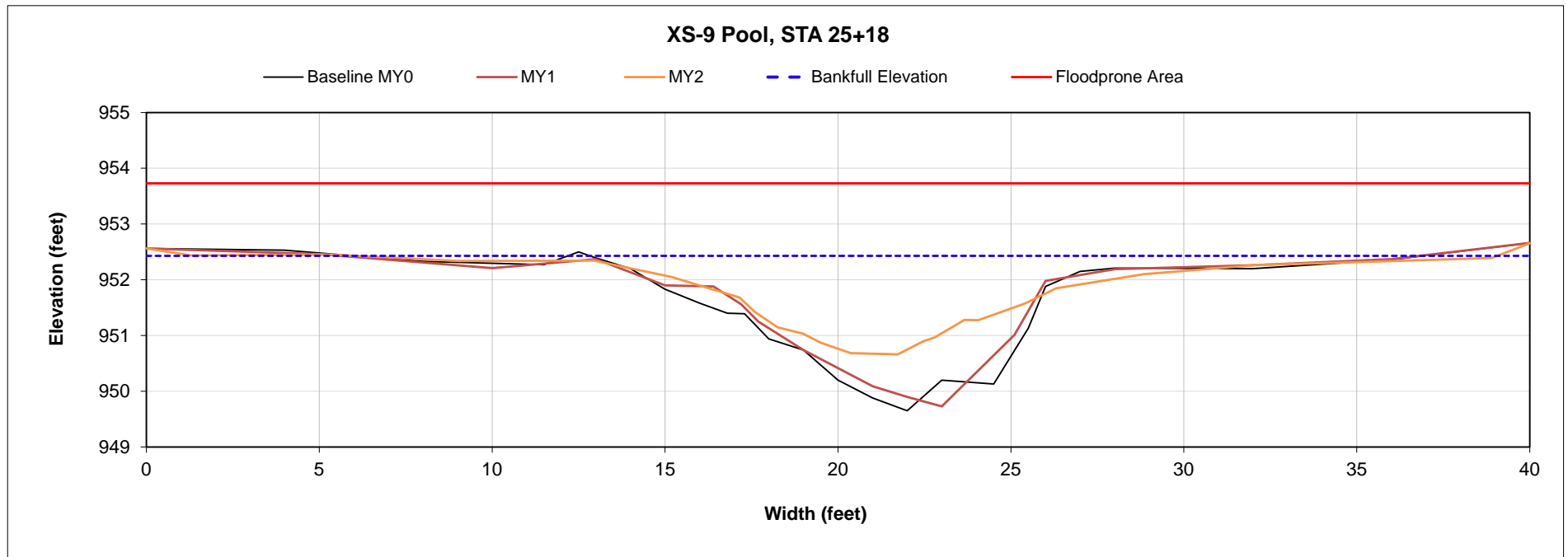


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-9
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	952.4
Low Bank Height Elevation (ft)	952.1
Bankfull Max Depth (ft)	1.8
Low Bank Height (ft)	1.4
Bank Height Ratio	0.81
Bankfull X-section Area (ft²)	16.8
% Change Bank Height Ratio	19.0%



Looking Downstream

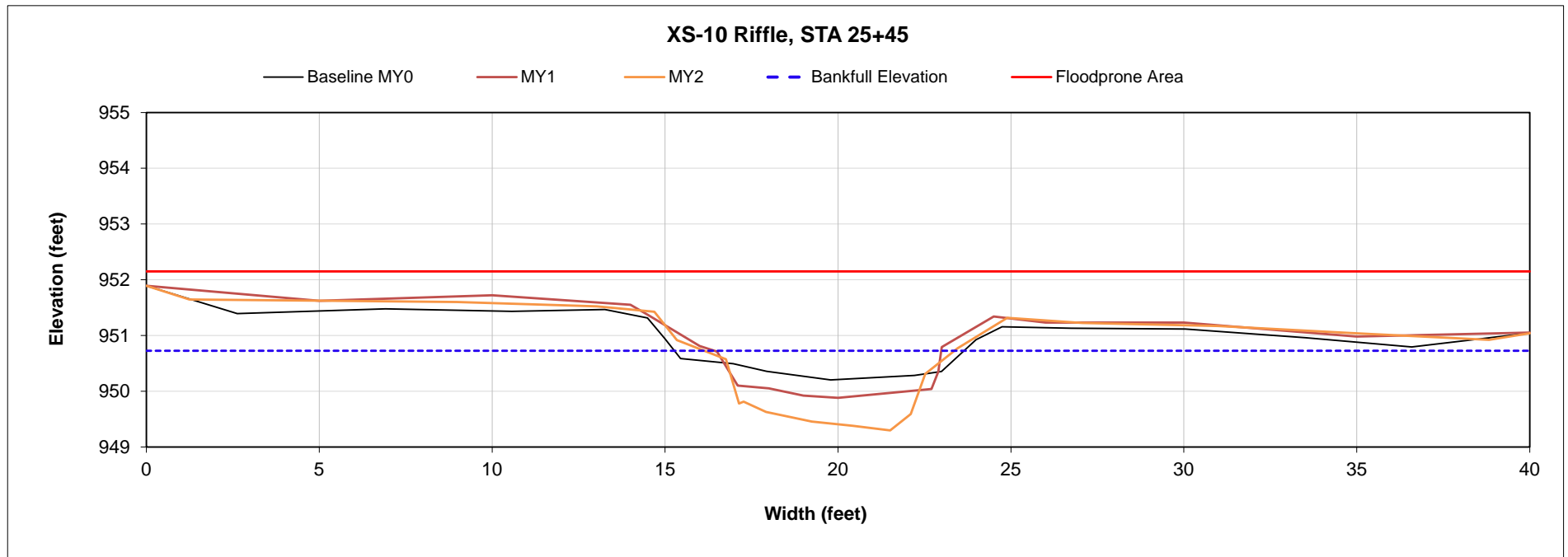


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-10
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	950.7
Low Bank Height Elevation (ft)	951.3
Bankfull Max Depth (ft)	1.4
Low Bank Height (ft)	2.0
Bank Height Ratio	1.41
Bankfull X-section Area (ft²)	6.9
% Change Bank Height Ratio	41.0%



Looking Downstream

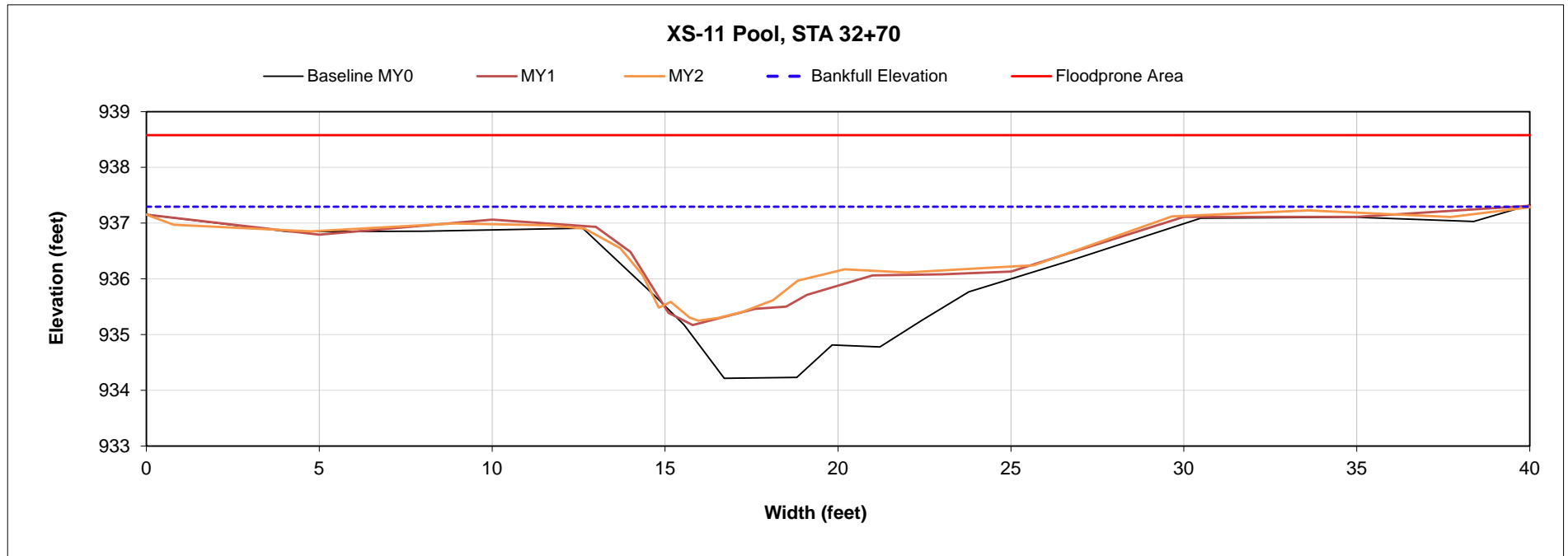


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-11
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	937.3
Low Bank Height Elevation (ft)	936.9
Bankfull Max Depth (ft)	2.0
Low Bank Height (ft)	1.7
Bank Height Ratio	0.81
Bankfull X-section Area (ft²)	23.6
% Change Bank Height Ratio	19.0%



Looking Downstream



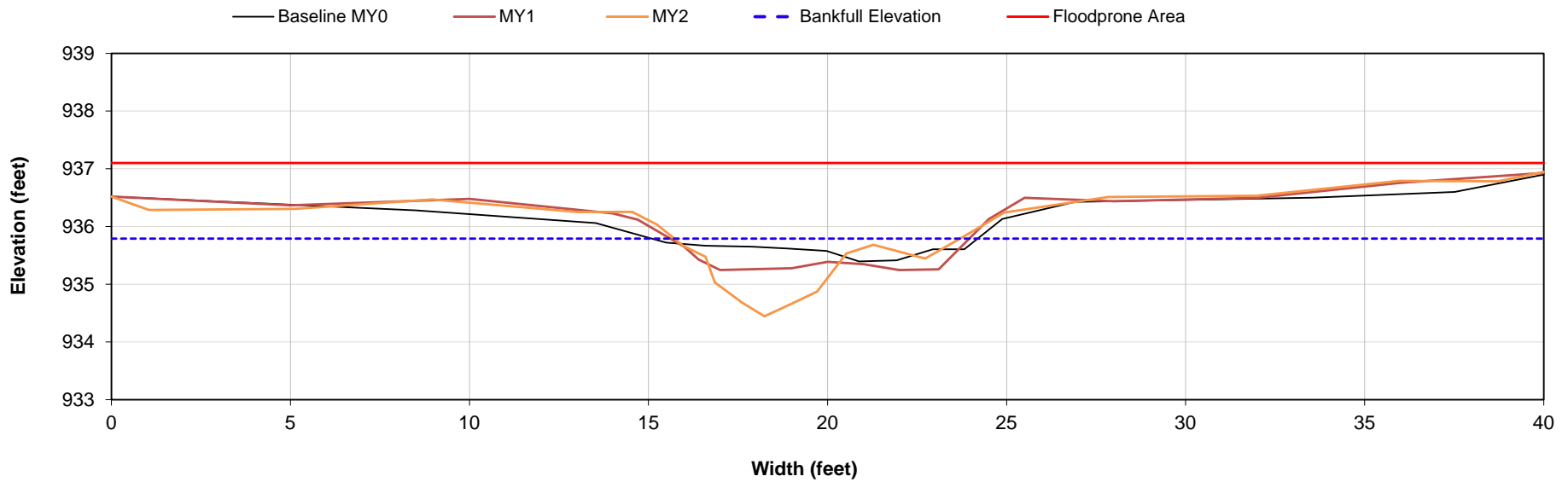
Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-12
Field Crew	K. Obermiller, C. Durham



