Monitoring Year 2 FINAL Monitoring Report

Stewarts Creek Tributaries Stream Restoration Project

Surry County, North Carolina

Yadkin River Basin, Hydrologic Unit Code (HUC) 03040101

Data Collection Period:
September 2021 – November 2021

Submission Date:
December 2021

NCDEQ Contract No. 7183
DMS ID No. 100023
RFP#16-006993
USACE Action ID No. SAW-2017-01508
DWR ID No. 20171043

Prepared For:

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Mr. Paul Wiesner
NCDEQ – Division of Mitigation Services
5 Ravenscroft Dr., Suite 102
Asheville, NC 28801

December 17, 2021

RE: Response to Draft Monitoring Year 2 (MY2) Monitoring Report Comments dated December 9, 2021
Stewarts Creek Tributaries Stream Restoration Project
Yadkin River Basin –HUC 03040101 – Surry County, North Carolina
NCDMS Project # 100023, Contract # 7183

Dear Mr. Wiesner,

Ecosystem Planning and Restoration (EPR) has reviewed the comments on the Draft MY2 Monitoring Report provided December 9, 2021. The comments have been addressed as described below and the Final MY2 Report and electronic deliverables have been revised in response to this review.

- *Table 1. Project Mitigation Quantities and Credits & Table 3. Project Attribute Table: The thermal regime for the project streams is "Cool". Please update the tables and MY2 report accordingly. Please ensure that this is updated in future monitoring reports as it was also a DMS comment in MY1.*
  - **Thermal Regime in Table 1 has been updated. The Microsoft Excel version of Table 1 in the electronic support files has been updated as well.**

- *Table 2. Summary: Goals, Performance, and Results: Cross Section Cumulative Monitoring Results; "……dimensions have not changed significantly during Monitoring Year 1." Please QA/QC the table and update to Monitoring Year 2.*
  - **QA/QCed and updated.**

- *Table 2 – Performance Criteria Column: The project success criteria also includes a monitoring year 3 interim success criteria of 320 stems/acre. Please update the performance criteria in the table (Performance Criteria column) and MY2 report accordingly. Please ensure that this is updated in future monitoring reports as it was also a DMS comment in the MY1 report.*
  - **Updated.**

- *Table 2 & Section 2.2.1 Vegetation Monitoring Data: The IRT approved mitigation plan for the project establishes the tree height success criteria as follows; "Trees in*

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each plot will average 7 feet in height at MY5 and 10 feet in height at MY7." Please discuss and report average tree heights in the revised MY2 report. Please also include this vegetation height success criteria in Table 2.

- **Added and discussed in Table 2 and Section 2.2.1.**

- *Section 2.2.1 Vegetation Monitoring Data – In the report text, please report/ discuss any plot/s (VPR-7) that did not meet the monitoring year 3 interim success criteria of 320 stems/acre.*
  - **Discussion added to Section 2.2.1.**

- *Report Text and Appendix B: Section 2.2.1 reports; "Riparian herbaceous vegetation that was established after construction and the supplemental planting appears to be flourishing throughout the Site. Areas of corn encroachment in the easement during Monitoring Year 1 were addressed and bare areas were replanted in Winter 2021." In the revised report (Appendix B), please provide a planting map, dates and species list from the Winter 2021 supplemental/ encroachment planting effort reported. Please reference the planting map and species list in the report text. Please also report what percentage of the initial planted area was supplementally planted in MY2 (2021). The supplemental planting area/s should also be included on the MY2 CCPV maps and in the digital support files.*
  - **A planting species list has been included in Appendix B, and the planted areas are now shown on the CCPV. The map and species list are referenced in Section 2.2.1 Vegetation Monitoring Data. The approximate percentage of the original planted area has also been included in this section.**

- *CCPV Maps: The MY3 interim success criteria for the project is 320 stems/acre. Please show any vegetation plots that do not meet the interim success criteria (VPR-7) as "red" on the CCPV Maps.*
  - **Updated.**

- *Table 4 (a-g)& Table 5 - Please include the date that the project was visually assessed at the top of each table. This was an IRT request at the 2021 credit release meeting.*
  - **The project assessment dates have been included in Tables 4 and 5.**

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- *Table 5. Vegetation Condition Assessment Table: The area of kudzu reported in MY2 is at the 0.1-acre mapping threshold. The area is shown on the CCPV maps. Please update table 5 to include the invasives reported and shown on the CCPV maps.*
    - **Updated.**

- *Appendix A_Monitoring Year 2 (2021) – Vegetation Photo Logs: Please provide dates for the vegetation photo points. If exact dates cannot be provided, please include the month and year for each photo.*
    - **Dates have been included for all vegetation photos points.**

- *Table 6 & Table 7: The MY3 interim success criteria for the project is 320 stems/acre. Please show any vegetation plots (stems/ acres cells) that do not meet the MY3 interim success criteria (VPR-7) as red/ orange on the tables.*
    - **Updated.**

- *Table 7. Vegetation Performance Standards Summary Table: Please report the average vegetation plot heights in the summary table.*
    - **Average height has been included in Table 7. The average height reported in the document was calculated from the stem height in the input file for the vegetation tool. The vegetation tool rounds these heights to whole numbers so that is why they are presented this way in the tables.**

- *Table 11. Project Activity and Reporting History: The table provided in the draft has not been updated for MY2 (2021). Please update the table and report any repair work, invasive treatment, supplemental planting and/ or maintenance work completed on the site since project construction and planting.*
    - **Updated for MY2 and to include MY1 repair work and MY2 supplemental planting.**

- *Section 2.1.4 Stream Hydrology: In the report text, please review and provide additional discussion regarding the numerous bankfull events reported in a normal rainfall year. This section notes, "Photos will be taken of flood indicators, such as debris lines and sediment deposition on the floodplain, whenever it is apparent that a bankfull event has occurred."; however, no photos are provided to substantiate the bankfull events reported.*
    - **Discussion of multiple bankfull events is now included in the report. Due to the frequency of events, EPR has not taken photos of apparent bankfull events**

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because there is no way of differentiating between which bankfull event caused the debris line and sediment deposition in the floodplain. This statement was removed from the text.

- *Digital Support Files: Please include line features that characterize the stream areas of concern reported in Table 4 and include these features in the CCPV. If available, please include the MY1 stream areas of concern as well.*
  - **MY1 and MY2 areas of concern data included in digital files under AreasofConcern.shp.**

- *Digital Support Files: The submitted veg input and output are from an older template and do not include the MY2 data. Please update the input, include all data, and resubmit the output and input workbooks.*
  - **Updated and included.**

- *Digital Support Files: Please include the daily precipitation data used in the stream gauge figures and ensure these data are consistent across excel workbooks.*
  - **This data is now included in the SCT_100023_MY2_GW and Precip.xls file in supporting files.**

If you have any questions regarding the Final MY2 Monitoring Report, please contact me at 919-388-0787 or via email at ebennett@eprusa.net.

Sincerely,

Erin M Bennett

Erin M. Bennett, PE

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1.0 PROJECT SUMMARY

Ecosystem Planning and Restoration, PLLC (EPR) implemented the Stewarts Creek Tributaries Stream Restoration Project (Project; Site) for the North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services (DMS) to provide 10,649.2 stream mitigation credits (SMCs) in the Yadkin River Basin, Hydrologic Unit Code (HUC) 03040101. The Stewarts Creek Tributaries Stream Restoration Project was contracted via NCDEQ-DMS RFP #16-006993. As approved by the North Carolina Interagency Review Team (NCIRT), all projects contracted under the 16-006993 RFP have a cool or warm water thermal regime service type. Penalties will not be assessed for using these project mitigation credits to satisfy cool or warm water thermal regime requirements. The Project restored 9,498 linear feet and enhanced 1,573 linear feet of three Unnamed Tributaries (UTs) to Stewarts Creek and Moores Fork within a 30-acre conservation easement (Figures 1A-E). Mitigation assets are listed in Table 1.

The Site is located in NCDEQ Division of Water Resources (DWR) Sub-basin 03-07-03 and DMS Targeted Local Watershed 03040101100010. The Site was historically utilized for agricultural and cattle practices. As such, wetlands and streams in the Project area were adversely impacted by direct cattle access, farming activities, and stream channelization. The Site is situated on historic pastureland in a WS-IV Watershed that is 49% agricultural land, 37% forest, 11% residential, and 1% impervious. Prior to construction activities, all Project streams were incised, the UTs were straightened and had adjacent row crops, and Moores Fork suffered from cattle damage. Pre-construction, or pre-existing, Site conditions are provided in Table 3 and the Summary Tables in Appendix C. Photos and a more detailed description of Site conditions before restoration are available in the Mitigation Plan (Final version submitted May 2019).

1.1 Goals and Objectives

The Project goals were established based on an assessment of Site conditions and restoration potential with careful consideration of the stressors identified in the Upper Yadkin Pee-Dee River Basin Restoration Priorities (RBRP) Report (NCEEP, 2009) and Yadkin Pee-Dee Basinwide Water Quality Plan (NCDWQ, 2008). These goals and objectives are presented in Table 2.

Site construction was completed in May 2020 and the as-built survey was completed in June 2020. Planting and baseline vegetation data collection occurred in May – June 2020. A detailed timeline of the Project activity and reporting history is provided in Appendix E.

1.2 Performance Criteria

Project success criteria were established in accordance with the *NCDEQ DMS Mitigation Plan Template* (ver. 06/2017), and *US Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016). The monitoring plan for the Site will follow the same guidance as the *NCDED DMS Annual Monitoring Report Format, Data, and Content Requirement* (October 2020). Table 2 details the USACE success criteria that evaluate whether Project goals have been met throughout the monitoring period. For more detailed

success criteria refer to the Final Mitigation Plan or the As-built Baseline Monitoring Report (Final version submitted October 2020).

Table 1. Project Mitigation Quantities and Credits

Project Component (reach ID, etc.)	Original Mitigation Plan ft/ac	As-built ft/ac	Original Mitigation Thermal Regime Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Mitigation Credits	Notes/Comments
UT1	2,742	2,742	Cool	R	1.0	2,742	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
UT2	1,009	1,009	Cool	R	1.0	1,009	
UT3 R1	944	944	Cool	R	1.0	944	
UT3 R2	2,421	2,421	Cool	R	1.0	2,421	
Moores Fork R1	1,573	1,573	Cool	E2	2.5	629.2*	Habitat Structures, Benching, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
Moores Fork R2	1,998	1,998	Cool	R	1.0	1,998	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement.
Moores Fork R3	384	384	Cool	R	1.0	384	
Net Change In Credit From Buffers	-	-	-	-	-	522	Wilmington District Stream Buffer Credit Calculator (Updated 1/19/2018)
					Total Assets Summary:		**10,649.2 SMUs**

Length and Area Summations by Mitigation Category

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)
		Riverine	Non-Riverine	
Restoration	9,498			
Enhancement				
Enhancement I				
Enhancement II	1,573			
Rehabilitation				
Preservation				
High Quality Pres				

Overall Assets Summary

Asset Category	Overall Credits
Stream	**10,649.2**

*Moores Fork R1 mitigation credits were miscalculated in the IRT approved Mitigation Plan and have been updated.

Table 2. Summary: Goals, Performance, and Results

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Reduce sediment inputs and stream turbidity;	▪ Reduce the amount of land in active livestock pasture. ▪ Install fencing to exclude livestock from Project buffers and streams. ▪ Increase distance between active farming operations and receiving waters. ▪ Restore and protect riparian buffers to filter runoff. ▪ Stabilize eroding streambanks and concentrated runoff areas.	▪ Excluding livestock from all streams and buffers. The exclusion of livestock will remove a direct source of nutrients, fecal coliform, and sediment from the system. ▪ Restoring the Project streams to stable, functioning condition. Appropriate channel dimensions and in-stream log and wood structures will ensure channel stability and improve aquatic habitats. ▪ Restoring natural riparian vegetation. Restored riparian buffers will provide a source of woody debris and detritus for aquatic organisms, restore diverse aquatic and terrestrial habitats appropriate for the ecoregion and landscape setting, and provide shade, reduce water temperatures, and increase dissolved oxygen concentrations.	▪ Recordation and protection of a conservation easement meeting DMS guidelines ▪ Visual inspection of fence installed to exclude cattle from the stream and riparian buffer, demonstrating no encroachment. ▪ Vegetation success criteria of 320 native stems/ acre in Year 3, 260 native stems/acre in Year 5, and 210 native stems/acre in Year 7. Trees in each plot will average 7 feet in height at MY5 and 10 feet in height at MY7. ▪ Visual documentation of installed watering system and regular checks on its operation during annual monitoring. ▪ Visual inspection of BMP's to ensure proper function during monitoring period. ▪ Geomorphic cross sections indicate stable sections over the monitoring period. ▪ Bank height ratio (BHR) cannot exceed 1.2 for all	<u>Permanent Vegetation Plots</u> 11 permanent vegetation plots, 0.02 acre in size (minimum), surveyed during As-built, Years 1, 2, 3, 5, and 7 between July 1st and leaf drop. Data collection includes species, height, planted vs. volunteer, and age.	The 11 permanent vegetation plots survey during Monitoring Year 2 had an average stem density of 548 stems/acre which meets the success criteria of 320 native stems/acre in MY3. The 11 permanent vegetation plots surveyed during Monitoring Year 2 had an average tree height of 2.3 feet which does not meet the interim success criteria of 7 feet in MY5.
Reduce nutrient inputs	▪ Reduce the amount of land in active livestock pasture and row crop agriculture. ▪ Install fencing to exclude livestock from Project buffers and streams. ▪ Increase buffer widths between active farming operations and receiving waters. ▪ Restore and protect riparian buffers to filter runoff. ▪ Promote higher water table conditions, and thus denitrification, along restored headwaters.				
Reduce Fecal Coliform Inputs	▪ Reduce the amount of land in active livestock pasture. ▪ Exclude livestock from Project streams and buffers. ▪ Increase buffer width between active farming operations and receiving waters. ▪ Restore and protect riparian buffers to filter runoff.			<u>Annual Random Vegetation Plots</u> 11 randomly selected vegetation plots, 0.02 acre in size (minimum), surveyed during As-built, Years 1, 2, 3, 5, and 7 between July 1st and leaf drop. Data collection includes species and height.	The 11 randomly selected vegetation plots had an average stem density of 460 native stems/acre. which meets the success criteria of 320 native stems/acre in MY3. VPR-7 had 230 native stems/acre and didn't meet the interim success criteria. The 11 randomly selected vegetation plots had an average tree height of 1.8 feet which does not meet the interim

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
		▪ Conversion of row crops to forested buffer. ▪ Protecting all areas with conservation easement.	measured cross sections on a given reach. ▪ Entrenchment ratio (ER) must be 2.2 or above for all measured riffle cross sections for C/E stream types and 1.4 or above for B stream types. ▪ Documentation of hydrophytic vegetation within vegetation monitoring plots. ▪ Documentation of four bankfull events in different years throughout the monitoring period. ▪ Documentation of 30 days of consecutive stream flow in all reaches each monitoring year		success criteria of 7 feet in MY5.
Restore / Enhance Degraded Riparian Buffers	▪ Restore riparian buffer vegetation to filter runoff and provide organic matter and shade. ▪ Protect riparian buffers with permanent conservation easement.			<u>Stream Profile</u> Full longitudinal survey on all restored and enhanced stream channels. Data was collected during As-built survey only (unless otherwise required).	A full longitudinal survey of the Projects streams was conducted during As-built monitoring. Though instability and degradation were noted on the lower reaches of Moore's Fork, no longitudinal profile was shot during MY2. As a course of action is discussed regarding repairs on Moores Fork, a longitudinal profile survey may be necessary in the future and will be discussed in the 2022 AMP.
Implement Agricultural BMPs in Agricultural Watersheds	▪ Construct agricultural conveyance system to filter and reduce agricultural runoff into restored stream systems. ▪ Construct a critical area restoration BMP by removing and decommissioning a heavily eroding forest road and cattle use area.			<u>Cross Sections</u> Cross sections are surveyed during Years 1,2,3,5, and 7. 26 total cross sections, 17 cross sections on the UTs and 9 cross sections on Moores Fork.	The Year 2 monitoring cross section surveys indicate that the majority of the Project streams are geomorphically stable and restored channel dimensions have not changed significantly during Monitoring Year 2. The lower reaches of Moores Fork show bank instability that will require maintenance/repairs. This will be discussed in the 2022 AMP.