Looking Downstream

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	935.8
Low Bank Height Elevation (ft)	936.2
Bankfull Max Depth (ft)	1.3
Low Bank Height (ft)	1.8
Bank Height Ratio	1.34
Bankfull X-section Area (ft²)	4.5
% Change Bank Height Ratio	34.0%

XS-12 Riffle, STA 32+88

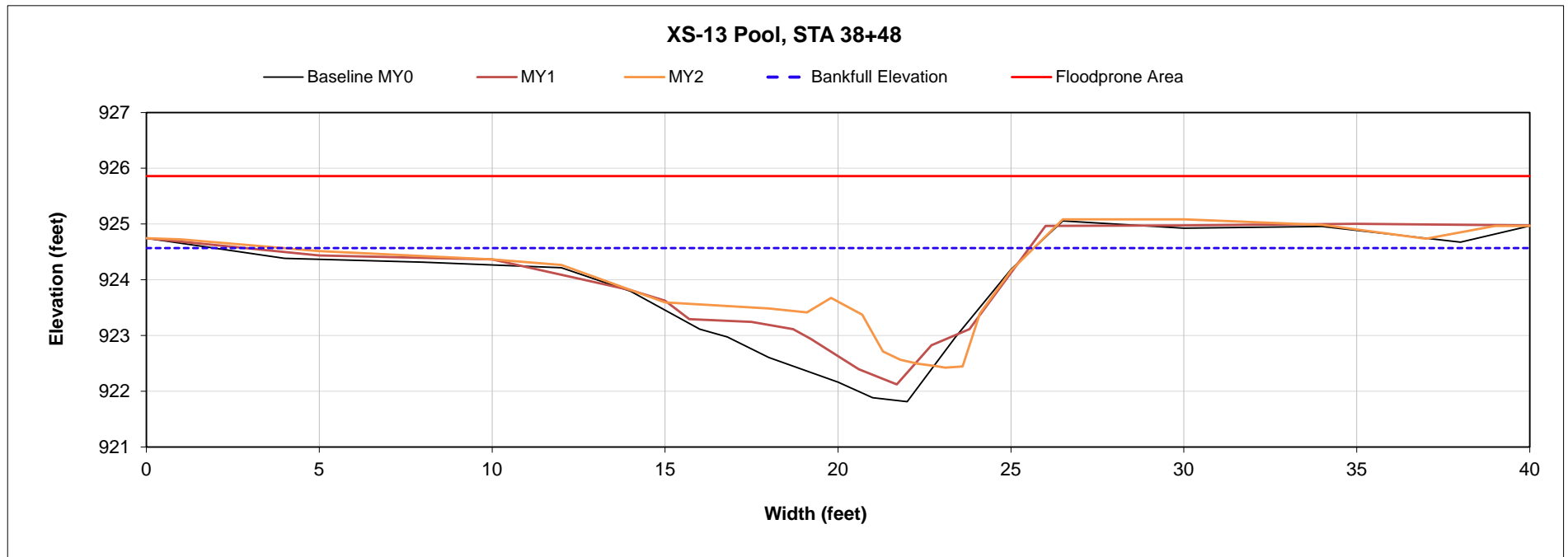


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-13
Field Crew	E. Dunnigan, J. Bernstorf

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	924.6
Low Bank Height Elevation (ft)	924.4
Bankfull Max Depth (ft)	2.1
Low Bank Height (ft)	1.9
Bank Height Ratio	0.90
*Bankfull X-section Area (ft²)	16.4
% Change Bank Height Ratio	10.0%



Looking Downstream



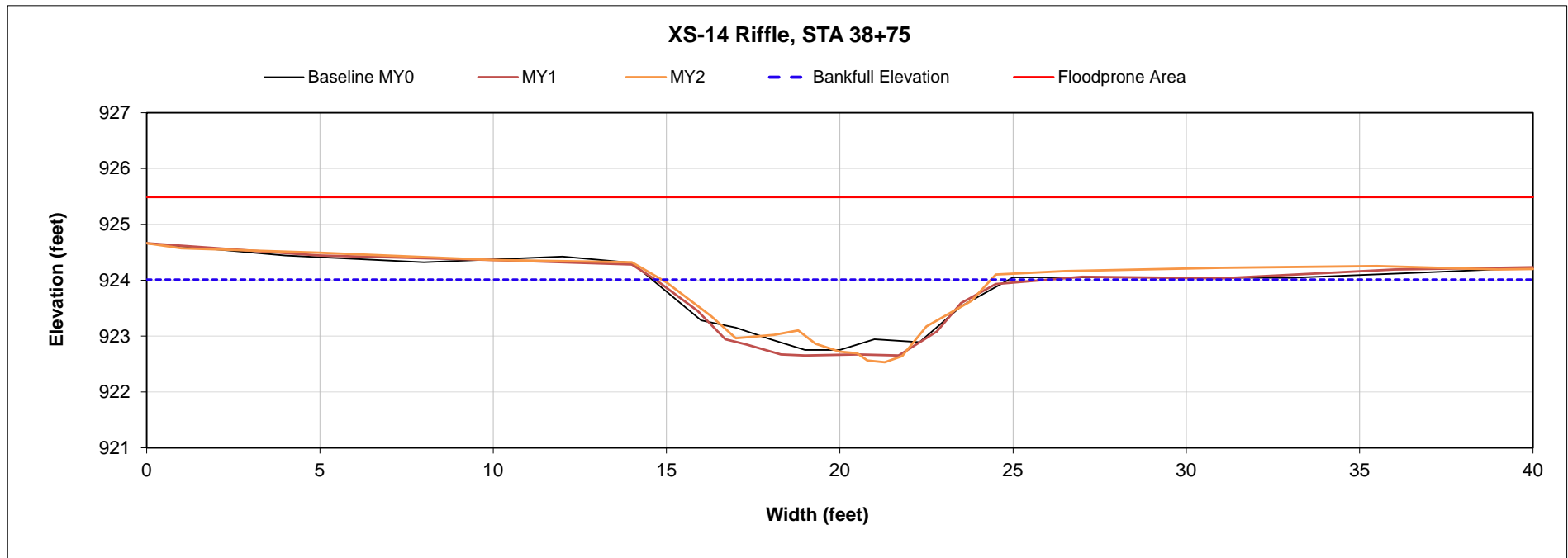
*Due to a calculation error MY0 bankfull was corrected from 19.9 to 16.4

Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-14
Field Crew	E. Dunnigan, J. Bernstorf

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	924.0
Low Bank Height Elevation (ft)	924.1
Bankfull Max Depth (ft)	1.5
Low Bank Height (ft)	1.6
Bank Height Ratio	1.06
Bankfull X-section Area (ft ²)	8.4
% Change Bank Height Ratio	6.0%



Looking Downstream

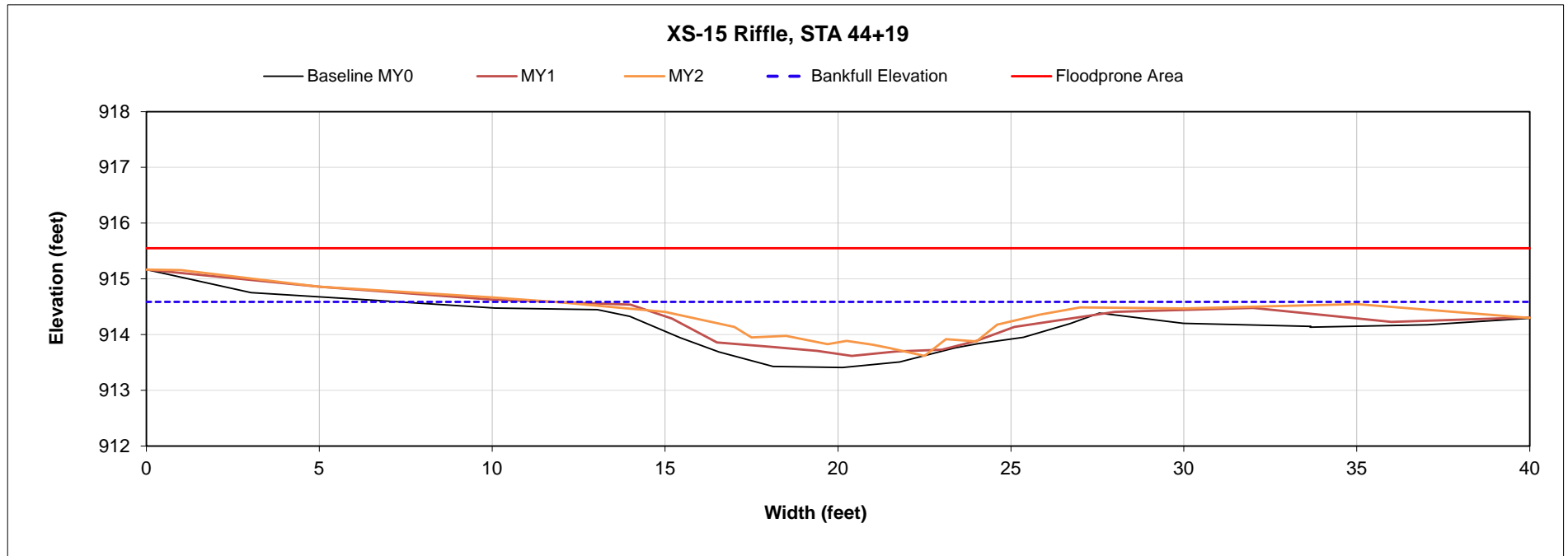


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-15
Field Crew	E. Dunnigan, J. Bernstorf

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	914.6
Low Bank Height Elevation (ft)	914.5
Bankfull Max Depth (ft)	1.0
Low Bank Height (ft)	0.9
Bank Height Ratio	0.90
Bankfull X-section Area (ft²)	7.7
% Change Bank Height Ratio	10.0%