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Reduce Urban/ Suburban Stormwater Runoff	▪ Restore riparian buffers along headwater streams that drain suburban areas. ▪ Protect riparian buffers with permanent conservation easement.			<u>Visual Assessment</u> Conducted yearly on all restored stream channels and in-stream structures.	Visual assessment of streams indicate that restored channels and in-stream structures within the majority of Stewart's Creek are in good condition and functioning as intended. The lower reaches of Moores Fork show bank instability that will require maintenance/repairs. This will be discussed in the 2022 AMP.
				<u>Additional Cross Sections</u> Only surveyed if instability is documented during monitoring.	No additional cross sections were surveyed during MY2.
Reduce Stream Channel and Streambank Instability	▪ Restore degraded stream channels by establishing appropriate dimension, pattern and profile. ▪ Install in-stream structures to provide stream channel and streambank stability. ▪ Restore and protect riparian buffer to provide bank protection and stability. ▪ Install fencing to exclude livestock from Project streams and buffers.			<u>Stream Hydrology Monitoring</u> 5 pressure transducers and a rain gauge will record precipitation and streamflow data continuously through the monitoring period. Photos of high water indicators will be taken yearly.	Flow gauge data from MY2 indicate that the UTs met the established success criteria of 30 days or more of consecutive flow throughout the year. In addition, 2 – 10 bankfull events were recorded for the UTs.

Table 3. Project Attribute Table

Project Background Information				
Project Name		Stewarts Creek Tributaries Stream Restoration Project		
County		Surry		
Project Area (acres)		30		
Project Coordinates (latitude and longitude)		latitude 36 deg 30' 55" N, longitude 80 deg 41' 41" W and latitude 36 deg 30' 37" N, longitude 80 deg 42' 01" W		
Planted Acreage (Acres of Woody Stems Planted)		30		
Project Watershed Summary Information				
Physiographic Province		Piedmont		
River Basin		Yadkin Pee-Dee		
USGS Hydrologic Unit 8-digit	03040101	USGS Hydrologic Unit 14-digit	3040101100010	
Project Drainage Area (Acres and Sq. Mi.)		3,001 acres/ 4.69 Sq.Mi. (Total)		
Project Stream Thermal Regime		Cool		
Project Drainage Area Percentage of Impervious Area		Average 1%		
CGIA Land Use Classification		Average 35% Agriculture 50% Forested/Scrubland 11% Residential		

Reach Summary Information				
Parameters	**Moores Fork**	**UT1**	**UT2**	**UT3**
Length of reach (linear feet)	3,955	2,742	1,009	3,365
Valley confinement (Confined, moderately confined, unconfined)	Unconfined	Unconfined	Unconfined	Unconfined
Drainage area (Acres and Square Miles)	4.4 Sq.Mi., 2816 Ac	0.11 Sq.Mi., 70 Ac	0.07 Sq.Mi., 45 Ac	0.11 Sq.Mi., 70 Ac
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification	WS-IV	WS-IV	WS-IV	WS-IV
Stream Classification (existing)	F4	G4 -> F4	Channelized E4	F4
Stream Classification (proposed)	C4	C4	C4	C4
Evolutionary trend (Simon)	V	IV	IV	IV
FEMA classification	AE	AE	AE	AE

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Yes	SAW-2017-01508
Water of the United States - Section 401	Yes	Yes	DWR #17-1043
Division of Land Quality (Erosion and Sediment Control)	Yes	Yes	General Permit NCG010000 - ID # SURRY-2020-005
Endangered Species Act	No	Yes	Categorical Exclusion Document; Appendix 10 in Mitigation Plan
Historic Preservation Act	No	Yes	
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	Yes	CLOMR 19-04-3237R, Floodplain Development Permit PL201900063, and LOMR case number 21-04-0390P
Essential Fisheries Habitat	No	N/A	N/A

2.0 MONITORING DATA ASSESSMENT

This document reports the Monitoring Year 2 data and compares it to the baseline data to determine the success of the Stewarts Creek Stream Restoration Project based on the performance criteria stated above.

2.1 Stream Monitoring

Stream monitoring involved field collection to assess the hydrologic and geomorphic functions of UT1, UT2, UT3, and Moores Fork. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 2. These monitoring parameters follow USACE guidance, but will also allow for monitoring of other parameters to document Site performance related to the Project goals listed in Table 2. The locations of the established monitoring cross sections and any channel instability areas are shown in Figures 1B-1E (Current Condition Plan View (CCPV)). On October 29, 2020, a 3.2-inch rain event associated with Hurricane Zeta occurred at the Site and caused some streambank damage along Moores Fork. This damage is mentioned in Table 2, Table 4, and the Figures 1B-1E.

2.1.1 Stream Profile

A full longitudinal profile was surveyed for the entire length of the restored streams in May - June 2020 to document as-built conditions. This survey was tied to a permanent benchmark and includes thalweg, water surface, right bank, and left bank features. Profile measurements were taken at the head of each feature (e.g. riffle, pool) and at the max depth of pools. The longitudinal profile will not be surveyed during annual monitoring unless vertical channel instability has been observed during monitoring and remedial actions or repairs are needed. As a course of action is discussed regarding repairs on Moores Fork, a longitudinal profile survey may be necessary in the future and will be discussed in the 2022 Adaptative Management Plan (AMP).

2.1.2 Stream Dimension

Permanent cross sections were installed across the Site to monitor stream stability through dimension change. Of the 26 permanent cross sections installed, 9 were located on Moores Fork and 17 on the UTs with 12 permanent cross sections installed in riffles and 14 in pools. Each cross section was monumented using t-posts on both streambanks. The location and elevation of each pin was located and recorded to facilitate data comparison from year to year. Cross sections were surveyed using a Topcon RL-H5A Self Leveling Laser Level. Reported data includes measurements of Bankfull Elevation (based on as-built bankfull area), Bank Height Ratio (BHR) (based on as-built bankfull area), Thalweg Elevation, Top of Bank Elevation, Top of Bank Max Depth, Top of Bank Cross Sectional Area, and Entrenchment Ratio (ER) (Appendix C). BHR measurements were made by holding the bankfull area recorded in the Baseline As-built report constant and adjusting the bankfull elevation. Reference photos were and will be taken of both streambanks every year to provide a visual assessment of any changes that may occur.

The Year 1 monitoring cross section surveys indicate that the majority of Project streams are geomorphically stable and restored channel dimensions have not changed significantly during Monitoring Year 2. Twenty-three out of the total twenty-six stream cross sections showed only minor fluctuations compared to the as-built condition and meet the success criteria for restored stream channels as established in the Mitigation Plan and shown in Table 2. The cross-section plots, photos, and data summary are included in Appendix C. Notes on specific cross-sections and actions to be taken in the future are listed below.

- Cross-section 2 on Moores Fork Reach 1 Enhancement shows an increase in bank-height-ratio. It is our professional judgement that this will fluctuate through the monitoring years and will not cut down any further due to it currently being cut down to bedrock.
- Cross-sections 4 and 5 are in the lower reaches of Moores Fork that show bank instability that will require maintenance/ repair. This will be addressed in the 2022 AMP.

2.1.3 Channel Stability

Channel stability is assessed on an annual basis using photographs to visually document the condition of the restored Project streams. Photographs are taken from the same location in the same direction each year. 38 photo points were established during baseline monitoring and are shown in the CCPV (Figures 1B-1E). Visual assessments of channel stability were also made regularly throughout Monitoring Year 2.

Stream photo points and visual assessment indicate that a majority of restored channels and in-stream structures are in good condition and performing as intended. During Monitoring Year 1, repairs, including bank sloping, installation of soil lifts, and rootwad revetments, were completed. Subsequent to these repairs, Hurricane Zeta caused some additional damage in a localized area at the transition between Moores Fork Reach 1 and 2. The location of streambank damage is shown in the CCPV (Figures 1B-1E). Photos of these areas are also included in the Monitoring Year 2 Photolog (Appendix A). The lower reaches of Moores Fork show bank instability that will require maintenance/ repair. This will be addressed in the 2022 AMP.

2.1.4 Stream Hydrology

Five pressure transducers were installed along the UTs to document stream flow and the occurrence of bankfull events within the monitoring period. The locations of these gauges are shown in the CCPV (Figures 1B–1E). All gauges were installed at the downstream end of pools. The constructed bankfull elevation at each gauge was located and recorded, as well as the elevation of the downstream controlling grade. These elevations will be compared with the gauge readings to determine and document whether the stream is flowing and if a bankfull event has occurred.

A tipping bucket rain gauge was also installed at a nearby EPR mitigation site to accurately document rainfall at the Site. The rainfall data can be compared to the flow gauge data to verify

that high flows at the Site are correlated with rainfall events. The monitoring gauges were downloaded regularly throughout Monitoring Year 2 and rainfall data is presented in the flow gauge plots in Appendix D.

Flow gauge data from MY2 indicate that all three Project streams met the established success criteria of 30 days or more of consecutive flow throughout the year. According to the gauge for UT1 (SG-1), the stream had consistent flow throughout the year (308 consecutive days of flow) and the gauge documented 1 bankfull event. SG-2, located downstream on UT1, documented consistent flow throughout the year (308 days of consecutive flow) and 8 separate bankfull events. SG-3, located on UT3 Reach 1, documented consistent flow throughout the year (290 consecutive days of flow) and 3 bankfull events. SG-4, located on UT3 Reach 2, documented consistent flow throughout the year (308 consecutive days of flow) and 6 bankfull events. SG-5, located on UT2, documented consistent flow throughout the year (217 consecutive days of flow) and 1 bankfull event. Bankfull events were further verified by analysis of rain gauge data. The date and timing of these bankfull events correlated with significant rainfall events recorded by the tipping bucket rain gauge.

In MY2 the stream gauges were serviced, inspected, and recalibrated to determine if the gauging instruments were the reason for multiple bankfull events in MY1. The numerous bankfull events in MY2 are likely influenced by the seasonal channel constriction due to vegetation growth in the channel that clears out every winter. As can be seen from the streamflow data plots in Appendix D, baseflow levels appear to rise during spring and summer months during the time when vegetation is growing most, leading to increased channel roughness and decreased conveyance area. The vegetation and small channel size led to regular out of bank events that access the floodplain. These reaches are performing as intended and show no signs of instability; therefore, the number of bankfull events and temporary channel constriction due to vegetation is not concerning. The in-channel vegetation is expected to decrease over time as woody vegetation along the banks matures and shades out the herbaceous vegetation in the stream channel.

2.2 Riparian Vegetation Monitoring

Riparian vegetation monitoring evaluates the growth and development of planted and volunteer vegetation across the Site. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 2. These monitoring parameters follow USACE guidance, but will also allow for monitoring of other parameters to document Site performance related to the Project goals listed in Table 2.

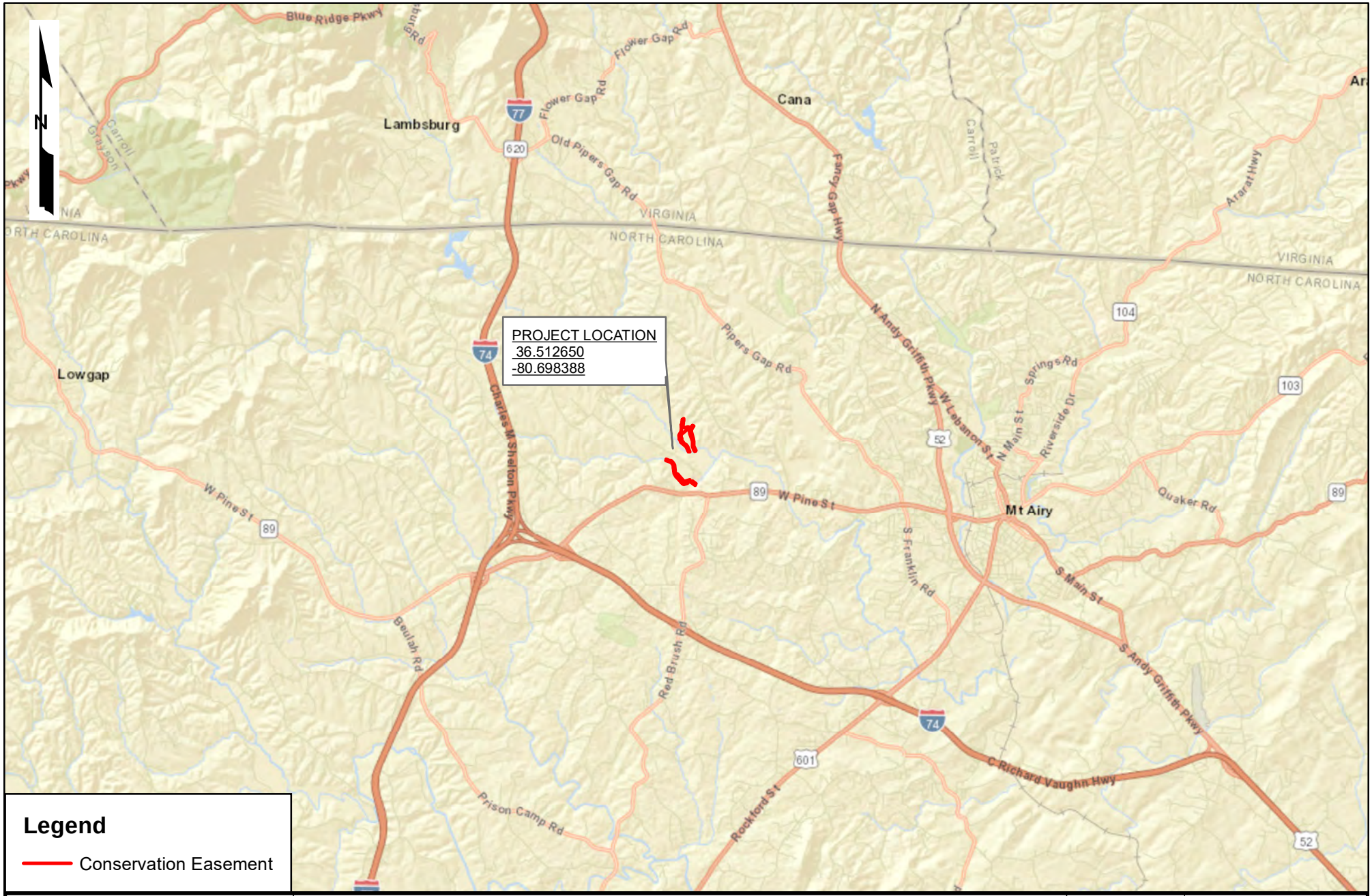
2.2.1 Vegetation Monitoring Data

Eleven (11) permanent vegetation monitoring plots were monitored across the Site. The corners of the permanent vegetation plots were marked using steel t-posts and the location of each plot was surveyed during the as-built survey. The individual trees within each permanent plot were flagged and identified to facilitate repeat monitoring each year. In addition to the 11

permanent plots, 11 randomly placed vegetation plots are established each year and the location of these plots is recorded using GPS. All vegetation plots for MY2 are shown in the CCPV (Figures 1B – 1E). Annual vegetation data is compiled and summarized using the DMS Vegetation Data Entry Tool.

Year 2 vegetation monitoring occurred in September 2021, before leaf drop, and more than 180 days after supplemental planting. Planted stem counts for each plot ranged from 7-18 trees per plot (283 - 729 trees per acre). The average density of planted stems from all 22 vegetation plots (permanent and random) was 12 trees per plot (504 trees per acre). Therefore, the vegetation plot data indicates that planted trees on the Site are meeting the interim success criteria for Monitoring Year 3 except for VPR-7. Monitoring Year 2 had an average planted stem height of 2.3 feet for permanent vegetation plots and 1.8 feet for randomly placed vegetation plots which doesn't meet the interim success criteria of 7 feet in MY5. Interim success criteria for stem height is for MY5 so 3 additional years of tree growth will occur prior to determining if the site is meeting the interim success criteria. Stem height will be monitored in MY3 and MY5 to determine whether the site appears to be on track to meet the interim success criteria in MY5.