Looking Downstream

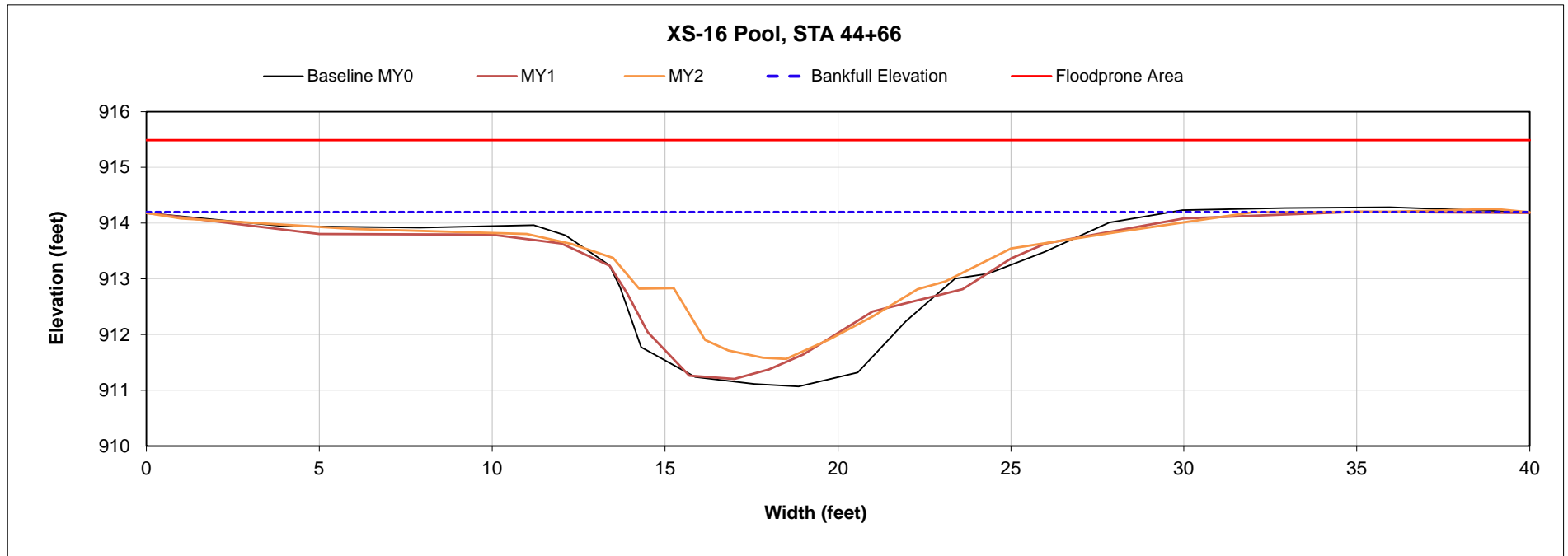


Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R5
Cross Section ID	XS-16
Field Crew	E. Dunnigan, J. Bernstorf

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	914.2
Low Bank Height Elevation (ft)	913.8
Bankfull Max Depth (ft)	2.6
Low Bank Height (ft)	2.2
Bank Height Ratio	0.85
Bankfull X-section Area (ft²)	27.1
% Change Bank Height Ratio	15.0%



Looking Downstream



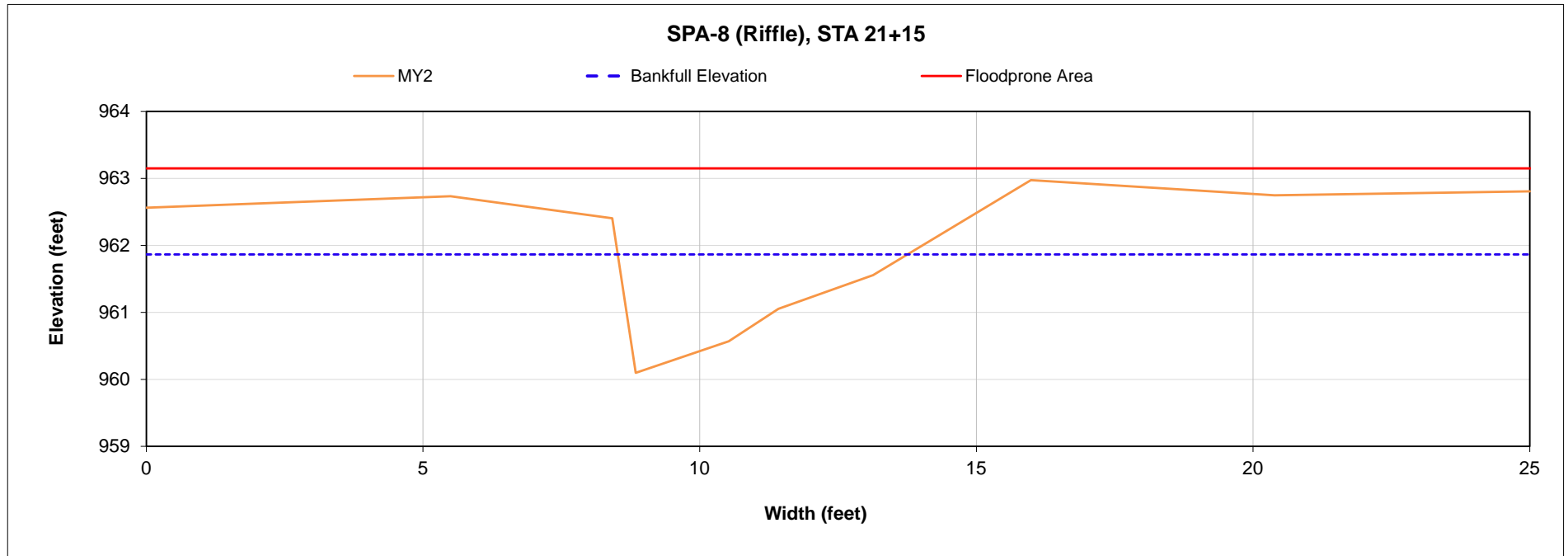
Project Name	Horne Creek Tributaries Mitigation Project
Project ID	100026
Reach ID	R4
Cross Section ID	SPA-8
Field Crew	K. Obermiller, C. Durham

Dimension Data Summary: MY2 2021	
Bankfull Elevation (ft)	961.9
Low Bank Height Elevation (ft)	962.4
Bankfull Max Depth (ft)	1.8
Low Bank Height (ft)	2.3
Bank Height Ratio	1.30
Bankfull X-section Area (ft²)	*4.9

*SPA-8 Bankfull area was estimated off design parameters for constructed rock riffles on R4



Looking Downstream



**Table 7a. Baseline Stream Data Summary
Horne Creek Tributaries Mitigation Project**

Parameter	Design		Baseline	
Reach ID: R1				
Dimension (Riffle)	Min	Max	Min	Max
Bankfull Width (ft)	-	7.0	6.2	7.6
Floodprone Width (ft)	28.0	65.0	23.9	34.5
Bankfull Mean Depth (ft)	-	0.4	0.4	0.5
Bankfull Max Depth (ft)	-	0.6	0.7	1.0
Bankfull Cross Sectional Area (ft ²)	-	2.9	2.6	3.9
Width/Depth Ratio	-	17.0	14.7	14.8
Entrenchment Ratio	4.0	9.3	3.9	4.5
Bank Height Ratio	-	1.0	1.0	1.0
Profile				
Riffle Length (ft)	10.0	20.0	10.7	26.1
Riffle Slope (ft/ft)	0.038	0.062	0.040	0.058
Pool Length (ft)	5.0	20.0	6.8	19.8
Pool Max Depth (ft)	0.8	1.4	0.9	1.9
Pool Spacing (ft)	10.5	35.0	10.8	35.5
Pattern				
Channel Beltwidth (ft)	24.5	56.0	12.4	24.3
Radius of Curvature (ft)	14.0	21.0	12.6	20.3
Rc:Bankfull Width (ft/ft)	2.0	3.0	2.0	2.7
Meander Wavelength (ft)	49.0	84.0	49.2	57.2
Meander Width Ratio	3.5	8.0	1.7	7.9
Transport Parameters				
Boundary Shear Stress (lb/ft ²)	0.79		0.84	
Max part size (mm) mobilized at bankfull	127.00		135.00	
Stream Power (W/m ²)	47.60		56.93	
Additional Reach Parameters				
Rosgen Classification	B4		B4	
Bankfull Velocity (fps)	4.2		4.6	
Bankfull Discharge (cfs)	12.0		12.0	
Sinuosity	1.07		1.12	
Water Surface Slope (Channel) (ft/ft)	0.037		0.037	
Bankfull Slope (ft/ft)	0.037		0.038	

Parameter	Design		Baseline	
Reach ID: R2				
Dimension (Riffle)	Min	Max	Min	Max
Bankfull Width (ft)	-	6.0	-	-
Floodprone Width (ft)	15.0	19.0	-	-
Bankfull Mean Depth (ft)	-	0.5	-	-
Bankfull Max Depth (ft)	-	0.6	-	-
Bankfull Cross Sectional Area (ft ²)	-	2.8	-	-
Width/Depth Ratio	-	13.1	-	-
Entrenchment Ratio	2.5	3.2	-	-
Bank Height Ratio	-	1.0	-	-
Profile				
Riffle Length (ft)	5.0	15.0	5.6	13.1
Riffle Slope (ft/ft)	0.033	0.054	0.047	0.073
Pool Length (ft)	5.0	15.0	8.6	15.3
Pool Max Depth (ft)	0.9	1.6	1.4	2.7
Pool Spacing (ft)	9.0	30.0	11.0	27.1
Pattern				
Channel Beltwidth (ft)	-	-	-	-
Radius of Curvature (ft)	-	-	-	-
Rc:Bankfull Width (ft/ft)	-	-	-	-
Meander Wavelength (ft)	-	-	-	-
Meander Width Ratio	-	-	-	-
Transport Parameters				
Boundary Shear Stress (lb/ft ²)	0.75		-	
Max part size (mm) mobilized at bankfull	123.00		-	
Stream Power (W/m ²)	43.31		-	
Additional Reach Parameters				
Rosgen Classification	B4		B4	
Bankfull Velocity (fps)	4.4		4.4	
Bankfull Discharge (cfs)	12.0		12.0	
Sinuosity	1.08		1.11	
Water Surface Slope (Channel) (ft/ft)	0.030		0.042	
Bankfull Slope (ft/ft)	0.030		0.046	

**Table 7a. Baseline Stream Data Summary
Horne Creek Tributaries Mitigation Project**

Parameter	Design		Baseline	
Reach ID: R4				
Dimension (Riffle)	Min	Max	Min	Max
Bankfull Width (ft)	-	9.0	7.9	9.6
Floodprone Width (ft)	38.0	79.0	59.0	70.0
Bankfull Mean Depth (ft)	-	0.6	0.5	0.5
Bankfull Max Depth (ft)	-	0.8	0.7	0.8
Bankfull Cross Sectional Area (ft ²)	-	5.2	3.7	5.1
Width/Depth Ratio	-	15.6	17.2	18.2
Entrenchment Ratio	4.2	8.8	4.2	5.0
Bank Height Ratio	-	1.0	1.0	1.0
Profile				
Riffle Length (ft)	10.0	30.0	11.5	33.2
Riffle Slope (ft/ft)	0.032	0.052	0.027	0.063
Pool Length (ft)	10.0	30.0	8.5	25.3
Pool Max Depth (ft)	1.2	2.0	1.4	2.6
Pool Spacing (ft)	13.5	45.0	20.6	57.9
Pattern				
Channel Beltwidth (ft)	31.5	72.0	31.7	48.2
Radius of Curvature (ft)	18.0	27.0	13.4	24.3
Rc:Bankfull Width (ft/ft)	2.0	3.0	1.7	2.5
Meander Wavelength (ft)	63.0	108.0	71.9	111.1
Meander Width Ratio	3.5	8.0	9.1	11.6
Transport Parameters				
Boundary Shear Stress (lb/ft ²)	0.93		0.75	
Max part size (mm) mobilized at bankfull	144.00		123.00	
Stream Power (W/m ²)	57.07		46.87	
Additional Reach Parameters				
Rosgen Classification	B4/C4b		B4/C4b	
Bankfull Velocity (fps)	4.2		4.3	
Bankfull Discharge (cfs)	22.0		22.0	
Sinuosity	1.31		1.32	
Water Surface Slope (Channel) (ft/ft)	0.029		0.025	
Bankfull Slope (ft/ft)	0.029		0.025	

Parameter	Design		Baseline	
Reach ID: R5				
Dimension (Riffle)	Min	Max	Min	Max
Bankfull Width (ft)	-	10.0	10.0	13.3
Floodprone Width (ft)	54.0	134.0	95.0	140.0
Bankfull Mean Depth (ft)	-	0.7	0.5	0.8
Bankfull Max Depth (ft)	-	0.9	0.7	1.2
Bankfull Cross Sectional Area (ft ²)	-	7.2	4.5	8.4
Width/Depth Ratio	-	13.9	14.5	27.7
Entrenchment Ratio	5.4	13.4	3.4	4.0
Bank Height Ratio	-	1.0	1.0	1.0
Profile				
Riffle Length (ft)	15.0	30.0	14.8	39.0
Riffle Slope (ft/ft)	0.030	0.040	0.015	0.043
Pool Length (ft)	15.0	35.0	16.1	41.9
Pool Max Depth (ft)	1.4	2.5	2.0	3.1
Pool Spacing (ft)	15.0	70.0	37.8	59.7
Pattern				
Channel Beltwidth (ft)	35.0	80.0	41.6	56.8
Radius of Curvature (ft)	20.0	30.0	19.3	29.9
Rc:Bankfull Width (ft/ft)	2.0	3.0	1.9	2.2
Meander Wavelength (ft)	70.0	120.0	81.8	107.6
Meander Width Ratio	3.5	8.0	7.6	10.5
Transport Parameters				
Boundary Shear Stress (lb/ft ²)	0.79		0.75	
Max part size (mm) mobilized at bankfull	128.00		123.00	
Stream Power (W/m ²)	43.10		42.77	
Additional Reach Parameters				
Rosgen Classification	C4		C4	
Bankfull Velocity (fps)	3.8		3.9	
Bankfull Discharge (cfs)	27.0		27.0	
Sinuosity	1.21		1.23	
Water Surface Slope (Channel) (ft/ft)	0.020		0.020	
Bankfull Slope (ft/ft)	0.020		0.020	

**Table 7b. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Horne Creek Tributaries Mitigation Project #100026**

Parameters	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	8.9	6.7	6.8					7.6	6.5	6.4					7.9	11.2	8.0					6.2	6.0	4.5				
Floodprone Width (ft)	36.7	34.7	32.4					34.5	34.2	40.0					33.3	34.9	33.3					23.9	25.5	24.7				
Bankfull Mean Depth (ft)	1.2	1.7	1.6					0.5	0.6	0.6					1.2	0.9	1.2					0.4	0.4	0.6				
Bankfull Max Depth (ft)	2.1	2.2	2.1					1.0	1.2	1.1					1.9	2.2	1.9					0.7	0.7	0.8				
Bankfull Cross Sectional Area (ft ²)	11.1	11.1	11.1					3.9	3.9	3.9					9.6	9.6	9.6					2.6	2.6	2.6				
Bankfull Width/Depth Ratio	7.1	4.0	4.2					14.8	10.9	10.6					6.4	13.0	6.6					14.7	14.0	7.8				
Bankfull Entrenchment Ratio	4.1	5.2	4.7					4.5	5.2	6.2					4.2	3.1	4.2					3.9	4.2	5.5				
Bankfull Bank Height Ratio	1.0	1.2	1.24					1.0	0.9	1.04					1.0	0.9	1.00					1.0	0.9	1.10				
d50 (mm)	N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a				
Parameters	Cross Section 5 (Riffle)							Cross Section 6 (Pool)							Cross Section 7 (Pool)							Cross Section 8 (Riffle)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	7.9	8.7	8.2					9.6	22.0	12.3					9.4	14.0	9.3					9.6	8.5	10.5				
Floodprone Width (ft)	40.0	40.0	40.0					40.0	40.0	40.0					40.0	40.0	40.0					40.0	40.0	40.0				
Bankfull Mean Depth (ft)	0.5	0.4	0.5					1.2	0.5	0.9					1.3	0.9	1.3					0.5	0.6	0.5				
Bankfull Max Depth (ft)	0.7	0.7	0.7					2.2	1.8	2.1					2.7	2.1	2.4					0.8	1.0	0.9				
Bankfull Cross Sectional Area (ft ²)	3.7	3.7	3.7					11.6	11.6	11.6					12.4	12.4	12.4					5.1	5.1	5.1				
Bankfull Width/Depth Ratio	17.2	20.6	18.0					7.9	41.7	13.1					7.1	15.8	7.0					18.2	14.2	21.9				
Bankfull Entrenchment Ratio	5.0	4.6	4.9					4.2	1.8	3.2					4.3	2.9	4.3					4.2	4.7	3.8				
Bankfull Bank Height Ratio	1.0	0.9	1.16					1.0	0.9	1.01					1.0	0.9	1.02					1.0	1.0	0.89				
d50 (mm)	N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a				
Parameters	Cross Section 9 (Pool)							Cross Section 10 (Riffle)							Cross Section 11 (Pool)							Cross Section 12 (Riffle)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	12.9	14.6	32.9					10.0	8.3	7.2					17.0	37.9	35.2					11.2	8.8	8.0				
Floodprone Width (ft)	40.0	40.0	40.0					40.0	40.0	40.0					40.0	40.0	40.0					38.5	32.5	40.0				
Bankfull Mean Depth (ft)	1.3	1.2	0.5					0.7	0.8	1.0					1.4	0.6	0.7					0.5	0.5	0.6				
Bankfull Max Depth (ft)	2.5	2.5	1.8					1.0	1.2	1.4					2.7	2.1	2.0					0.7	0.6	1.3				
Bankfull Cross Sectional Area (ft ²)	16.8	16.8	16.8					6.9	6.9	6.9					23.6	23.6	23.6					4.5	4.5	4.5				
Bankfull Width/Depth Ratio	9.8	12.6	64.2					14.5	10.0	7.6					12.2	60.8	52.7					27.7	17.2	14.0				
Bankfull Entrenchment Ratio	3.1	2.7	1.2					4.0	4.8	5.5					2.4	1.1	1.1					3.4	3.7	5.0				
Bankfull Bank Height Ratio	1.0	1.0	0.90					1.0	1.3	1.40					1.0	0.9	0.85					1.0	1.4	1.34				
d50 (mm)	N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a				
Parameters	Cross Section 13 (Pool)							Cross Section 14 (Riffle)							Cross Section 15 (Riffle)							Cross Section 16 (Pool)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	13.0	15.4	20.7					10.2	9.5	9.5					13.3	17.8	23.0					16.6	28.0	32.0				
Floodprone Width (ft)	40.0	40.0	40.0					40.0	40.0	40.0					40.0	40.0	40.0					40.0	40.0	40.0				
Bankfull Mean Depth (ft)	1.3	1.1	0.8					0.8	0.9	0.9					0.6	0.4	0.3					1.6	1.0	0.8				
Bankfull Max Depth (ft)	2.4	2.3	2.1					1.2	1.3	1.5					0.9	0.9	1.0					2.9	2.9	2.6				
Bankfull Cross Sectional Area (ft ²)	*16.4	16.4	16.4					8.4	8.4	8.4					7.7	7.7	7.7					27.1	27.1	27.1				
Bankfull Width/Depth Ratio	10.3	14.4	26.1					2.4	10.7	10.7					22.9	41.2	69.1					10.2	29.0	37.8				
Bankfull Entrenchment Ratio	3.1	2.6	1.9					3.9	4.2	4.2					3.0	2.2	1.7					2.4	1.4	1.3				
Bankfull Bank Height Ratio	1.0	1.0	0.97					1.0	1.0	1.06					1.0	0.9	0.90					1.0	0.9	0.85				
d50 (mm)	N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a					N/a	N/a	N/a				

**Table 7c. Monitoring Data - Stream Reach Summary
Horne Creek Tributaries Mitigation Project**

Parameter	Baseline		MY1		MY2		MY3		MY4		MY5+	
Reach ID: R1	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Profile												
Riffle Length (ft)	10.7	26.1										
Riffle Slope (ft/ft)	0.0395	0.0582										
Pool Length (ft)	6.8	19.8										
Pool Max depth (ft)	0.9	1.9										
Pool Spacing (ft)	10.8	35.5										
Pattern												
Channel Beltwidth (ft)	12.4	24.3										
Radius of Curvature (ft)	12.6	20.3										
Rc:Bankfull width (ft/ft)	2.0	2.7										
Meander Wavelength (ft)	49.2	57.2										
Meander Width Ratio	1.7	7.9										
Additional Reach Parameters												
Rosgen Classification	B4											
Sinuosity (ft)	1.12											
Water Surface Slope (Channel) (ft/ft)	0.0368											
BF slope (ft/ft)	0.038											
³ Ri% / Ru% / P% / G% / S%												
³ SC% / Sa% / G% / C% / B% / Be%												
³ d16 / d35 / d50 / d84 / d95 /												
² % of Reach with Eroding Banks												
Channel Stability or Habitat Metric												
Biological or Other												

Pattern and Profile data will not typically be collected unless visual data, dimensional data or profile data indicate significant deviations from baseline conditions

Parameter	Baseline		MY1		MY2		MY3		MY4		MY5+	
Reach ID: R2	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Profile												
Riffle Length (ft)	5.6	13.1										
Riffle Slope (ft/ft)	0.0473	0.0725										
Pool Length (ft)	8.6	15.3										
Pool Max depth (ft)	1.4	2.7										
Pool Spacing (ft)	11.0	27.1										
Pattern												
Channel Beltwidth (ft)	-	-										
Radius of Curvature (ft)	-	-										
Rc:Bankfull width (ft/ft)	-	-										
Meander Wavelength (ft)	-	-										
Meander Width Ratio	-	-										
Additional Reach Parameters												
Rosgen Classification	B4											
Sinuosity (ft)	1.11											
Water Surface Slope (Channel) (ft/ft)	0.04228											
BF slope (ft/ft)	0.04565											
³ Ri% / Ru% / P% / G% / S%												
³ SC% / Sa% / G% / C% / B% / Be%												
³ d16 / d35 / d50 / d84 / d95 /												
² % of Reach with Eroding Banks												
Channel Stability or Habitat Metric												
Biological or Other												

Pattern and Profile data will not typically be collected unless visual data, dimensional data or profile data indicate significant deviations