Only minor vegetation problem areas were noted in MY2 vegetation plots. Riparian herbaceous vegetation that was established after construction and the supplemental planting appears to be flourishing throughout the Site. Areas of corn encroachment in the easement during Monitoring Year 1 were addressed and bare areas were supplementally planted in April 2021. A total of 15% (3.6 acres) of the original planted areas was replanted in 2021. The supplementally planted areas are shown in the CCPV (Figures 1B – 1E). A species list for the supplemental planting is provided in Appendix B and matches the species in the approved mitigation plan that were originally planted after construction. Additionally, approximately 0.1 acres of invasive kudzu was noted on the left floodplain within the conservation easement on Moores Fork Reach 3 shown in the CCPV (Figures 1B – 1E). The kudzu had not spread significantly as of MY2 monitoring and will be chemically treated in Spring 2022.



STEWARTS CREEK TRIBUTARIES STREAM RESTORATION PROJECT

VICINITY MAP

DMS PROJECT ID# 100023

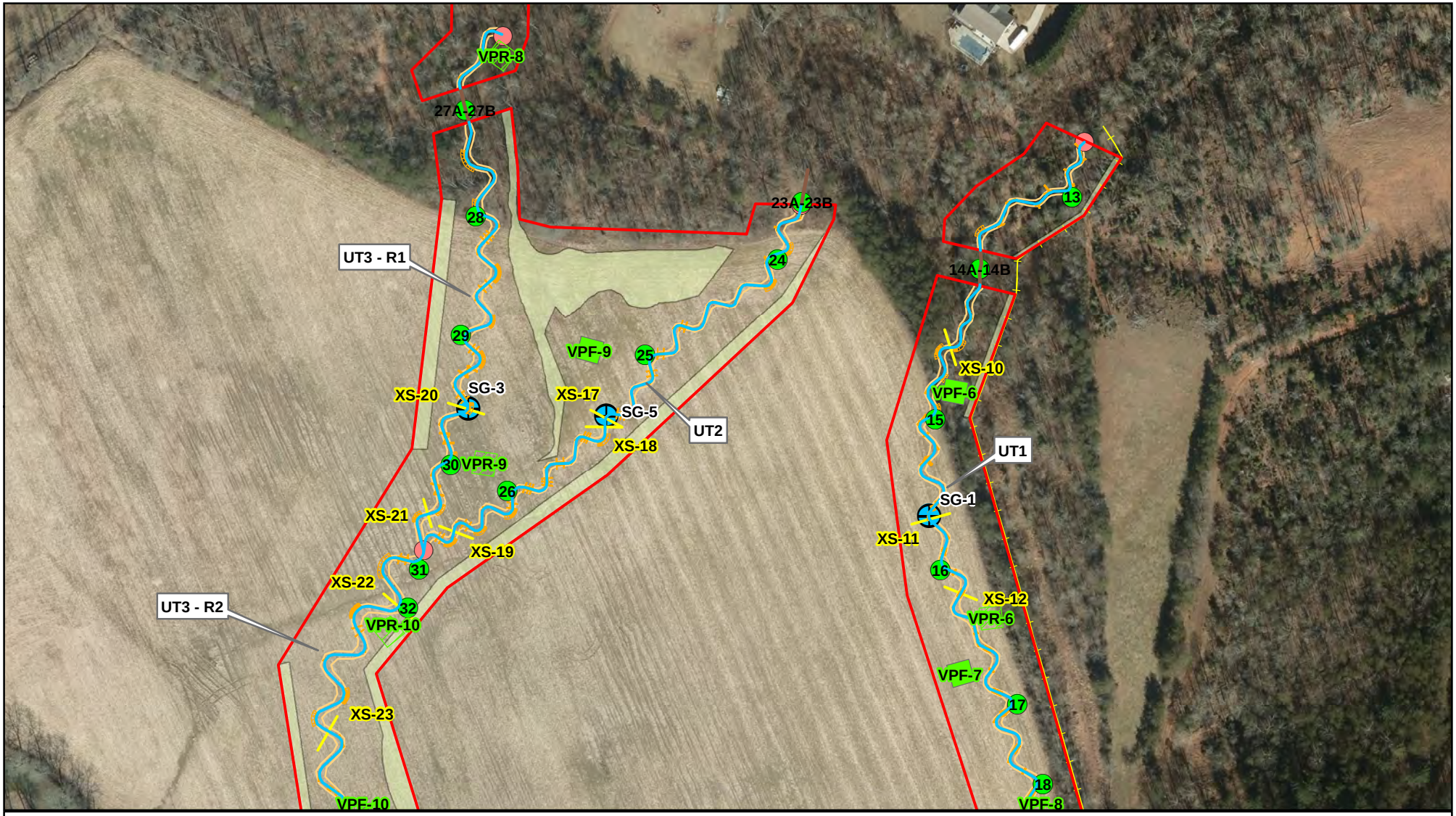
DECEMBER 2021

FIGURE 1A

SURRY COUNTY, NC

NC Mitigation Services ENVIRONMENTAL QUALITY

EPR ECOSYSTEM PLANNING & RESTORATION



Streams - Enhancement
Streams - Restoration
Conservation Easement
No Credit

Kudzu

Random Vegetation Plot
Successful
Unsuccessful

Fixed Vegetation Plot
Successful
Unsuccessful
Structures

Top of Bank
Photo Points
Stream Gauges
Cross Sections

Reach Breaks
Fence
Areas of Concern
2021 Supplemental Planting

NC OneMap Orthoimagery (2018)

0 100 200 Feet

1 inch = 200 feet

N

STEWARTS CREEK TRIBUTARIES STREAM RESTORATION PROJECT

Current Condition Plan View: Asset Map
MY2: 2021

DMS Project ID# 100023

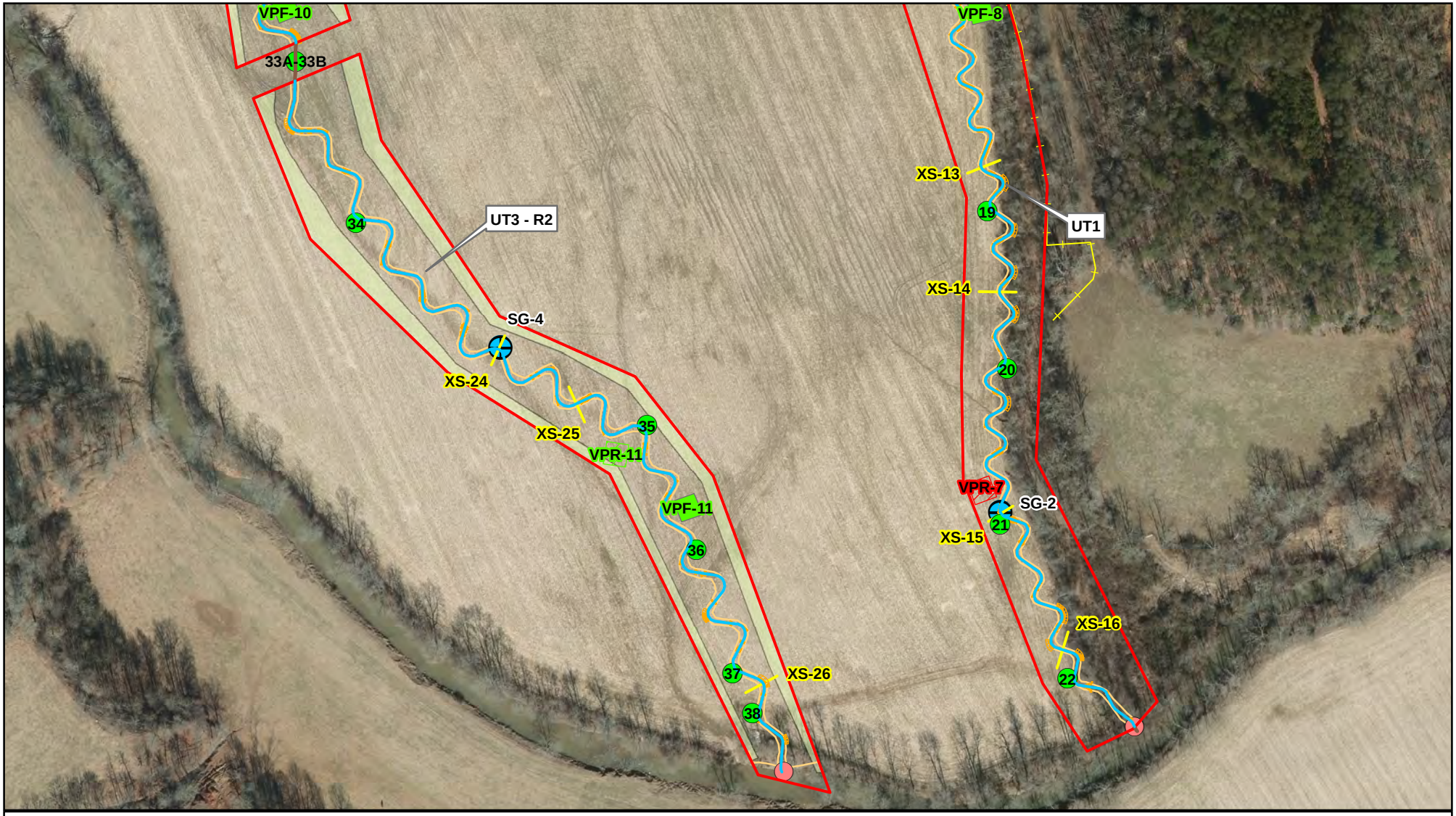
December 2021

FIGURE 1B

Surry County, NC

Mitigation Services Environmental Quality

Ecosystem Planning & Restoration



Streams - Enhancement
Streams - Restoration
Conservation Easement
No Credit

Kudzu

Random Vegetation Plot
Successful
Unsuccessful

Fixed Vegetation Plot
Successful
Unsuccessful
Structures

Top of Bank
Photo Points
Stream Gauges
Cross Sections

Reach Breaks
Fence
Areas of Concern
2021 Supplemental Planting

NC OneMap Orthoimagery (2018)

0 100 200 Feet

1 inch = 200 feet

N

STEWARTS CREEK TRIBUTARIES STREAM RESTORATION PROJECT

Current Condition Plan View: Asset Map
MY2: 2021

DMS Project ID# 100023

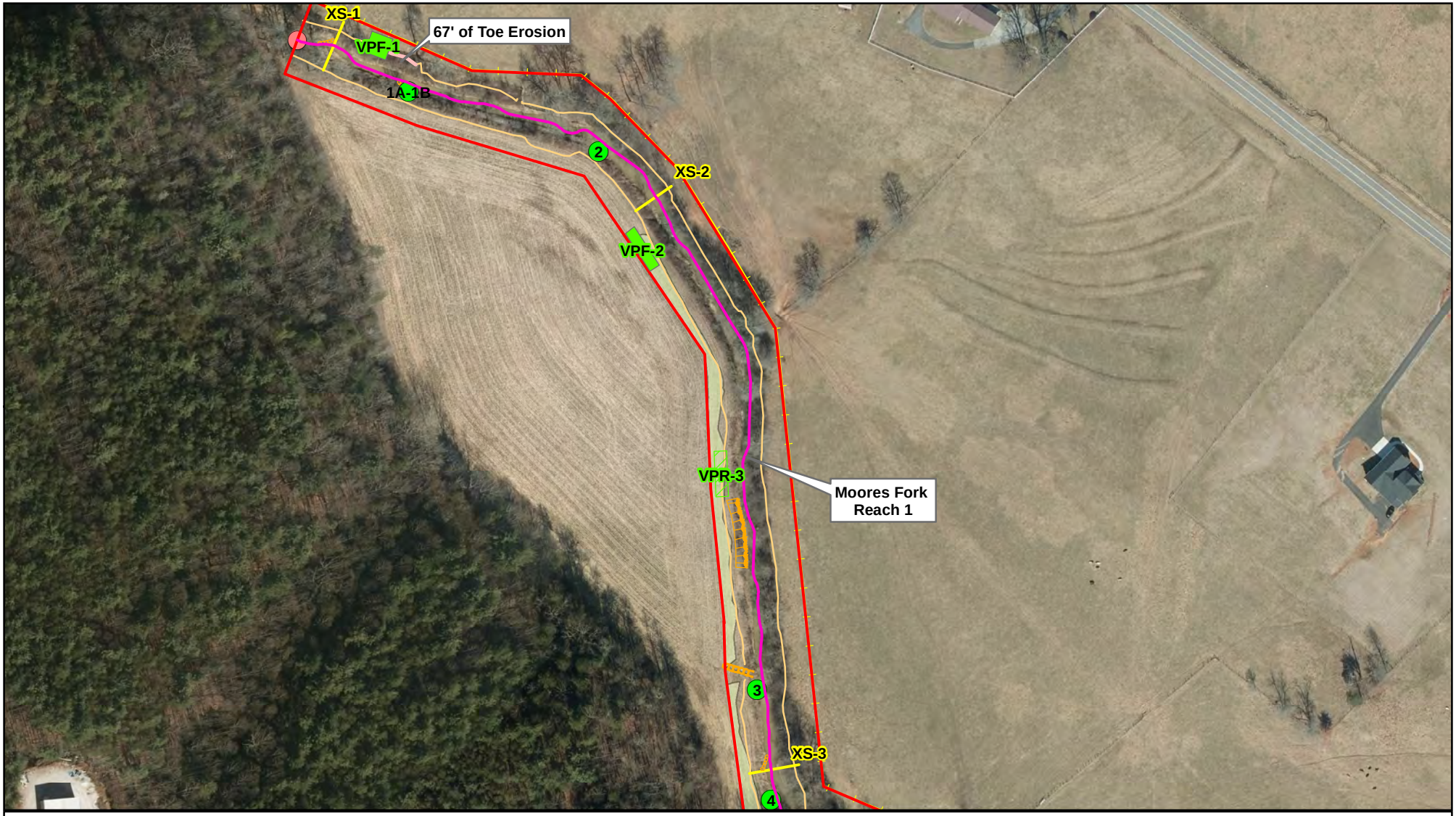
December 2021

FIGURE 1C

Surry County, NC

Mitigation Services Environmental Quality

Ecosystem Planning & Restoration



Streams - Enhancement
Streams - Restoration
Conservation Easement
No Credit

Kudzu

Random Vegetation Plot
Successful
Unsuccessful

Fixed Vegetation Plot
Successful
Unsuccessful
Structures

Top of Bank
Photo Points
Stream Gauges
Cross Sections

Reach Breaks
Fence
Areas of Concern
2021 Supplemental Planting

NC OneMap Orthoimagery (2018)