**Table 7c. Monitoring Data - Stream Reach Summary
Horne Creek Tributaries Mitigation Project**

Parameter	Baseline		MY1		MY2		MY3		MY4		MY5+	
Reach ID: R4	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Profile												
Riffle Length (ft)	11.5	33.2										
Riffle Slope (ft/ft)	0.02734	0.06283										
Pool Length (ft)	8.5	25.3										
Pool Max depth (ft)	1.4	2.6										
Pool Spacing (ft)	20.6	57.9										
Pattern												
Channel Beltwidth (ft)	31.7	48.2										
Radius of Curvature (ft)	13.4	24.3										
Rc:Bankfull width (ft/ft)	1.7	2.5										
Meander Wavelength (ft)	71.9	111.1										
Meander Width Ratio	9.1	11.6										
Additional Reach Parameters												
Rosgen Classification	B4/C4b											
Sinuosity (ft)	1.32											
Water Surface Slope (Channel) (ft/ft)	0.025											
BF slope (ft/ft)	0.02535											
³ Ri% / Ru% / P% / G% / S%												
³ SC% / Sa% / G% / C% / B% / Be%												
³ d16 / d35 / d50 / d84 / d95 /												
² % of Reach with Eroding Banks												
Channel Stability or Habitat Metric												
Biological or Other												

Pattern and Profile data will not typically be collected unless visual data, dimensional data or profile data indicate significant deviations from

Parameter	Baseline		MY1		MY2		MY3		MY4		MY5+	
Reach ID: R5	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Profile												
Riffle Length (ft)	14.8	39.0										
Riffle Slope (ft/ft)	0.0155	0.0434										
Pool Length (ft)	16.1	41.9										
Pool Max depth (ft)	2.0	3.1										
Pool Spacing (ft)	37.8	59.7										
Pattern												
Channel Beltwidth (ft)	41.6	56.8										
Radius of Curvature (ft)	19.3	29.9										
Rc:Bankfull width (ft/ft)	1.9	2.2										
Meander Wavelength (ft)	81.8	107.6										
Meander Width Ratio	7.6	10.5										
Additional Reach Parameters												
Rosgen Classification	C4											
Sinuosity (ft)	1.23											
Water Surface Slope (Channel) (ft/ft)	0.01984											
BF slope (ft/ft)	0.01984											
³ Ri% / Ru% / P% / G% / S%												
³ SC% / Sa% / G% / C% / B% / Be%												
³ d16 / d35 / d50 / d84 / d95 /												
² % of Reach with Eroding Banks												
Channel Stability or Habitat Metric												
Biological or Other												

Pattern and Profile data will not typically be collected unless visual data, dimensional data or profile data indicate significant deviations from

Appendix E: Hydrologic Data

Table 8a and 8b: Verification of Bankfull Events

Figure 3: Surface Flow Data

Figure 4: Flow and Crest Gauge Installation Diagrams

Figure 5: Rainfall Data

**Table 8A: Verification of Bankfull Events - R1
Horne Creek Tributaries Mitigation Project**

Monitoring Year	Date of Collection	Date of Occurrence	Method	Photos	Measurement above bankfull (feet)
MY1	9/15/2020	8/21/2020	Pressure Transducer	No	0.18
	11/5/2020	9/17/2020	Pressure Transducer	No	0.18
	11/5/2020	10/11/2020	Pressure Transducer	No	0.28
	11/5/2020	10/29/2020	Pressure Transducer	No	0.11
	8/12/2020	Unknown	Cork Gauge	Yes	0.20
	11/5/2020	Unknown	Cork Gauge	Yes	0.35
MY2	10/26/2021	1/1/2021	Pressure Transducer	No	0.03
	10/26/2021	1/28/2021	Pressure Transducer	No	0.02
	10/26/2021	2/13/2021	Pressure Transducer	No	0.02
	10/26/2021	2/15/2021	Pressure Transducer	No	0.36
	10/26/2021	2/18/2021	Pressure Transducer	No	0.06
	10/26/2021	3/19/2021	Pressure Transducer	No	0.14
	10/26/2021	3/25/2021	Pressure Transducer	No	0.02
	10/26/2021	3/26/2021	Pressure Transducer	No	0.08
	4/30/2021	Unknown	Cork Gauge	Yes	0.35
	10/26/2021	7/2/2021	Pressure Transducer	No	0.71
	10/26/2021	8/7/2021	Pressure Transducer	No	0.51
	10/26/2021	8/16/2021	Pressure Transducer	No	0.009
	10/26/2021	Unknown	Cork Gauge	Yes	1.3



4/30/2021



10/26/2021

**Table 8B: Verification of Bankfull Events - R5
Horne Creek Tributaries Mitigation Project**

Monitoring Year	Date of Collection	Date of Occurrence	Method	Photos	Measurement above bankfull (feet)
MY1	6/17/2020	5/20/2020	Pressure Transducer	No	0.10
	6/17/2020	5/24/2020	Pressure Transducer	No	0.96
MY2	10/26/2021	2/15/2021	Pressure Transducer	No	0.55
	10/26/2021	7/2/2021	Pressure Transducer	No	0.88
	10/26/2021	8/16/2021	Pressure Transducer	No	0.47
	10/26/2021	8/18/2021	Pressure Transducer	No	0.61
	9/2/2021	Unknown	Cork Gauge	Yes	1
	10/26/2021	9/21/2021	Pressure Transducer	No	1.67
	10/26/2021	9/22/2021	Pressure Transducer	No	0.16
	10/27/2021	Unknown	Crest Gauge	Yes	1.4

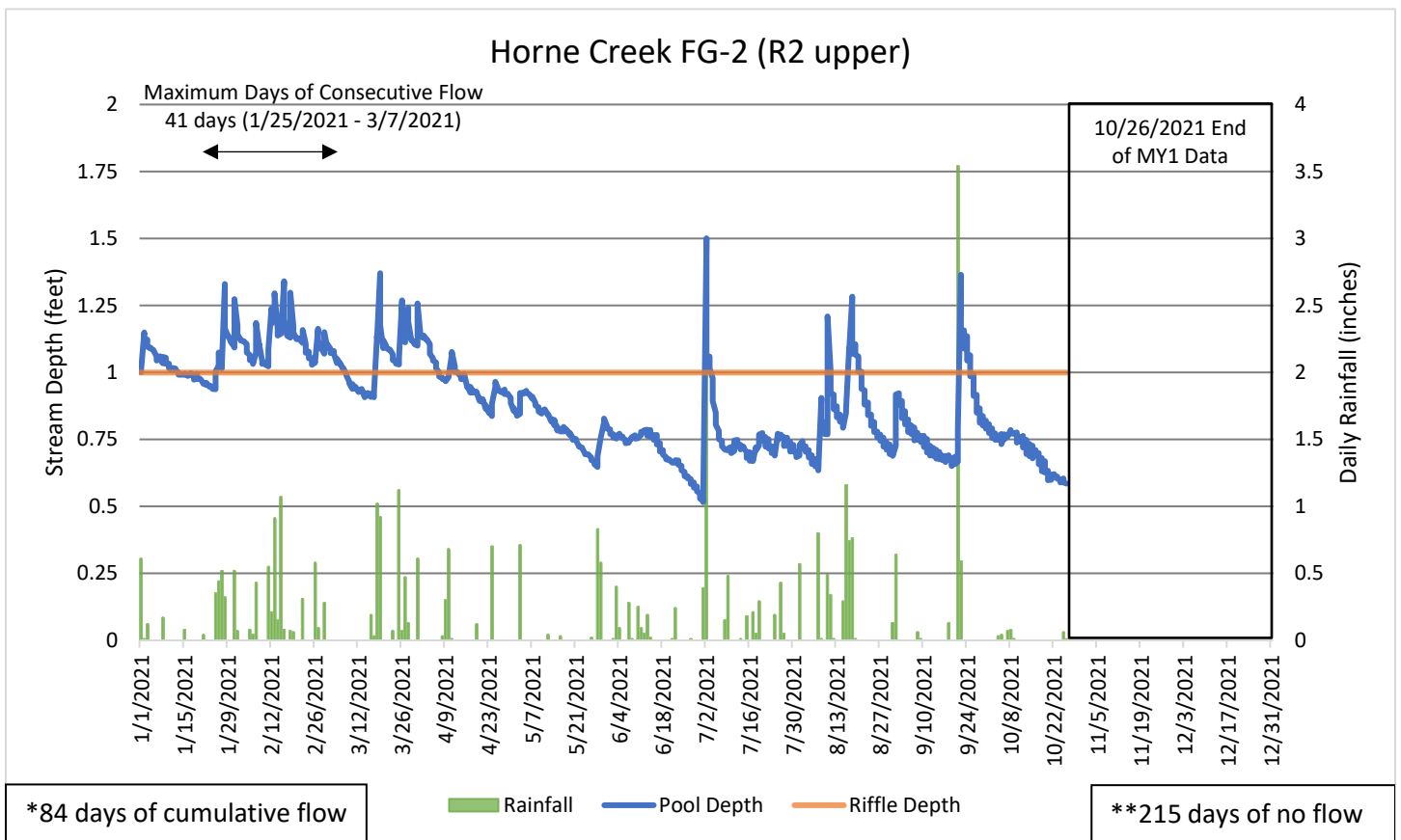
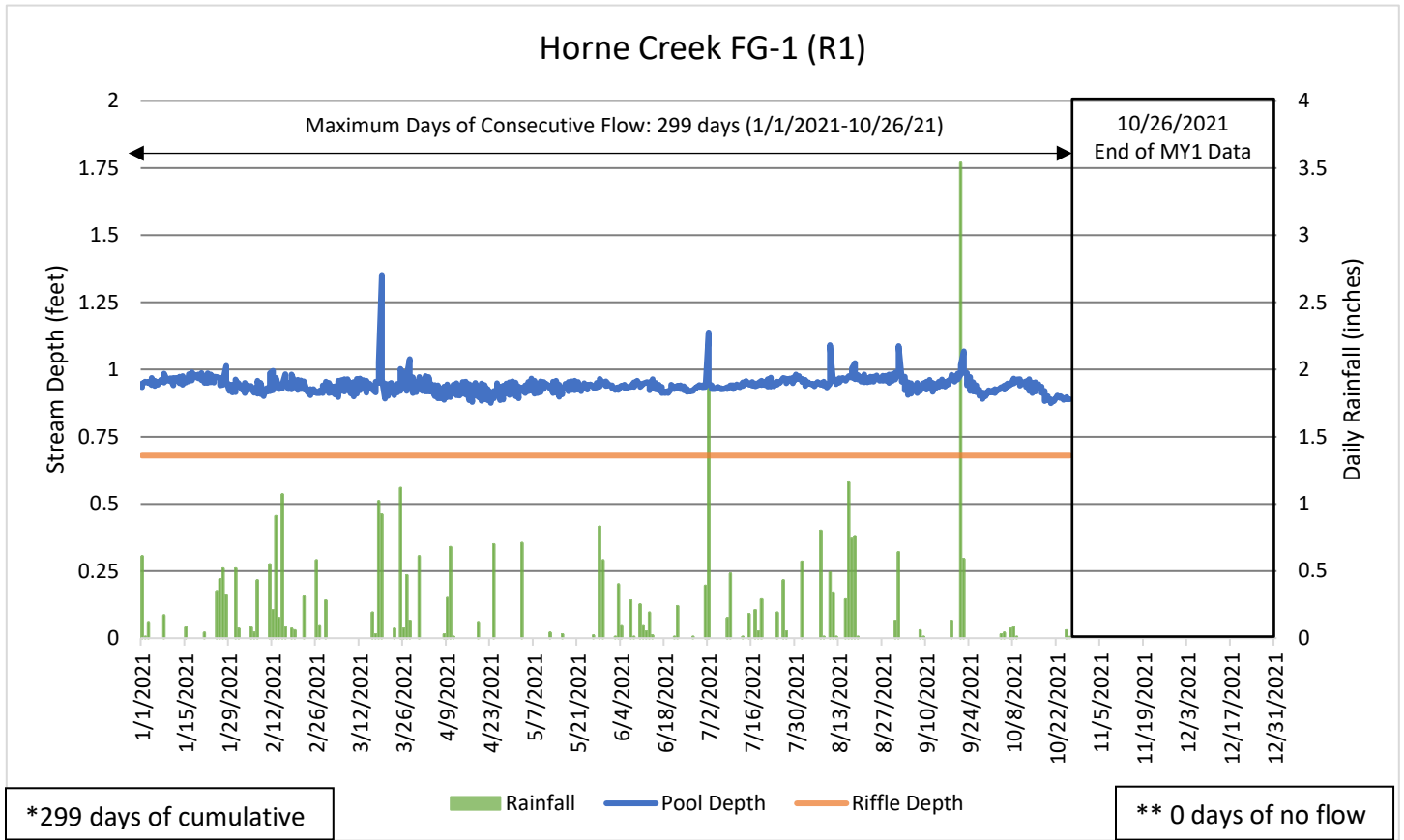


9/2/2021

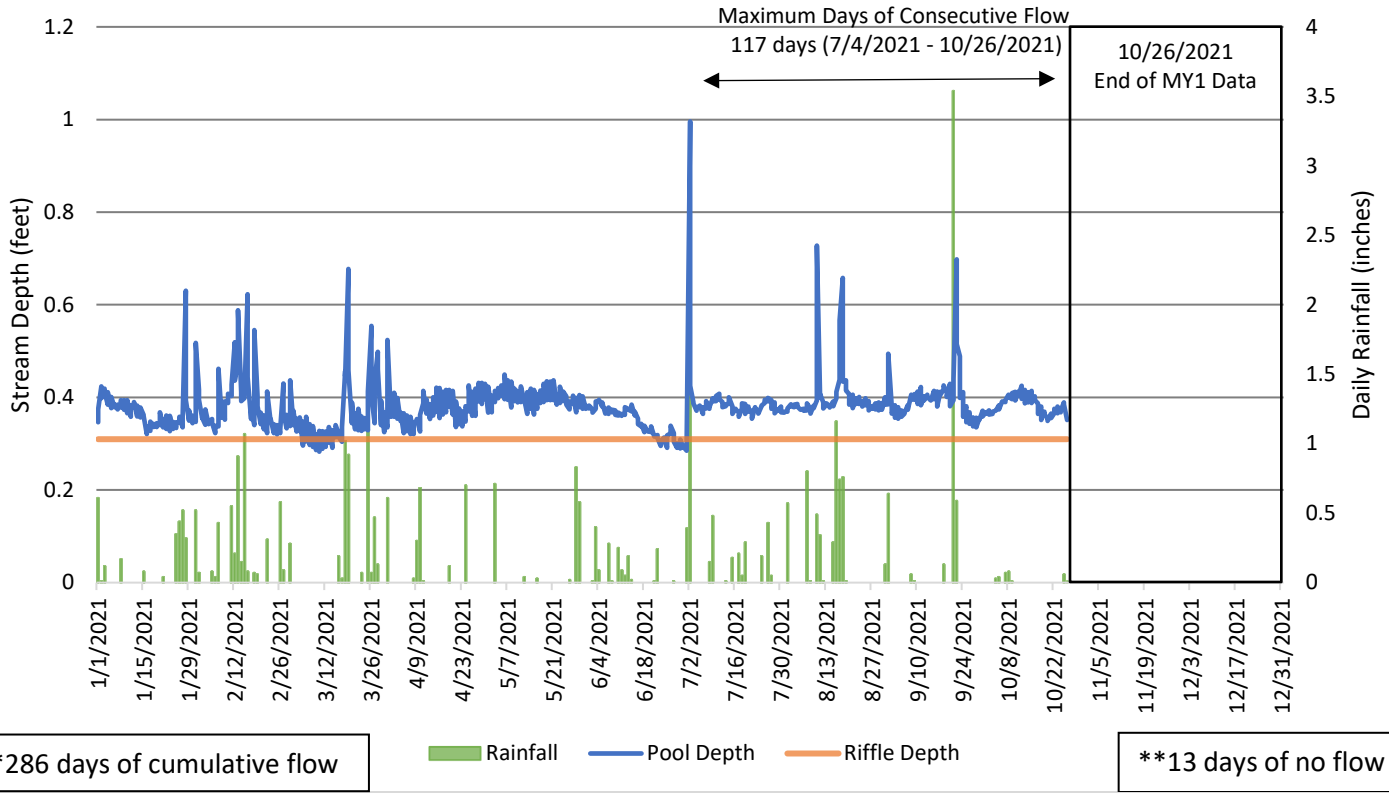


10/27/2021

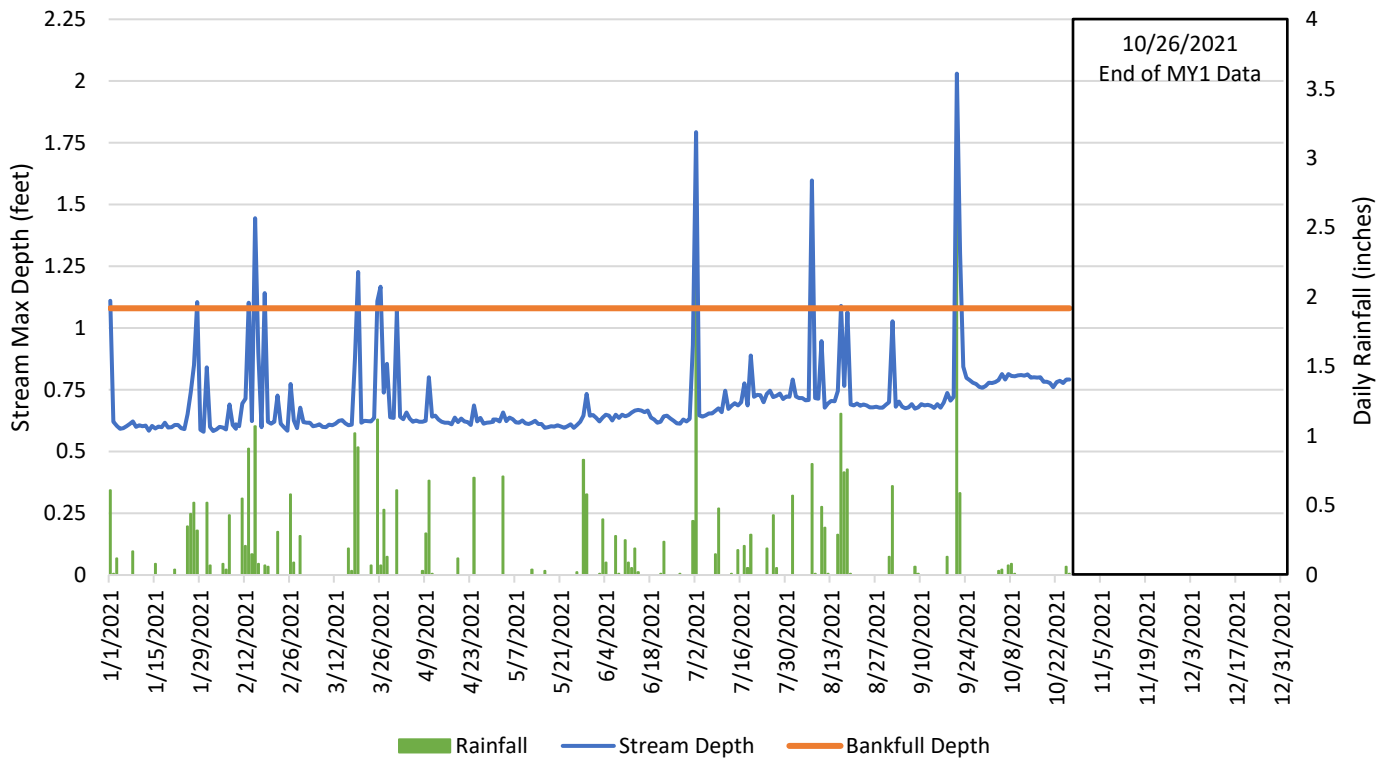
Figure 3: Surface Flow Data
Horne Creek Tributaries Mitigation Project



Horne Creek FG-3 (R2 lower)



Horne Creek - Crest Gauge CG-1 (R1)



Horne Creek CG-2 (R5)