0 100 200 Feet

1 inch = 200 feet

N

STEWARTS CREEK TRIBUTARIES STREAM RESTORATION PROJECT

Current Condition Plan View: Asset Map
MY2: 2021

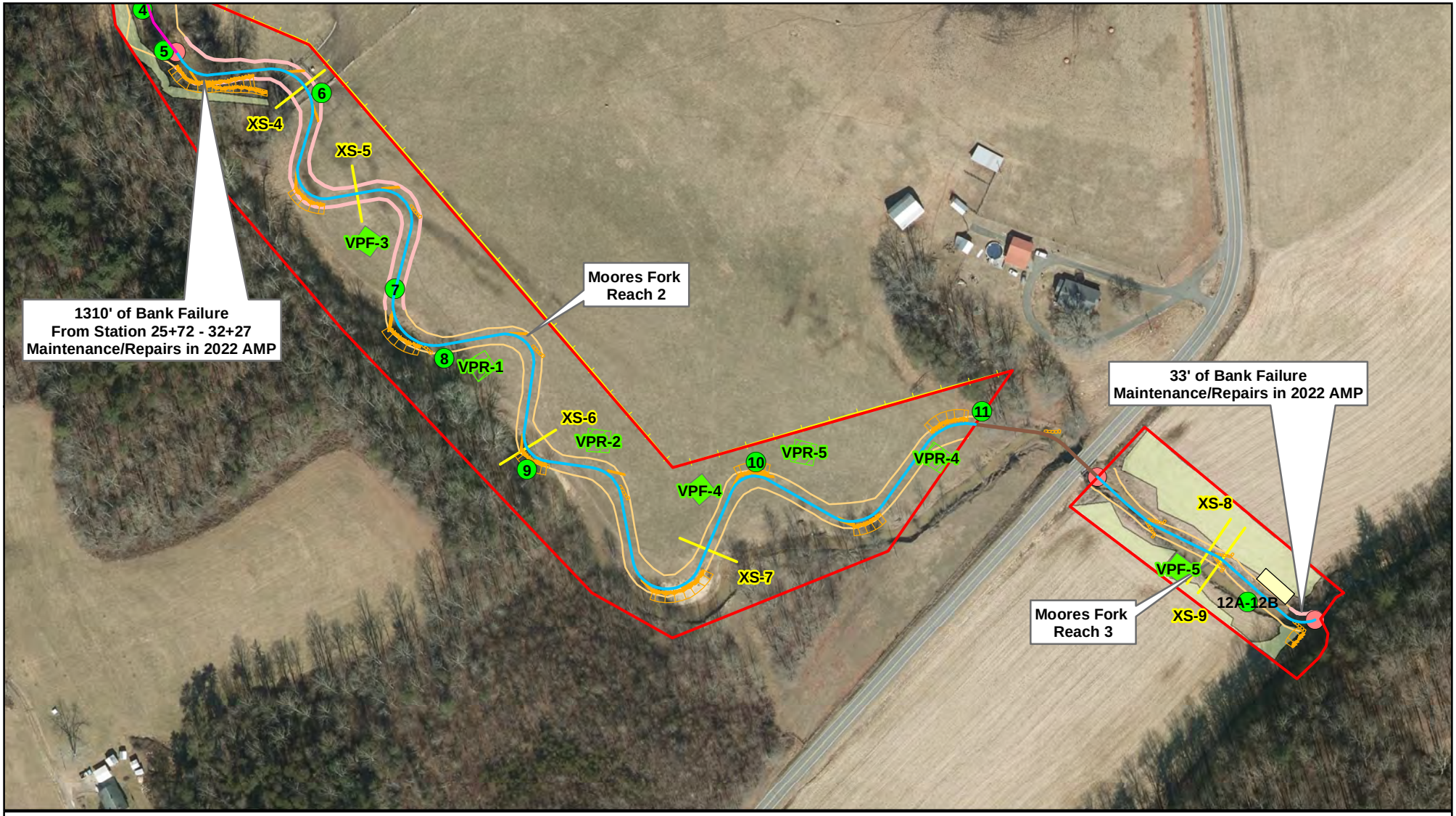
DMS Project
ID# 100023
December 2021

FIGURE 1D

Surry County, NC

Mitigation Services
Environmental Quality

Ecosystem Planning & Restoration



Streams - Enhancement
Streams - Restoration
Conservation Easement
No Credit

Kudzu

Random Vegetation Plot
Successful
Unsuccessful

Fixed Vegetation Plot
Successful
Unsuccessful
Structures

Top of Bank
Photo Points
Stream Gauges
Cross Sections

Reach Breaks
Fence
Areas of Concern
2021 Supplemental Planting

NC OneMap Orthoimagery (2018)

0 100 200 Feet

1 inch = 200 feet

N

STEWARTS CREEK TRIBUTARIES STREAM RESTORATION PROJECT

Current Condition Plan View: Asset Map
MY2: 2021

DMS Project
ID# 100023
December 2021

FIGURE 1E

Surry County, NC

Mitigation Services
Environmental Quality

Ecosystem Planning & Restoration

3.0 REFERENCES

North Carolina Department of Environmental Quality, Division of Mitigation Services (DMS). DMS Vegetation Data Entry Tool, October 2020. https://ncdms.shinyapps.io/Veg_Table_Tool/

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North Carolina Ecosystem Enhancement Program. 2009. Upper Yadkin Pee-Dee River Basin Restoration Priorities.

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U.S. Army Corps of Engineers. 2016. Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District.

Appendix A: Visual Assessment Data

Table 4. Visual Stream Morphology Stability Assessment Table

Table 5. Vegetation Condition Assessment Table

Monitoring Year 2 Photo Log

Monitoring Year 2 Vegetation Photo Log

Table 4a. Visual Stream Morphology Stability Assessment Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Reach ID	**UT1**
Dates Visually Assessed	**11/04/21 and 11/16/21**
Assessed Stream Length (ft)	**2800**
Assessed Bank Length (ft)	**5600**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
				Totals	0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	55	55		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	61	61		100%

Table 4b. Visual Stream Morphology Stability Assessment Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Reach ID	**UT2**
Dates Visually Assessed	**11/04/21 and 11/16/21**
Assessed Stream Length (ft)	**1060**
Assessed Bank Length (ft)	**2120**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
				Totals	0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	22	22		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	25	25		100%

Table 4c. Visual Stream Morphology Stability Assessment Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Reach ID	**UT3 - Reach 1**
Dates Visually Assessed	**11/04/21 and 11/16/21**
Assessed Stream Length (ft)	**994**
Assessed Bank Length (ft)	**1988**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
				Totals	0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	19	19		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	20	20		100%

Table 4d. Visual Stream Morphology Stability Assessment Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Reach ID	**UT3 - Reach 2**
Dates Visually Assessed	**11/04/21 and 11/16/21**
Assessed Stream Length (ft)	**2486**
Assessed Bank Length (ft)	**4972**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
				Totals	0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	25	25		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	31	31		100%

Table 4e. Visual Stream Morphology Stability Assessment Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Reach ID	**Moores Fork - Reach 1**
Dates Visually Assessed	**11/04/21 and 11/16/21**
Assessed Stream Length (ft)	**1572.5**
Assessed Bank Length (ft)	**3145**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			67	98%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
				Totals	67	98%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	3	3		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	3	3		100%

Table 4f. Visual Stream Morphology Stability Assessment Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Reach ID	**Moores Fork - Reach 2**
Dates Visually Assessed	**11/04/21 and 11/16/21**
Assessed Stream Length (ft)	**2194.5**
Assessed Bank Length (ft)	**4389**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			1310	70%
				Totals	1310	70%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	7	7		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	30	33		91%

Table 4g. Visual Stream Morphology Stability Assessment Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Reach ID	**Moores Fork - Reach 3**
Dates Visually Assessed	**11/04/21 and 11/16/21**
Assessed Stream Length (ft)	**386**
Assessed Bank Length (ft)	**772**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			33	96%
				Totals	33	96%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	6	6		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	2	2		100%

Table 5. Vegetation Condition Assessment Table
Stewarts Creek Tributaries Mitigation Project (DMS No.100023)

Dates Visually Assessed **09/15/21 and 09/24/21**

Planted Acreage **24.2**

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.1 acres	0.00	0.0%
		Total	0.00	0.0%
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.25 acres	0.00	0.0%
		Cumulative Total	0.00	0.0%

Easement Acreage **30**

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Species included in summation above should be identified in report summary.	0.1 acres	0.10	0.3%
Easement Encroachment Areas	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	None	0.0	0.0%

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 1A – Moores Fork Reach 1, Sta. 11+81
Facing Upstream (11/16/2021)

Photo Point 1B – Moores Fork Reach 1, Sta. 11+81
Facing Downstream (11/16/2021)

Photo Point 2 – Moores Fork Reach 1, Sta. 14+79
Facing Downstream (11/16/2021)

Photo Point 3 – Moores Fork Reach 1, Sta. 23+37
Facing Downstream (11/16/2021)

Photo Point 4 – Moores Fork Reach 1, Sta. 24+96
Facing Upstream (11/16/2021)

Photo Point 5 – Moores Fork Reach 2, Sta. 25+61
Facing Downstream (11/16/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 6 – Moores Fork Reach 2, Sta. 27+97
Facing Downstream (11/16/2021)

Photo Point 7 – Moores Fork Reach 2, Sta. 32+21
Facing Upstream (11/16/2021)

Photo Point 8 – Moores Fork Reach 2, Sta. 33+48
Facing Upstream (11/16/2021)

Photo Point 9 – Moores Fork Reach 2, Sta. 36+47
Facing Upstream (11/16/2021)

Photo Point 10 – Moores Fork Reach 2, Sta. 41+77
Facing Upstream (11/4/2021)

Photo Point 11A – Moores Fork Reach 2, Sta. 45+79
Facing Upstream (11/16/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 11B – Moores Fork Reach 2, Sta. 45+79
Facing Downstream (11/16/2021)

Photo Point 12A – Moores Fork Reach 3, Sta. 50+54
Facing Upstream (11/4/2021)

Photo Point 12B – Moores Fork Reach 3, Sta. 50+54
Facing Downstream (11/4/2021)

Photo Point 13 – UT1, Sta. 10+84
Facing Upstream (11/4/2021)

Photo Point 14A – UT1, Sta. 12+91
Facing Upstream (11/4/2021)

Photo Point 14B – UT1, Sta. 12+91
Facing Downstream (11/4/2021)

ECOSYSTEM PLANNING & RESTORATION

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 15 – UT1, Sta. 15+52
Facing Upstream (11/4/2021)

Photo Point 16 – UT1, Sta. 18+34
Facing Upstream (11/4/2021)

Photo Point 17 – UT1, Sta. 21+12
Facing Upstream (11/4/2021)

Photo Point 18 – UT1, Sta. 22+81
Facing Upstream (11/4/2021)

Photo Point 19 – UT1, Sta. 27+39
Facing Upstream (11/4/2021)

Photo Point 20 – UT1, Sta. 30+35
Facing Upstream (11/4/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 21 – UT1, Sta. 33+42
Facing Upstream (11/4/2021)

Photo Point 22 – UT1, Sta. 36+73
Facing Downstream (11/4/2021)

Photo Point 23A – UT2, Sta. 10+47
Facing Upstream (11/4/2021)

Photo Point 23B – UT2, Sta. 10+47
Facing Downstream (11/4/2021)

Photo Point 24 – UT2, Sta. 11+57
Facing Upstream (11/4/2021)

Photo Point 25 – UT2, Sta. 14+65
Facing Upstream (11/4/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 26 – UT2, Sta. 18+32
Facing Upstream (11/4/2021)

Photo Point 27A – UT3 Reach 1, Sta. 11+51
Facing Upstream (11/4/2021)

Photo Point 27B – UT3 Reach 1, Sta. 11+51
Facing Downstream (11/4/2021)

Photo Point 28 – UT3 Reach 1, Sta. 13+35
Facing Upstream (11/4/2021)

Photo Point 29 – UT3 Reach 1, Sta. 15+88
Facing Upstream (11/4/2021)

Photo Point 30 – UT3 Reach 1, Sta. 18+28
Facing Upstream (11/4/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 31 – UT3 Reach 2, Sta. 20+10
Facing Upstream (11/4/2021)

Photo Point 32 – UT3 Reach 2, Sta. 21+27
Facing Upstream (11/4/2021)

Photo Point 33A – UT3 Reach 2, Sta. 27+44
Facing Upstream (11/4/2021)

Photo Point 33B – UT3 Reach 2, Sta. 27+44
Facing Downstream (11/4/2021)

Photo Point 34 – UT3 Reach 2, Sta. 30+47
Facing Upstream (11/4/2021)

Photo Point 35 – UT3 Reach 2, Sta. 37+79
Facing Upstream (11/4/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Photo Log

Photo Point 36 – UT3 Reach 2, Sta. 40+06
Facing Upstream (11/4/2021)

Photo Point 37 – UT3 Reach 2, Sta. 42+81
Facing Upstream (11/4/2021)

Photo Point 38 – UT3 Reach 2, Sta. 27+44
Facing Upstream (11/4/2021)

UT3 Culvert Opening (2021)

Site Overview – Moore's Fork

Site Overview – UT1, UT2, UT3

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Vegetation Photo Log

Veg Plot 1 – E Corner (9/15/2021)

Veg Plot 2 – NW Corner (9/15/2021)

Veg Plot 3 – N Corner (9/15/2021)

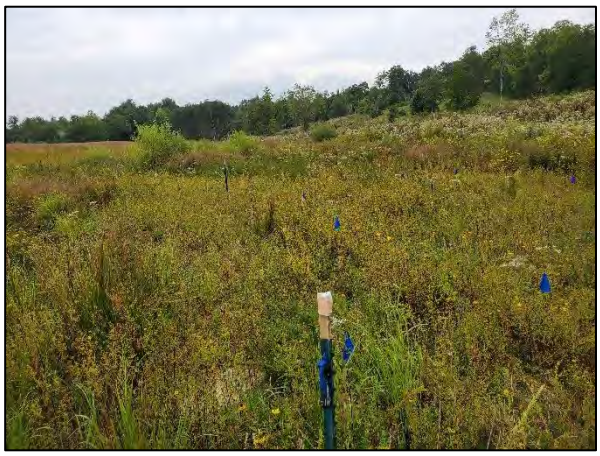
Veg Plot 4 – S Corner (9/15/2021)

Veg Plot 5 – S Corner (9/15/2021)

Veg Plot 6 –SE Corner (9/15/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Vegetation Photo Log

Veg Plot 7 – SE Corner (9/15/2021)



Veg Plot 8 – SW Corner (9/15/2021)

Veg Plot 9 – SE Corner (9/24/2021)

Veg Plot 10 – N Corner (9/24/2021)

Veg Plot 11 – SW Corner (9/24/2021)

Random Veg Plot 1 – (9/15/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Vegetation Photo Log

Random Veg Plot 2 – (9/15/2021)

Random Veg Plot 3 – (9/15/2021)

Random Veg Plot 4 – (9/15/2021)

Random Veg Plot 5 – (9/15/2021)

Random Veg Plot 6 – (9/15/2021)

Random Veg Plot 7 – (9/24/2021)

Stewarts Creek Tributaries Stream Restoration Project
Monitoring Year 2 - Vegetation Photo Log

Random Veg Plot 8 – (9/24/2021)

Random Veg Plot 9 – (9/24/2021)

Random Veg Plot 10 – (9/24/2021)

Random Veg Plot 11 – (9/24/2021)

Appendix B: Vegetation Plot Data

Table 6. Vegetation Plot Data

Table 7. Vegetation Performance Standards Summary Table

2021 Supplemental Planting Species List

Table 6a. Vegetation Performance Standards Summary Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Planted Acreage	24.2
Date of Initial Plant	2020-03-31
Date(s) of Supplemental Plant(s)	2020-11-03
Date(s) Mowing	#N/A
Date of Current Survey	2021-09-24
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	VPF-1		VPF-2		VPF-3		VPF-4		VPF-5	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL										
	Betula nigra	river birch	Tree	FACW	2	2	4	4	2	2	6	6	2	2
	Carya glabra	pignut hickory	Tree	FACU					1	1				
	Carya tomentosa	mockernut hickory	Tree											
	Cornus amomum	silky dogwood	Shrub	FACW									1	1
	Diospyros virginiana	common persimmon	Tree	FAC	1	1					1	1	1	1
	Fraxinus pennsylvanica	green ash	Tree	FACW			1	1						
	Liriodendron tulipifera	tuliptree	Tree	FACU			2	2						
	other				1	1								
	Platanus occidentalis	American sycamore	Tree	FACW			5	5	3	3	2	2	1	1
	Quercus alba	white oak	Tree	FACU	1	1								
	Quercus nigra	water oak	Tree	FAC	1	1			1	1	1	1	2	2
	Quercus phellos	willow oak	Tree	FAC	1	1	4	4	1	1	2	2		
	Quercus rubra	northern red oak	Tree	FACU	1	1								
	Salix nigra	black willow	Tree	OBL	1	1	2	2			1	1	5	5
	Ulmus americana	American elm	Tree	FACW	1	1			1	1	4	4		
Sum	Performance Standard				10	10	18	18	9	9	17	17	12	12
Mitigation Plan Performance Standard	Current Year Stem Count					10		18		9		17		12
	Stems/Acre					405		729		364		688		486
	Species Count					9		6		6		7		6
	Dominant Species Composition (%)					20		28		33		35		42
	Average Plot Height					3		2		3		2		3
	% Invasives					0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					10		18		9		17		12
	Stems/Acre					405		729		364		688		486
	Species Count					9		6		6		7		6
	Dominant Species Composition (%)					20		28		33		35		42
	Average Plot Height					3		2		3		2		3
	% Invasives					0		0		0		0		0