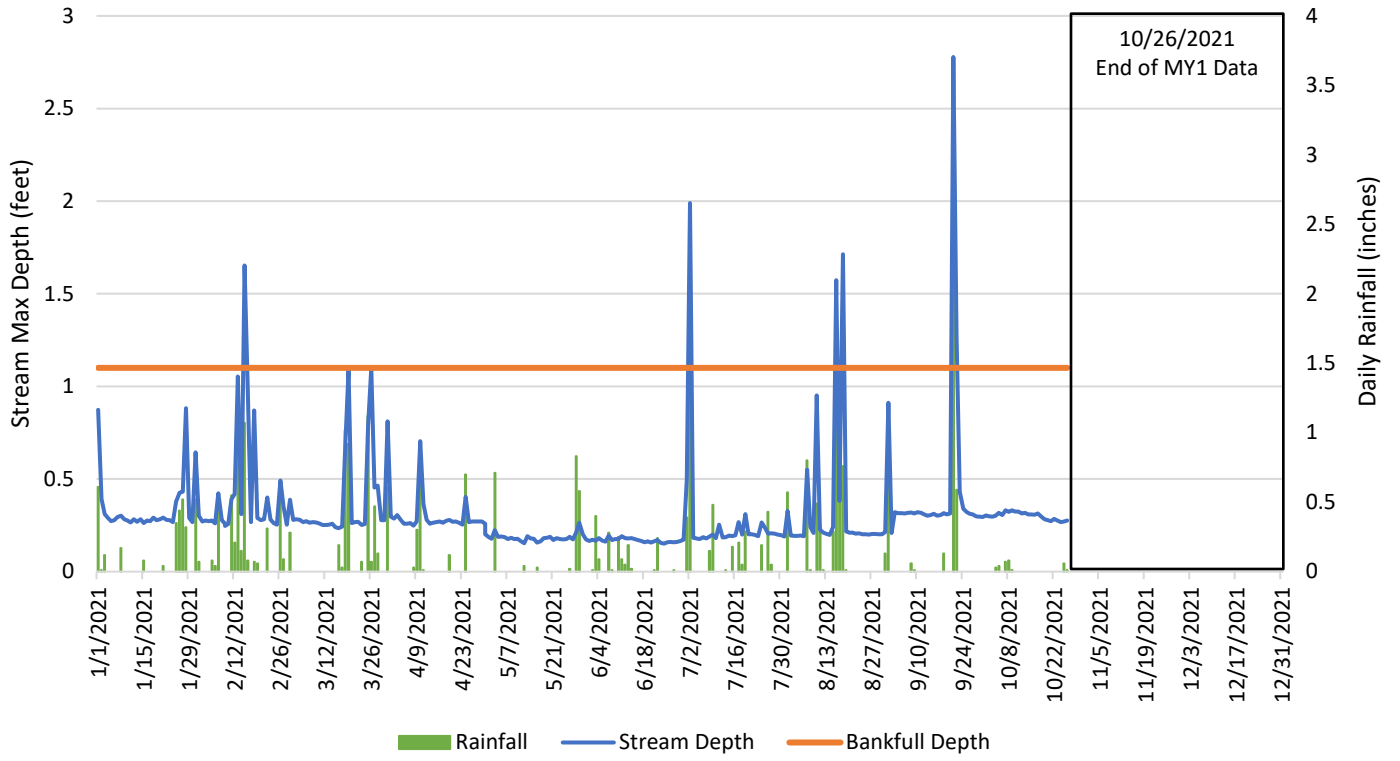
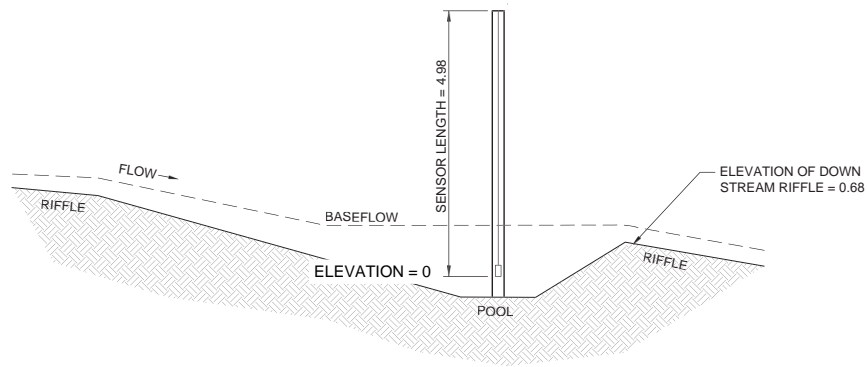


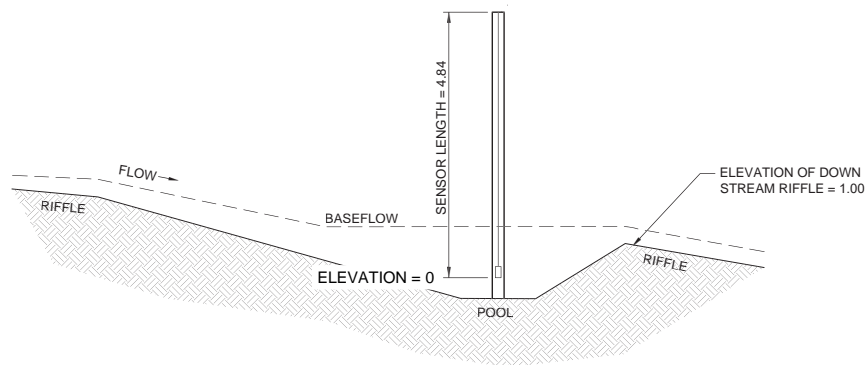
Figure 4: Flow Gauge Installation Diagrams



FLOW GAUGE FG-1 (R1)

Flow Depth = 0.68 Feet

*All elevations relative to sensor depth

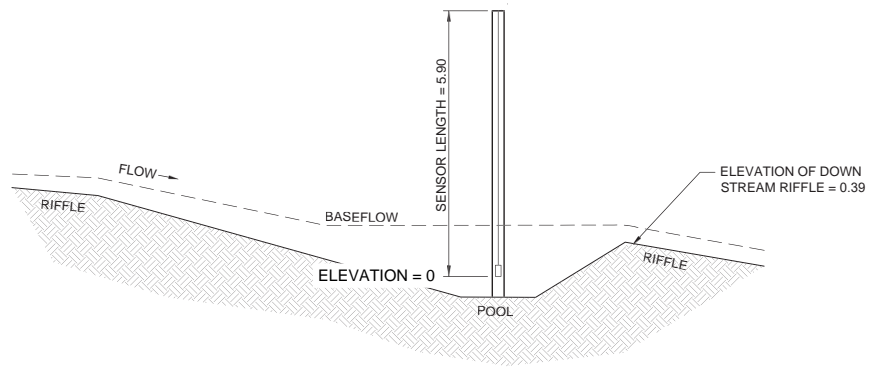


FLOW GAUGE FG-2 (R2)

Flow Depth = 1.00 Feet

*All elevations relative to sensor depth

Figure 4: Flow Gauge Installation Diagrams



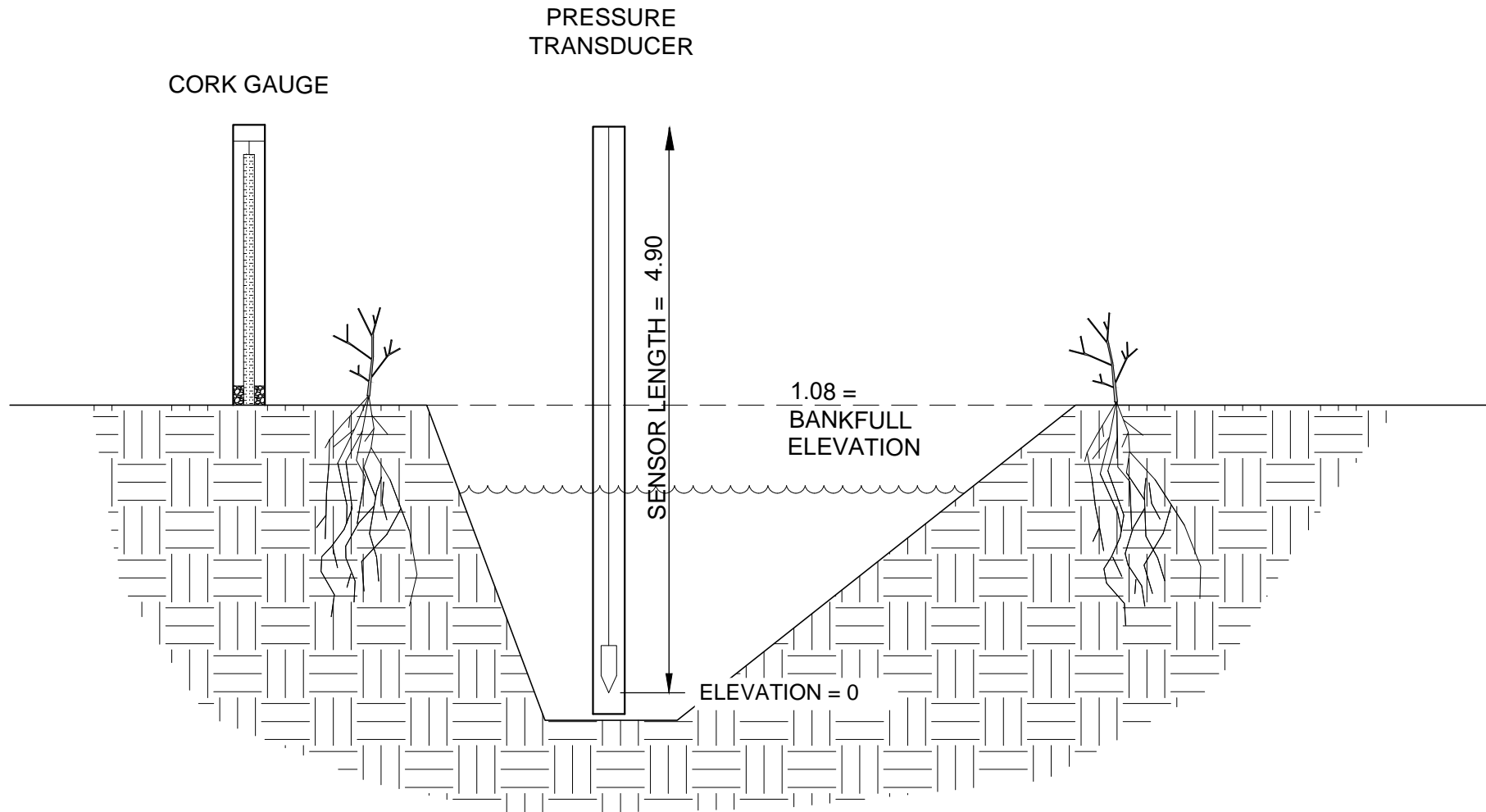
FLOW GAUGE FG-3 (R4)

Flow Depth = 0.39 Feet

*All elevations relative to sensor depth

Figure 4: Crest Gauge Installation Diagrams

CROSS SECTIONAL VIEW OF STREAM



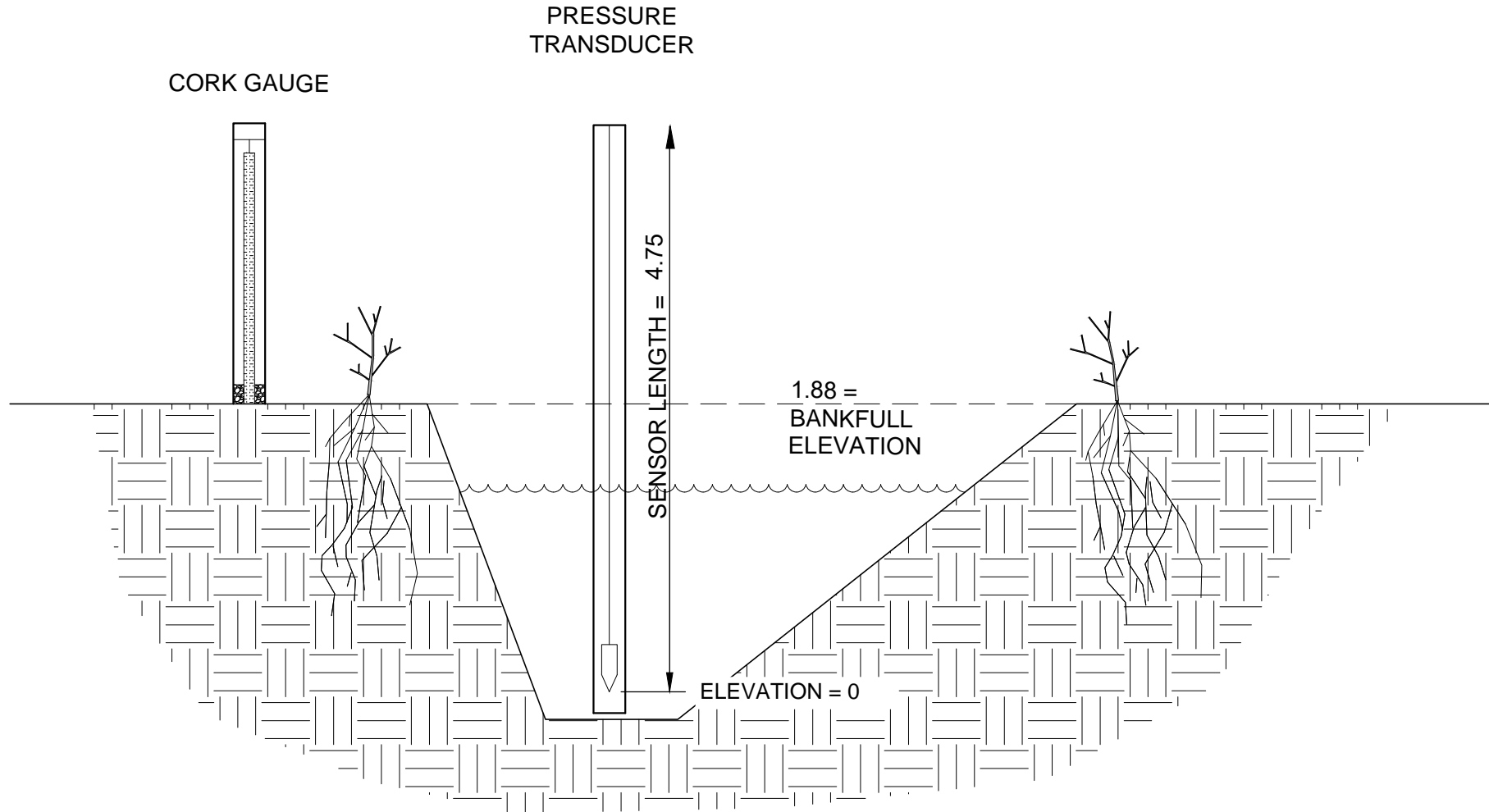
Crest Gauge CG-1 (R1)