Meets Interim Performance Criteria | **Does Not Meet Interim Performance Criteria**

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 6b. Vegetation Performance Standards Summary Table (continued)
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Planted Acreage	24.2
Date of Initial Plant	2020-03-31
Date(s) of Supplemental Plant(s)	2020-11-03
Date(s) Mowing	#N/A
Date of Current Survey	2021-09-24
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	VPF-6		VPF-7		VPF-8		VPF-9		VPF-10	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL										
	Betula nigra	river birch	Tree	FACW	1	1	3	3	4	4	2	2	2	2
	Carya glabra	pignut hickory	Tree	FACU							1	1		
	Carya tomentosa	mockernut hickory	Tree											
	Cornus amomum	silky dogwood	Shrub	FACW	3	3	1	1						
	Diospyros virginiana	common persimmon	Tree	FAC					1	1	1	1		
	Fraxinus pennsylvanica	green ash	Tree	FACW	1	1								
	Liriodendron tulipifera	tuliptree	Tree	FACU										
	other													
	Platanus occidentalis	American sycamore	Tree	FACW	1	1	1	1	5	5	2	2	2	2
	Quercus alba	white oak	Tree	FACU										
	Quercus nigra	water oak	Tree	FAC	3	3	2	2						
	Quercus phellos	willow oak	Tree	FAC	1	1	3	3	2	2	3	3	4	4
	Quercus rubra	northern red oak	Tree	FACU	1	1	1	1						
	Salix nigra	black willow	Tree	OBL									1	1
	Ulmus americana	American elm	Tree	FACW					3	3	5	5	6	6
Sum	Performance Standard				11	11	11	11	15	15	14	14	15	15
Mitigation Plan Performance Standard	Current Year Stem Count					11		11		15		14		15
	Stems/Acre					445		445		607		567		607
	Species Count					7		6		5		6		5
	Dominant Species Composition (%)					27		27		33		36		40
	Average Plot Height					2		2		2		2		2
	% Invasives					0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					11		11		15		14		15
	Stems/Acre					445		445		607		567		607
	Species Count					7		6		5		6		5
	Dominant Species Composition (%)					27		27		33		36		40
	Average Plot Height					2		2		2		2		2
	% Invasives					0		0		0		0		0

Meets Interim Performance Criteria | **Does Not Meet Interim Performance Criteria**

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 6c. Vegetation Performance Standards Summary Table (continued)
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Planted Acreage	24.2
Date of Initial Plant	2020-03-31
Date(s) of Supplemental Plant(s)	2020-11-03
Date(s) Mowing	#N/A
Date of Current Survey	2021-09-24
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	VPF-11		VPR-1	VPR-2	VPR-3	VPR-4	VPR-5	VPR-6	VPR-7	VPR-8	VPR-9	VPR-10	VPR-11
					Planted	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL			1					4		3		3	5
	Betula nigra	river birch	Tree	FACW	3	3	4	2	3	3	5		3	1	2	1	
	Carya glabra	pignut hickory	Tree	FACU													
	Carya tomentosa	mockernut hickory	Tree		1	1							1				
	Cornus amomum	silky dogwood	Shrub	FACW			1	2									1
	Diospyros virginiana	common persimmon	Tree	FAC				1		1		1			2		
	Fraxinus pennsylvanica	green ash	Tree	FACW	3	3	1			1		1		2		1	2
	Liriodendron tulipifera	tuliptree	Tree	FACU	2	2											
	other						1		1							1	
	Platanus occidentalis	American sycamore	Tree	FACW	4	4	1	4	4	4		3	1	1	2	3	1
	Quercus alba	white oak	Tree	FACU													
	Quercus nigra	water oak	Tree	FAC	1	1		2	2		1			3		1	
	Quercus phellos	willow oak	Tree	FAC				1		1	1	1	1		1		
	Quercus rubra	northern red oak	Tree	FACU	1	1											
	Salix nigra	black willow	Tree	OBL	1	1	1					5		3	2		3
	Ulmus americana	American elm	Tree	FACW	1	1	2	1	3	1	1		1		1	1	
Sum	Performance Standard				17	17	12	13	13	11	8	15	7	13	10	11	12
Mitigation Plan Performance Standard	Current Year Stem Count					17	12	13	13	11	8	15	7	13	10	11	12
	Stems/Acre					688	486	526	526	445	324	607	283	526	405	445	486
	Species Count					9	8	7	5	6	4	6	5	6	6	7	5
	Dominant Species Composition (%)					24	33	31	31	36	62	33	43	23	20	27	42
	Average Plot Height					2	1	1	2	2	1	2	2	2	2	2	2
	% Invasives					0	0	0	0	0	0	0	0	0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					17	12	13	13	11	8	15	7	13	10	11	12
	Stems/Acre					688	486	526	526	445	324	607	283	526	405	445	486
	Species Count					9	8	7	5	6	4	6	5	6	6	7	5
	Dominant Species Composition (%)					24	33	31	31	36	62	33	43	23	20	27	42
	Average Plot Height					2	1	1	2	2	1	2	2	2	2	2	2
	% Invasives					0	0	0	0	0	0	0	0	0	0	0	0

Meets Interim Performance Criteria | **Does Not Meet Interim Performance Criteria**

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 7a. Vegetation Performance Standards Summary Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Vegetation Performance Standards Summary Table												
	VPF-1				VPF-2				VPF-3			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	405	3	9	0	729	2	6	0	364	3	6	0
Monitoring Year 1	648	2	9	0	364	1	5	0	202	2	4	0
Monitoring Year 0	729	2	9	0	769	1	6	0	364	2	5	0
	VPF-4				VPF-5				VPF-6			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	688	2	7	0	486	3	6	0	445	2	7	0
Monitoring Year 1	648	2	8	0	567	2	8	0	567	1	8	0
Monitoring Year 0	688	2	9	0	486	2	7	0	688	2	8	0
	VPF-7				VPF-8				VPF-9			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	445	2	6	0	607	2	5	0	567	2	6	0
Monitoring Year 1	405	2	7	0	567	1	5	0	486	2	5	0
Monitoring Year 0	688	2	8	0	607	1	6	0	567	2	6	0
	VPF-10				VPF-11				VPR-1			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	607	2	5	0	688	2	9	0	486	1	8	0
Monitoring Year 1	364	1	5	0	648	2	9	0	405	2	6	0
Monitoring Year 0	526	2	6	0	567	2	8	0				
	Meets Interim Performance Criteria				Does Not Meet Interim Performance Criteria							

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

Table 7b. Vegetation Performance Standards Summary Table
Stewarts Creek Tributaries Stream Restoration Project (DMS No.100023)

Vegetation Performance Standards Summary Table												
	VPR-2				VPR-3				VPR-4			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	526	1	7	0	526	2	5	0	445	2	6	0
Monitoring Year 1	526	2	5	0	364	2	4	0	364	2	4	0
Monitoring Year 0												
	VPR-5				VPR-6				VPR-7			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	324	1	4	0	607	2	6	0	283	2	5	0
Monitoring Year 1	486	2	5	0	324	1	3	0	405	2	6	0
Monitoring Year 0												
	VPR-8				VPR-9				VPR-10			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	526	2	6	0	405	2	6	0	445	2	7	0
Monitoring Year 1	526	1	7	0	364	2	4	0	486	2	6	0
Monitoring Year 0												
	VPR-11											
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives								
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2	486	2	5	0								
Monitoring Year 1	405	2	4	0								
Monitoring Year 0												

Meets Interim Performance Criteria | **Does Not Meet Interim Performance Criteria**

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

Stewarts Creek Tributaries Stream Restoration Project 2021 Supplemental Planting Species List

Trees		
The following table lists bare-root vegetation selection for the 2021 replanting effort. -Trees were planted on April 9, 2021 with a 8' x 8' spacing – 681 Trees/Acre. Total supplemental planting area was approximately 3.6 acres.		
Scientific Name	**Common Name**	**Wetland Indicator Status**
Betula nigra	River Birch	FACW
Ostrya virginiana	Ironwood	FAC
Celtis laevigata	Sugarberry	FACW
Diospyros virginiana	Persimmon	FAC
Fraxinus pennsylvanica	Green Ash	FACW
Platanus occidentalis	Sycamore	FACW
Quercus nigra	Water Oak	FAC
Quercus phellos	Willow Oak	FAC
Ulmus americana	American Elm	FACW
Carya tomentosa	Mockernut Hickory	NI
Cercis canadensis	Redbud	FACU
Cornus florida	Flowering Dogwood	FACU
Juniperus virginiana	Eastern Red Cedar	FACU
Liriodendron tulipifera	Tulip Poplar	FACU
Oxydendrum arboreum	Sourwood	UPL
Prunus serotina	Black Cherry	FACU
Quercus alba	White Oak	FACU
Quercus falcata	Southern Red Oak	FACU
Quercus rubra	Northern Red Oak	FACU

Appendix C: Stream Geomorphology Data

Cross Sections with Annual Overlays

Table 8. Baseline Stream Data Summary

Table 9. Cross Section Morphology Monitoring Summary

Cross Section Plot - MY2 - November 2021

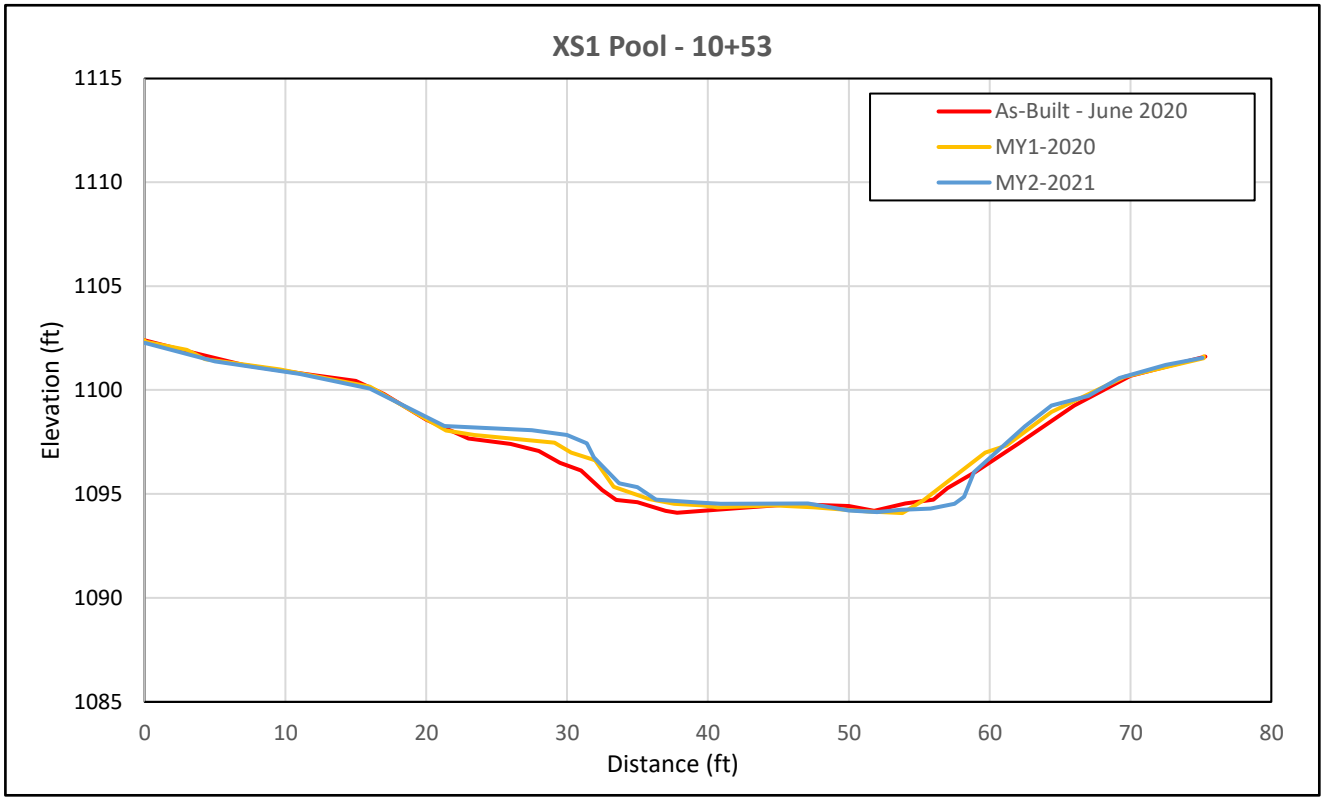
XS1 - Moores Fork Reach 1

Station 10+53 - Pool

XS1 looking upstream

XS1 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1097.06	1097.29	1097.27				
Bank Height Ratio - Based on AB-Bankfull Area	1.20	1.05	1.06				
Thalweg Elevation	1094.10	1094.08	1094.13				
LTOB Elevation	1097.67	1097.46	1097.44				
LTOB Max Depth	3.57	3.38	3.31				
LTOB Cross Sectional Area	93.76	77.33	76.98				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

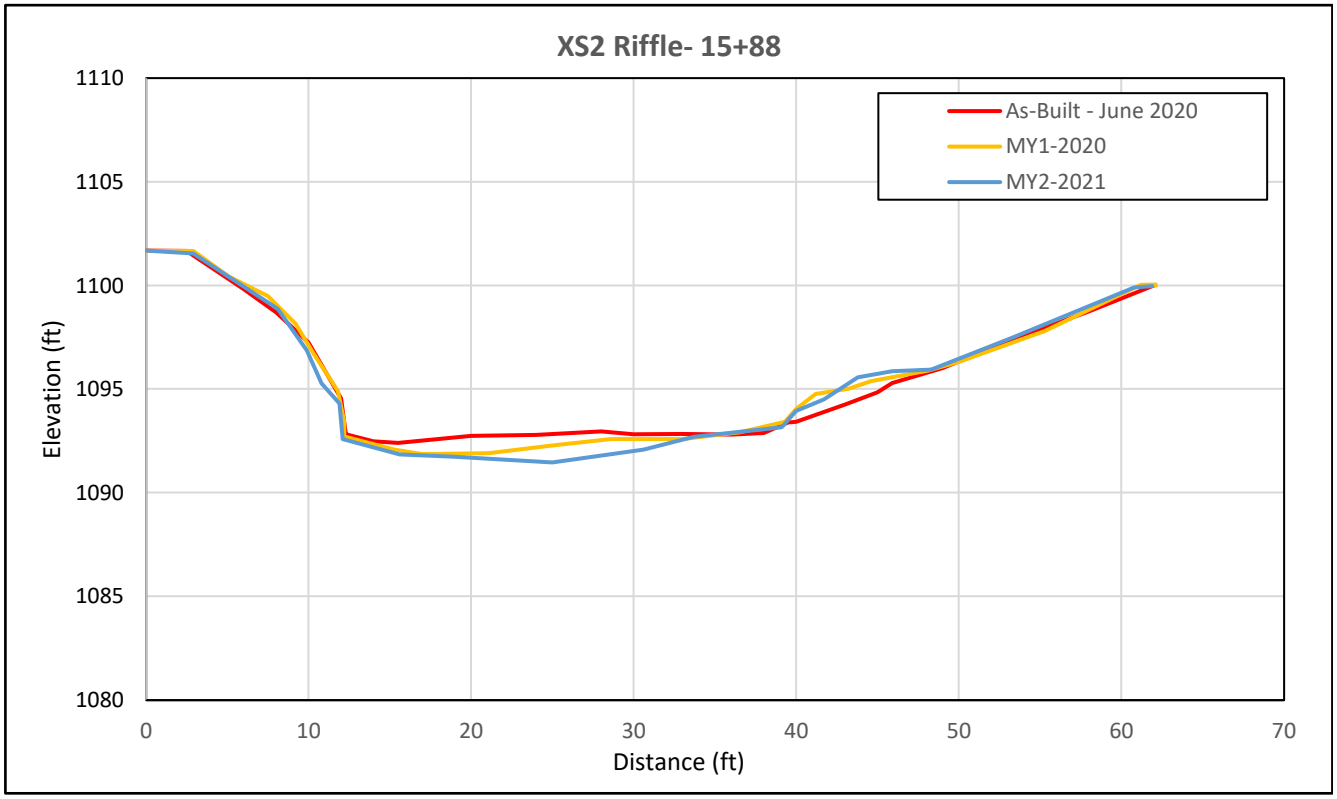
XS2 - Moores Fork Reach 1

Station 15+88 - Riffle

XS2 looking upstream

XS2 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1094.84	1094.64	1094.32				
Bank Height Ratio - Based on AB-Bankfull Area	1.18	1.04	1.44				
Thalweg Elevation	1092.41	1091.86	1091.47				
LTOB Elevation	1095.28	1094.76	1095.57				
LTOB Max Depth	2.87	2.90	4.1				
LTOB Cross Sectional Area	75.98	65.20	100.49				
Entrenchment Ratio	1.29	1.54	1.49				



Cross Section Plot - MY2 - November 2021

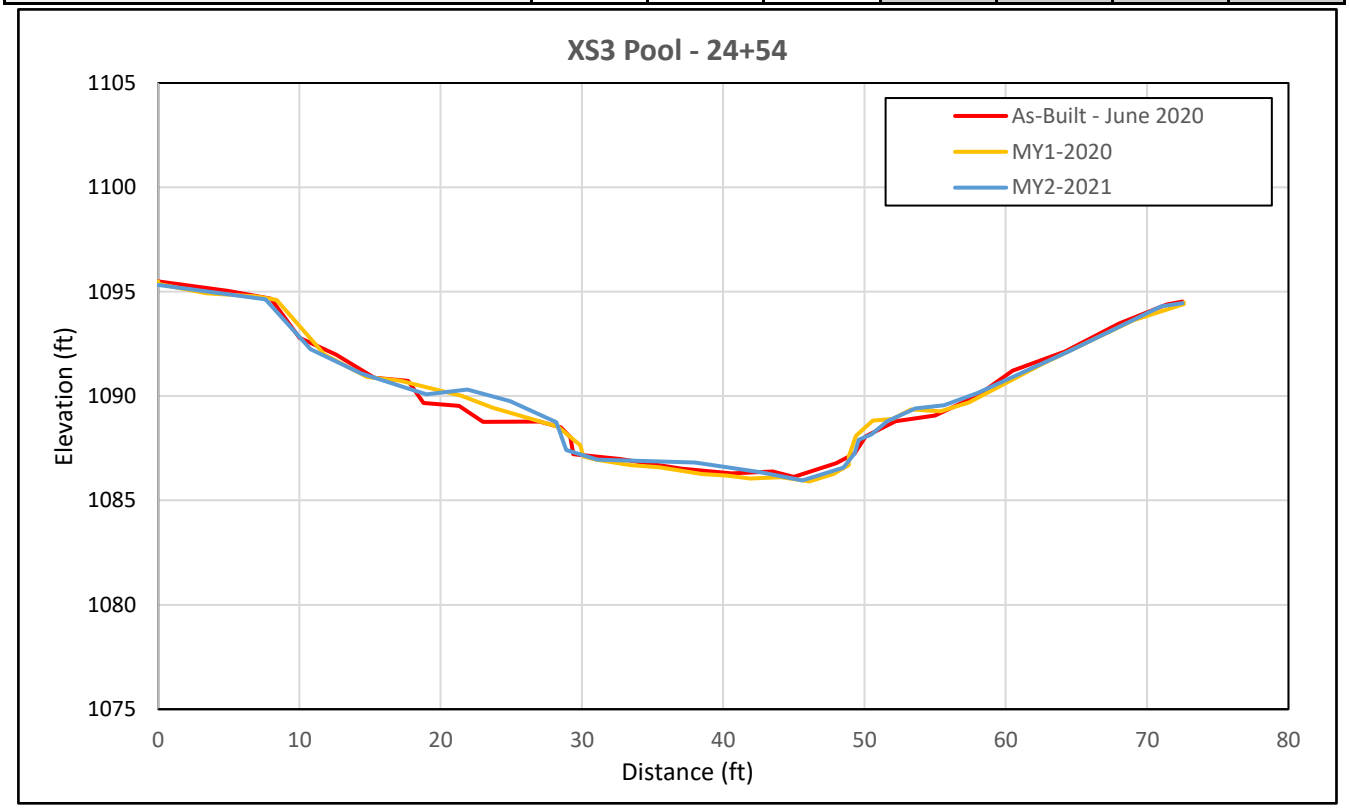
XS3 - Moores Fork Reach 1

Station 24+54 - Pool

XS3 looking upstream

XS3 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1088.77	1088.67	1088.77				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.06	1.01				
Thalweg Elevation	1086.14	1085.92	1085.96				
LTOB Elevation	1088.77	1088.82	1088.79				
LTOB Max Depth	2.63	2.90	2.83				
LTOB Cross Sectional Area	45.04	48.74	45.43				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

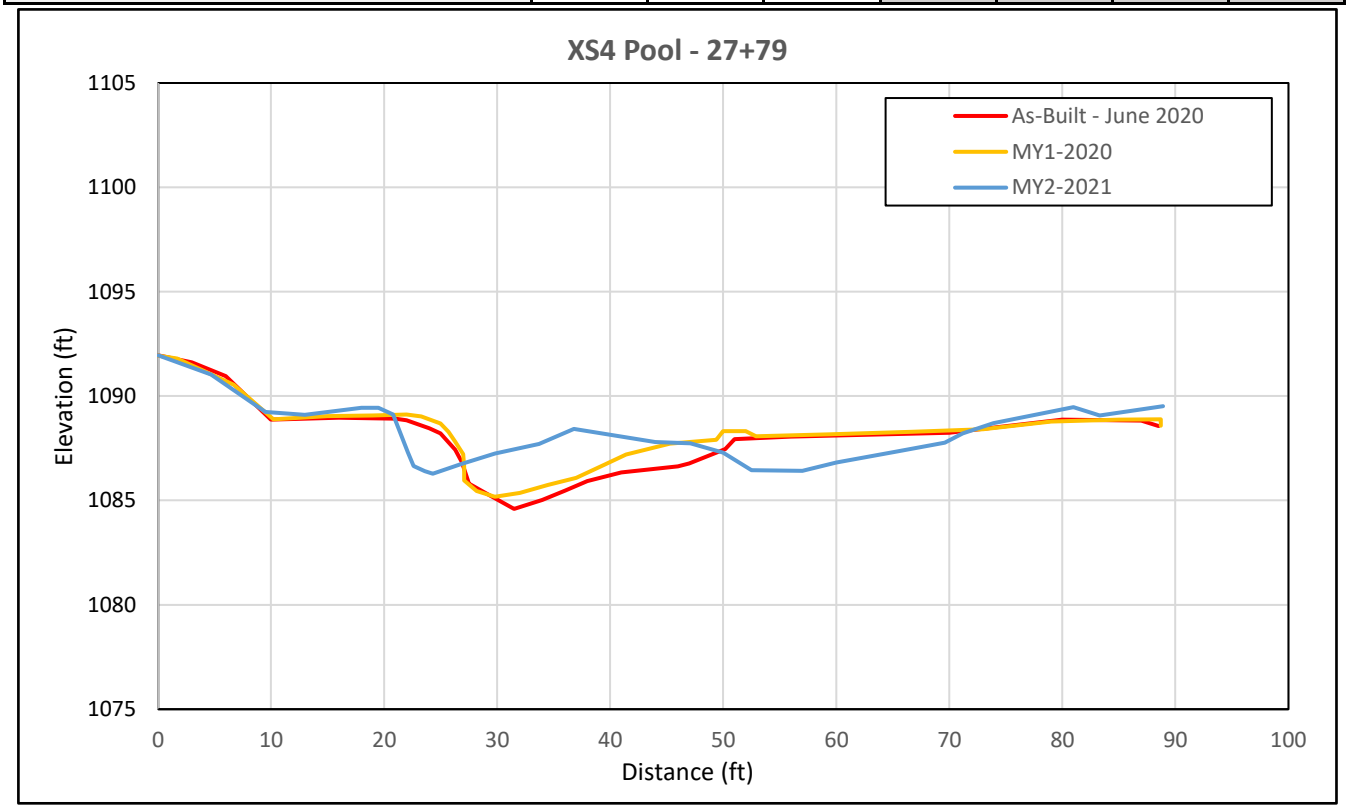
XS4 - Moores Fork Reach 2

Station 27+79 - Pool

XS4 looking upstream

XS4 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1087.94	1088.59	1088.26				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.80	1.61				
Thalweg Elevation	1084.60	1085.18	1086.29				
LTOB Elevation	1087.94	1087.91	1089.47				
LTOB Max Depth	3.34	2.73	3.18				
LTOB Cross Sectional Area	47.12	31.39	115.69				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

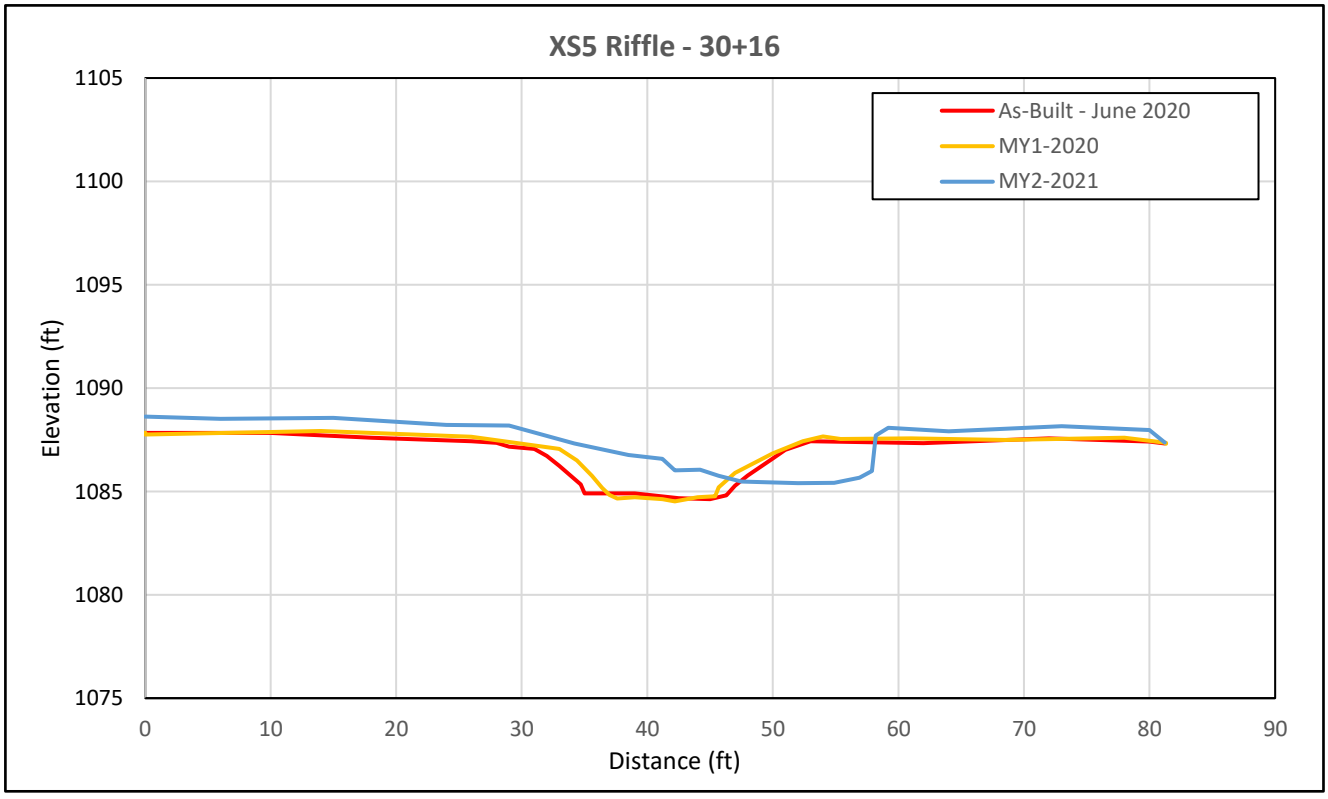
XS5 - Moores Fork Reach 2

Station 30+16 - Riffle

XS5 looking upstream

XS5 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1087.06	1087.32	1087.50				
Bank Height Ratio - Based on AB-Bankfull Area	1.11	1.04	1.10				
Thalweg Elevation	1084.63	1084.53	1085.47				
LTOB Elevation	1087.34	1087.43	1087.70				
LTOB Max Depth	2.71	2.90	2.23				
LTOB Cross Sectional Area	40.53	36.65	39.54				
Entrenchment Ratio	>4.01	>4.55	>3.69				



Cross Section Plot - MY2 - November 2021

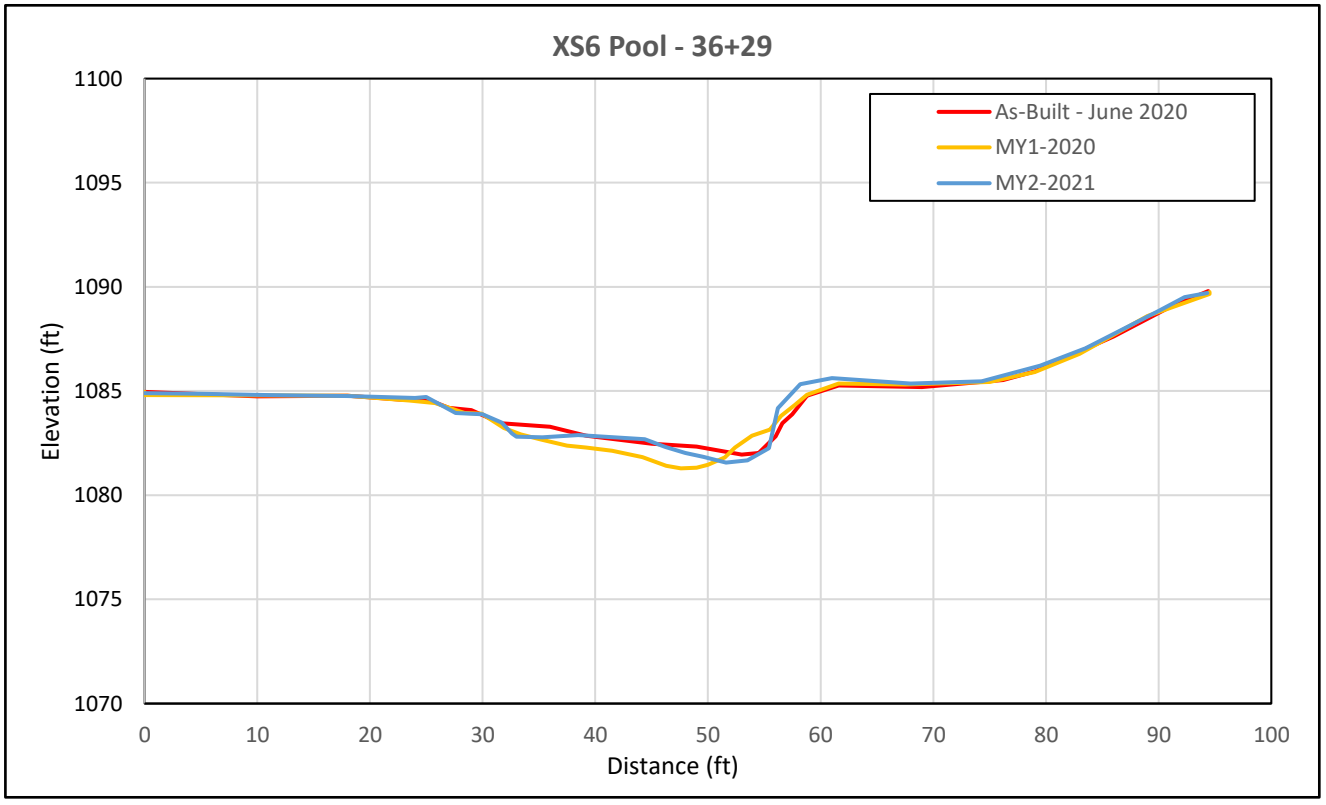
XS6 - Moores Fork Reach 2

Station 36+29 - Pool

XS6 looking upstream

XS6 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1084.62	1084.29	1084.51				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.08	1.07				
Thalweg Elevation	1081.95	1081.29	1081.57				
LTOB Elevation	1084.62	1084.54	1084.72				
LTOB Max Depth	2.67	3.25	3.15				
LTOB Cross Sectional Area	53.58	61.60	60.33				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