Bankfull Event Depth = 1.08 feet

*All elevations relative to sensor depth

Figure 4: Crest Gauge Installation Diagrams

CROSS SECTIONAL VIEW OF STREAM

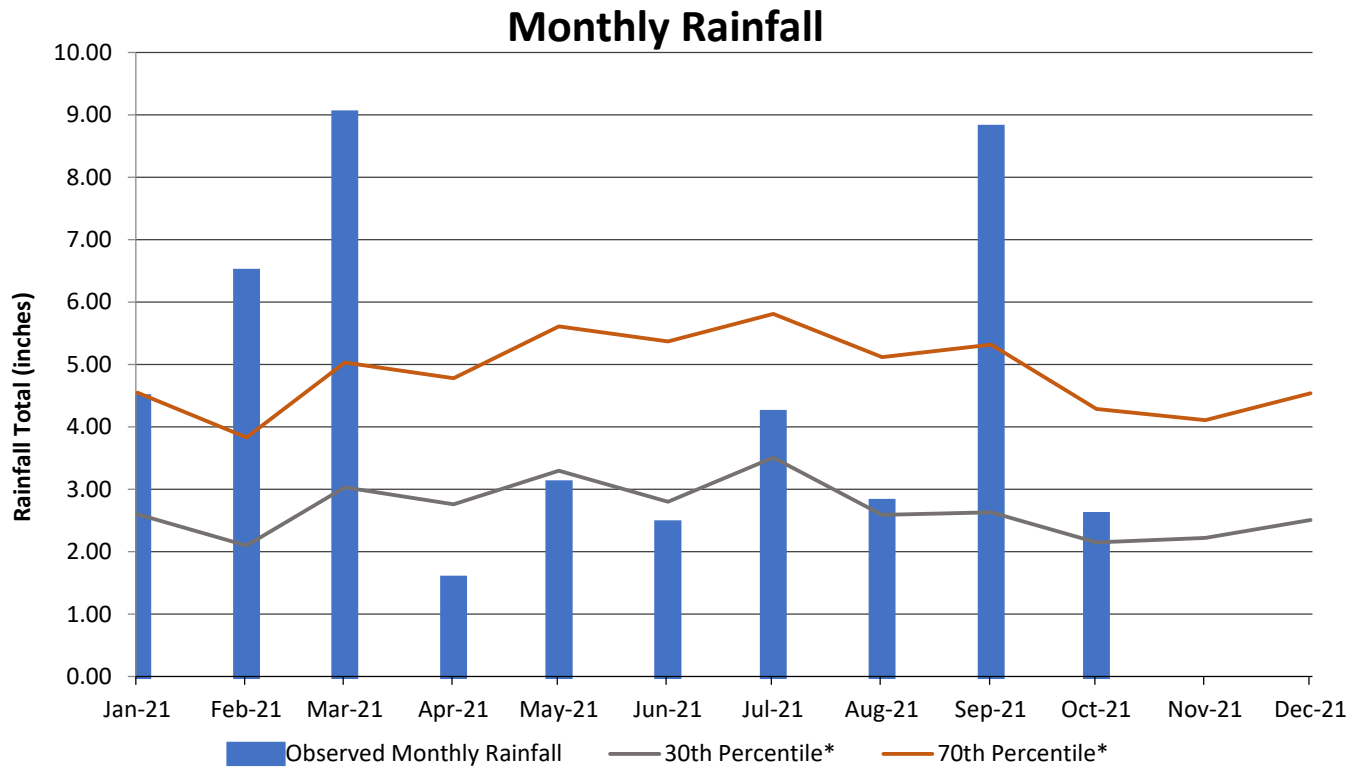


Crest Gauge CG-2 (R5)

Bankfull Event Depth = 1.88 feet

*All elevations relative to sensor depth

Figure 5: Monthly Rainfall Data
Horne Creek Tributaries Mitigation Project
MY2 2021



*30th and 70th percentile data collected from weather station Coop 315890 - Mount Airy, NC

**Incomplete Month

Month	30th Percentile*	70th Percentile*	Observed Monthly Rainfall
Jan-21	2.60	4.55	4.32
Feb-21	2.10	3.83	6.33
Mar-21	3.03	5.03	8.87
Apr-21	2.76	4.78	1.41
May-21	3.30	5.61	2.94
Jun-21	2.80	5.37	2.30
Jul-21	3.51	5.81	4.07
Aug-21	2.59	5.12	2.64
Sep-21	2.63	5.32	8.64
Oct-21	2.15	4.29	2.43
Nov-21	2.22	4.11	**
Dec-21	2.51	4.54	**

Appendix F: Correspondence

MY1/MY2 Regulatory Meeting Minutes

Meeting Minutes

Horne Creek Tributaries Mitigation Site

Subject: NCIRT MY1/MY2 Site Meeting

Date Prepared: November 18, 2021

Meeting Date and Time: November 17, 2021 at 9:00 am

Meeting Location: Horne Creek Tributaries Mitigation Site (Surry County, NC)

Attendees: USACE: Kim Browning, Todd Tugwell, Casey Haywood (NCIRT)

NCDEQ DWR: Erin Davis (NCIRT)

NCDMS: Matthew Reid, Paul Wiesner, Melonie Allen

WLS: Daniel Ingram, Cara Conder, Emily Dunnigan

These meeting minutes document notes and discussion points from the North Carolina Interagency Review Team (NCIRT) MY1/MY2 Site Visit for the Horne Creek Tributaries Mitigation Project (Yadkin River Basin, CU 03040101). The site is located in Surry County, near Pilot Mountain, North Carolina. The meeting began at 9:00 am with a project overview and discussion of issues during MY0 and MY1 on site. After the short discussion, attendees toured the project site to review existing conditions. The project site review notes are presented below in the order they were discussed/visited.

R1

- Group started by walking up R1.
- Erin expressed concern with tree growth along R1 in areas of dense juncus coverage along the channel. She requested a random vegetation plot in this area. WLS will survey a random vegetation plot in this area during MY3.
- Erin asked if wetland credit was proposed on site. Daniel responded that no wetland credit was proposed.
- Todd and Erin expressed concerns about stream shading. Todd noted that the high herbaceous cover is good for runoff filtering.
- Todd noted cattails along R1. Daniel responded that the cattails are in pockets along the floodplain and not in the channel.
- Todd noted that a log structure just downstream of the flow gauge is undercutting and it should be monitored. Daniel confirmed it was installed with a footer.
- Todd asked if work was done to structures with significant drops in MY0. Daniel responded that no remedial work was completed or planned, and the structures were built as proposed in the Mitigation Plan.

- Todd noted the upper limits of R1 may develop into a wetland system over time. No remedial action was requested.

R5

- Todd asked where the water was coming from that's eroding the floodplain near vegetation plot 10. Daniel responded that water is coming from seeps in the nearby slope. Todd did not see this area as a problem for future reports.
- Erin asked if WLS designed to save the trees along R5. Daniel responded yes, and to minimize disturbance.
- Cara asked Erin and Kim if black willow can be included in vegetation plot stem counts. Kim responded that they can be, if they are on the approved plant list (they are), and constitute no more than 50% of stems in a plot.
- Todd noted erosion from the field on R5 in one spot and asked it be closely monitored. Emily responded that we are monitoring this area and have done seeding/livestaking. Erin asked if WLS takes photos of this area. Emily responded that photos are included in monitoring reports.
- Todd noted low stem density along the left floodplain of R5 and requested random vegetation plots in MY3. Emily responded that WLS will complete random vegetation plots in this area in MY3.

R4

- Todd noted the new stream problem area on R4 (riffle blown out and channel cut down) should be monitored closely. Daniel responded the area will be monitored and supplemental cross section data will be included in MY2 report.
- Todd asked if any rilling was occurring under the blanket of the large right slope on R4. Emily responded that no rilling is occurring and herbaceous vegetation is slowly establishing.
- Erin asked if trees are growing on the large right slope of R4. Emily responded that trees are there, they are just difficult to see.

R2

- Todd asked how the flow gauge on R2 is calibrated and why it was installed in one of the only pools holding water. Daniel responded that it's calibrated to the head of downstream riffle elevation. He also said that HOBO gauges work best in deep water and WLS always installs them in deep pools to produce more reliable data.

General Comments/Summary

- Meeting minutes to be emailed to Matthew for review and included in the MY2 report.
- Erin asked that we watch vegetation closely, particularly in wet areas with high herbaceous cover. Daniel said that additional data for vegetation will be collected in MY3 and any proposed supplemental planting will occur in MY4.
- Kim asked to have all flow data for the flow gauge on R2 included in the MY2 report. Daniel responded that data will be included.



- Todd asked that the stream problem area on R5 be monitored closely, no remedial action is proposed at this time. Daniel responded that winter photographs will be included in the MY3 report.
- Kim asked that the top of R1 be monitored closely for marshy conditions and to make sure the stream is still defined.
- Emily asked Matthew if he requires pebble counts for future monitoring reports. Matthew responded that no pebble counts are required and to note the DMS email in future reports.
- Casey recommended closely monitoring an in-stream log structure on R5 near STA 43+00. Scour is occurring behind the log and piping may happen in the future.
- Casey recommends adding a photo point at the top of R1 to monitor stream channel definition.

The above minutes represent Water & Land Solutions' interpretation and understanding of the meeting discussion and actions. If recipients of these minutes should find any information contained in these minutes to be in error, incomplete, please notify the author with appropriate corrections and/or additions within five business days to allow adequate time for correction and redistribution.