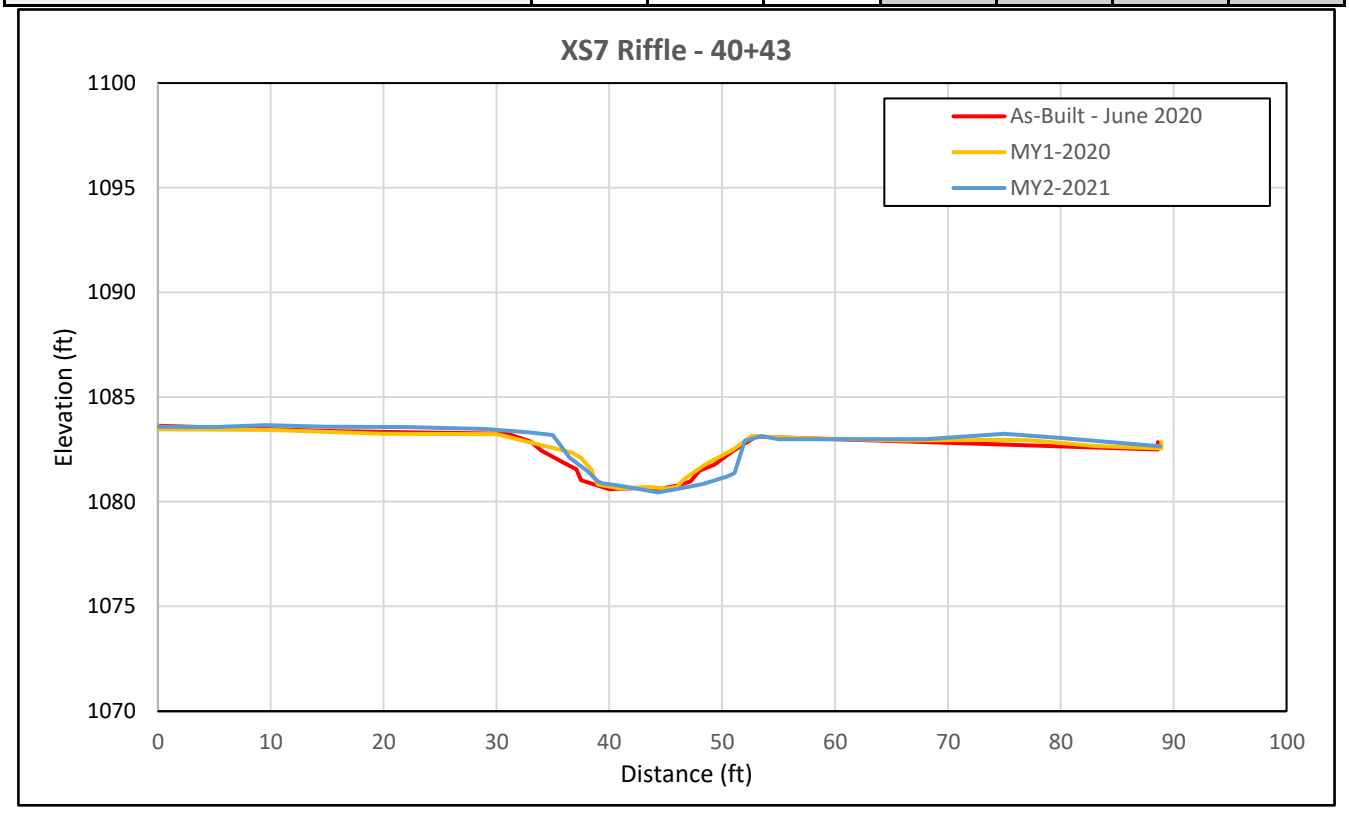
XS7 - Moores Fork Reach 2

Station 40+43 - Riffle

XS7 looking upstream

XS7 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1083.10	1083.29	1083.10				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.94	1.01				
Thalweg Elevation	1080.56	1080.63	1080.46				
LTOB Elevation	1083.10	1083.13	1083.13				
LTOB Max Depth	2.54	2.50	2.67				
LTOB Cross Sectional Area	33.72	30.17	34.27				
Entrenchment Ratio	>4.14	>4.07	>4.88				



Cross Section Plot - MY2 - November 2021

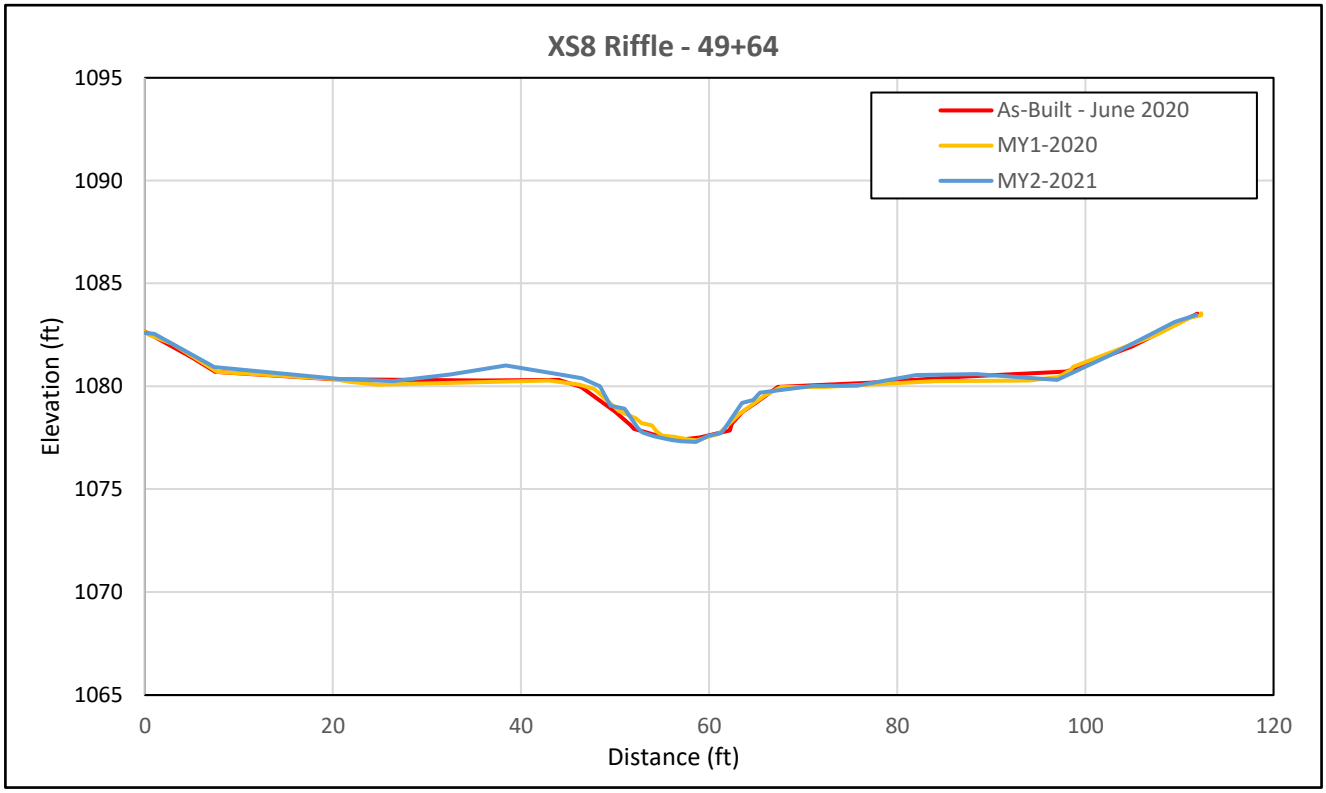
XS8 - Moores Fork Reach 3

Station 49+64 - Riffle

XS8 looking upstream

XS8 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1079.97	1080.11	1080.17				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.95	0.83				
Thalweg Elevation	1077.41	1077.37	1077.29				
LTOB Elevation	1079.97	1079.97	1079.68				
LTOB Max Depth	2.56	2.60	2.39				
LTOB Cross Sectional Area	33.89	31.07	25.77				
Entrenchment Ratio	5.12	5.20	6.42				



Cross Section Plot - MY2 - November 2021

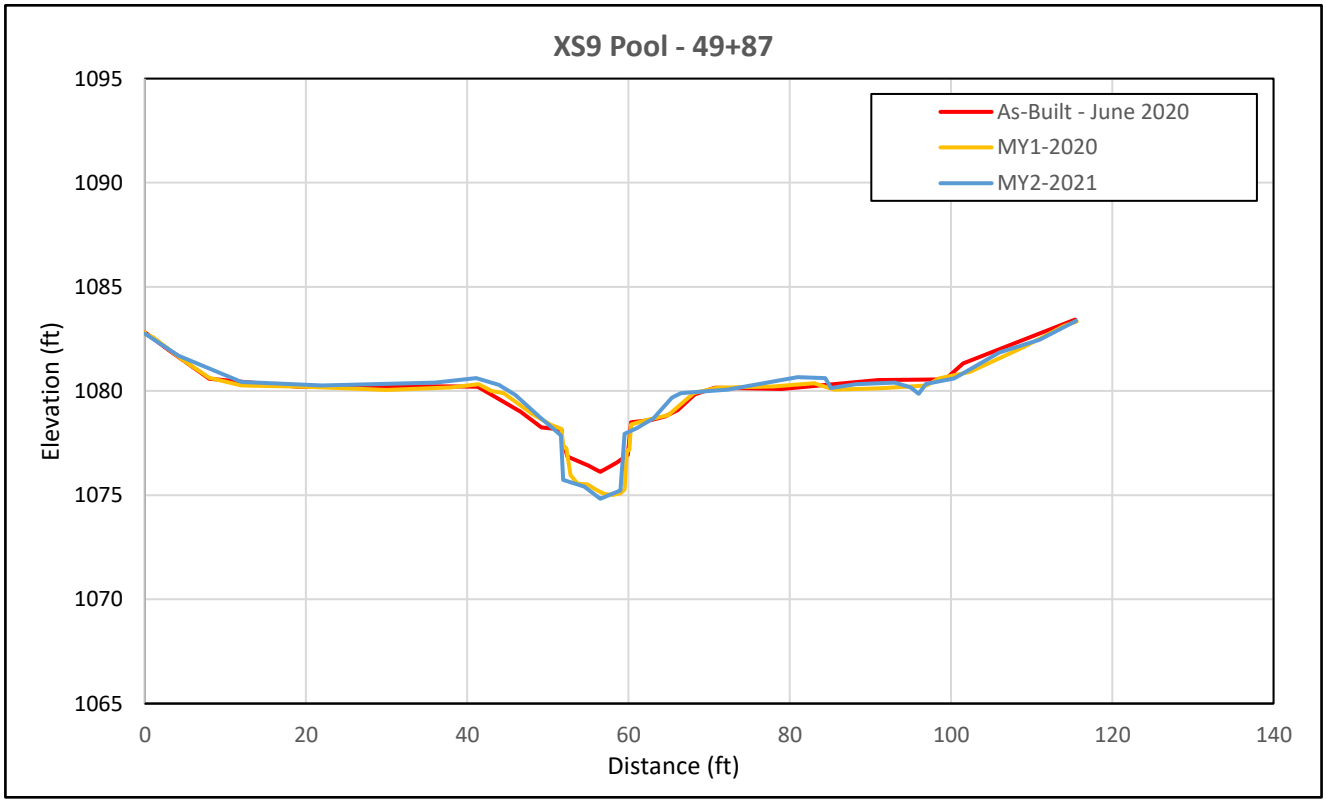
XS9 - Moores Fork Reach 3

Station 49+87 - Pool

XS9 looking upstream

XS9 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1080.16	1079.98	1080.07				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.04	0.97				
Thalweg Elevation	1076.12	1075.02	1074.84				
LTOB Elevation	1080.16	1080.16	1079.90				
LTOB Max Depth	4.04	5.14	5.06				
LTOB Cross Sectional Area	52.58	57.57	49.07				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

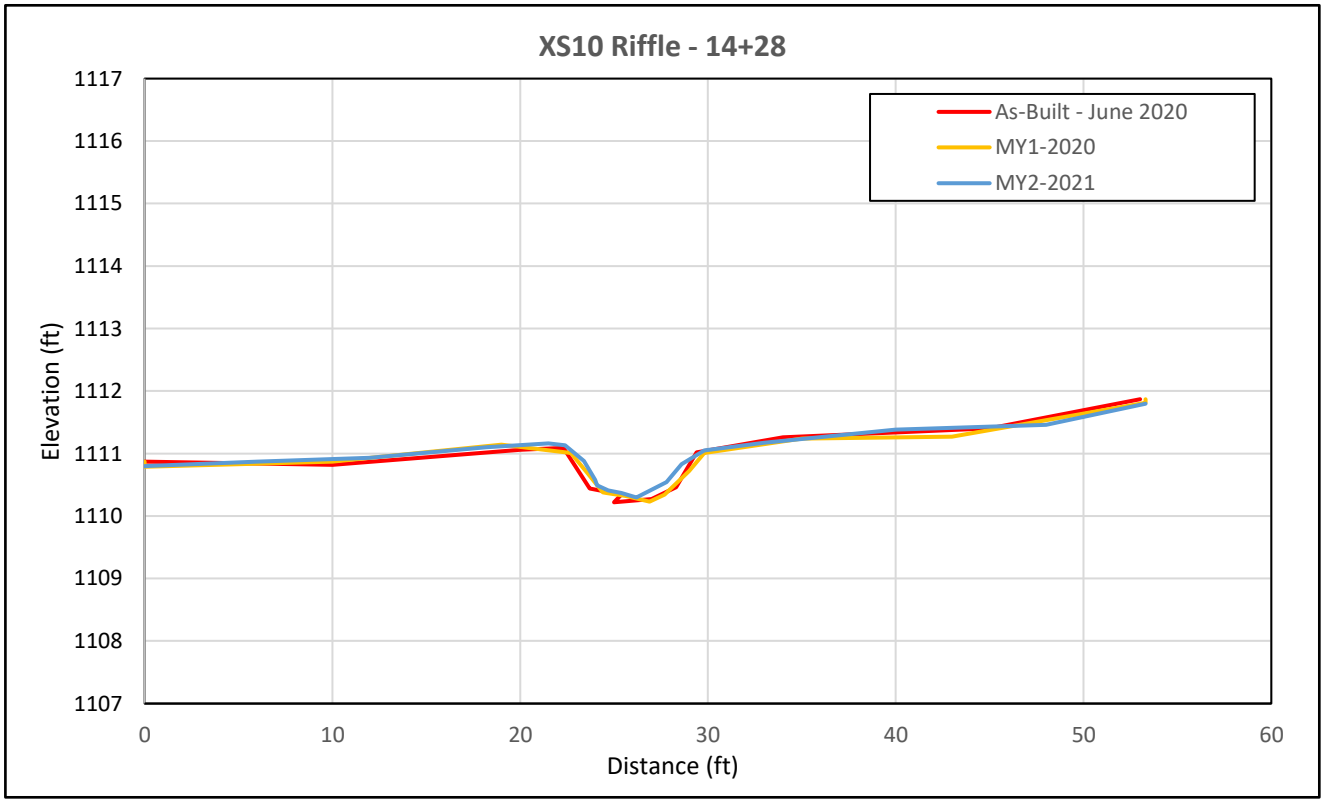
XS10 - UT1

Station 14+28 - Riffle

XS10 looking upstream

XS10 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1111.02	1111.05	1111.14				
Bank Height Ratio - Based on AB-Bankfull Area	1.08	0.95	0.99				
Thalweg Elevation	1110.22	1110.23	1110.30				
LTOB Elevation	1111.09	1111.01	1111.13				
LTOB Max Depth	0.87	0.78	0.83				
LTOB Cross Sectional Area	4.40	3.60	3.79				
Entrenchment Ratio	>7.5	>7.45	>7.53				

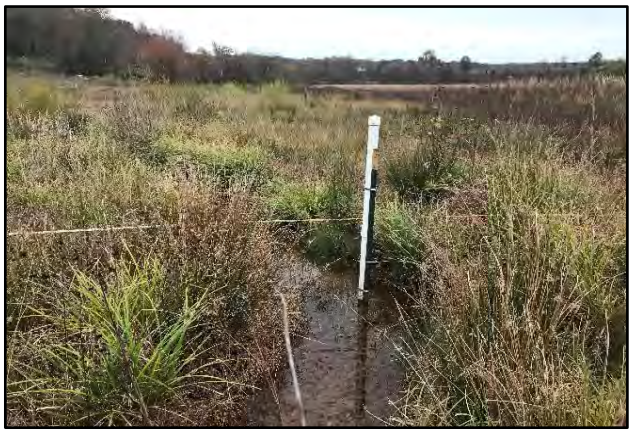


Cross Section Plot - MY2 - November 2021

XS11 - UT1

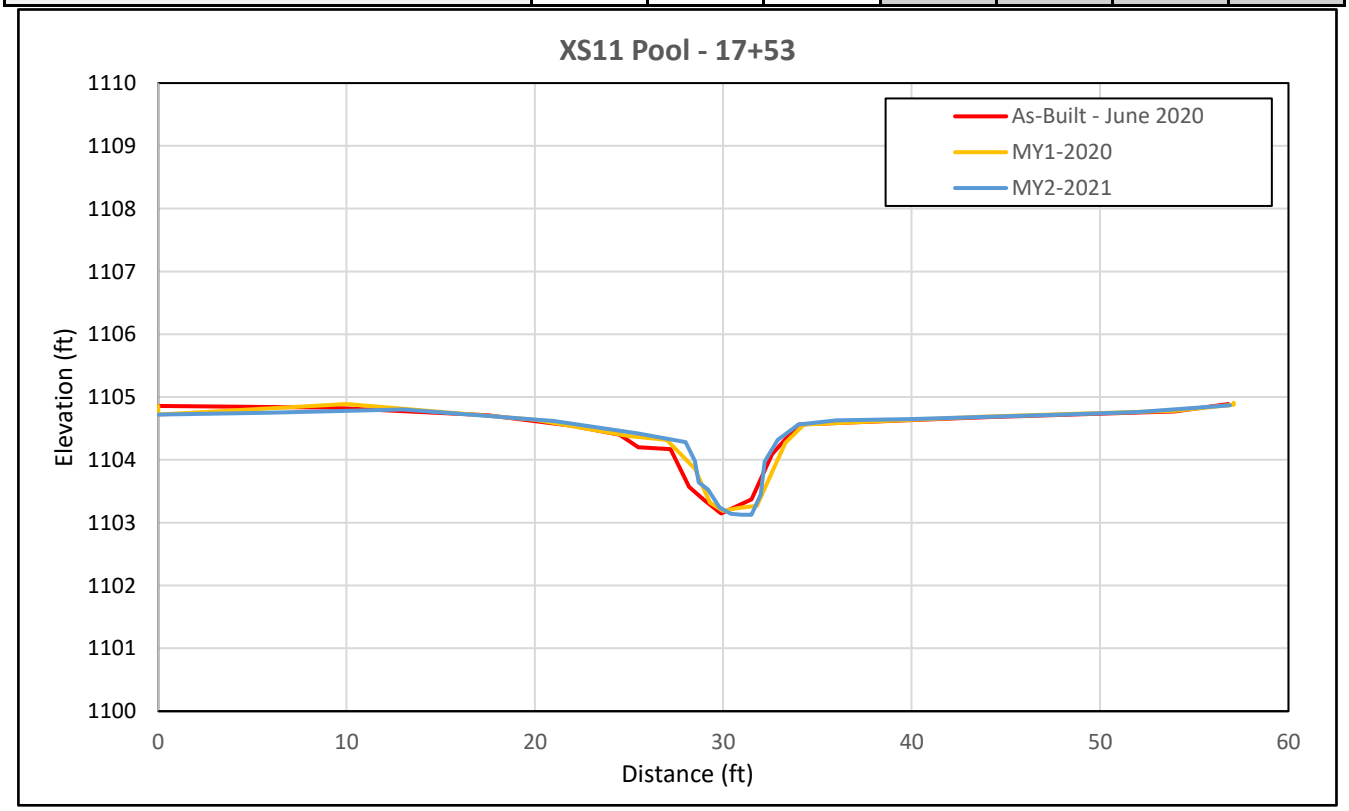
Station 17+53 - Pool

XS11 looking upstream



XS11 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1104.40	1104.45	1104.65				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.95	0.75				
Thalweg Elevation	1103.15	1103.19	1103.13				
LTOB Elevation	1104.40	1104.38	1104.28				
LTOB Max Depth	1.25	1.19	1.15				
LTOB Cross Sectional Area	5.48	4.92	3.67				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

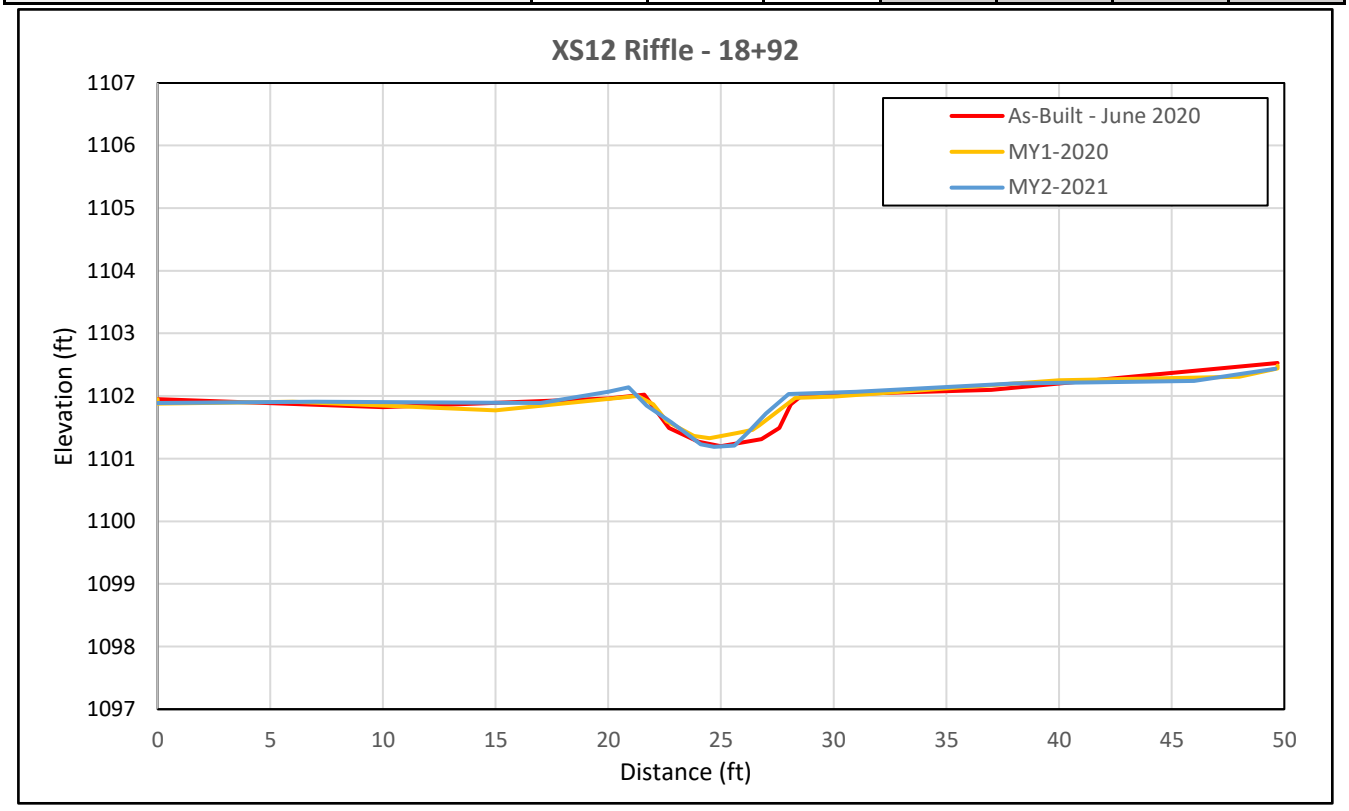
XS12 - UT1

Station 18+92 - Riffle

XS12 looking upstream

XS12 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1102.01	1102.14	1102.11				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.79	0.92				
Thalweg Elevation	1101.20	1101.33	1101.19				
LTOB Elevation	1102.01	1101.97	1102.03				
LTOB Max Depth	0.81	0.64	0.84				
LTOB Cross Sectional Area	3.92	2.78	3.39				
Entrenchment Ratio	>7.12	>7.27	>7.3				



Cross Section Plot - MY2 - November 2021

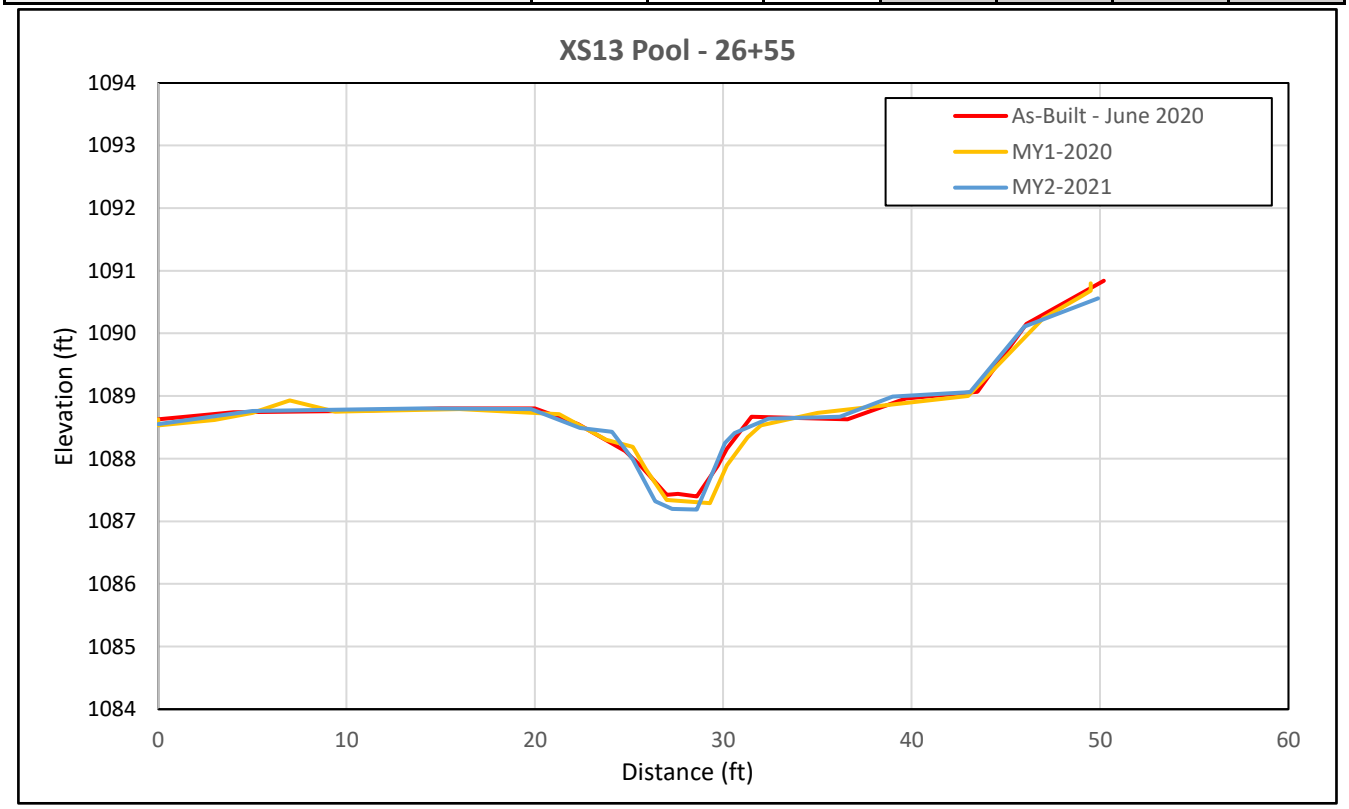
XS13 - UT1

Station 26+55 - Pool

XS13 looking upstream

XS13 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1088.55	1088.46	1088.51				
Bank Height Ratio - Based on AB-Bankfull Area	1.10	1.23	0.94				
Thalweg Elevation	1087.40	1087.29	1087.19				
LTOB Elevation	1088.67	1088.73	1088.43				
LTOB Max Depth	1.27	1.44	1.24				
LTOB Cross Sectional Area	6.64	8.60	4.95				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

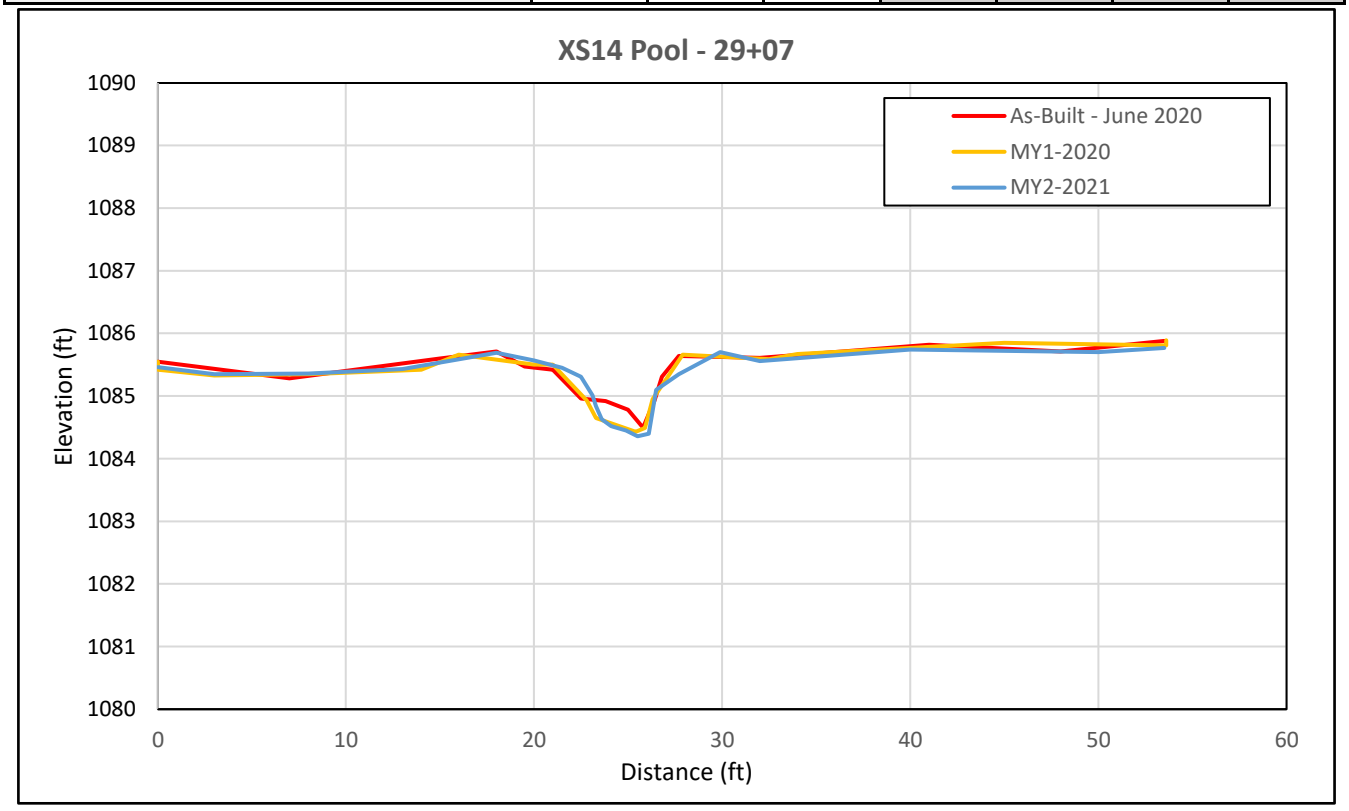
XS14 - UT1

Station 29+07 - Pool

XS14 looking upstream

XS14 looking downstream

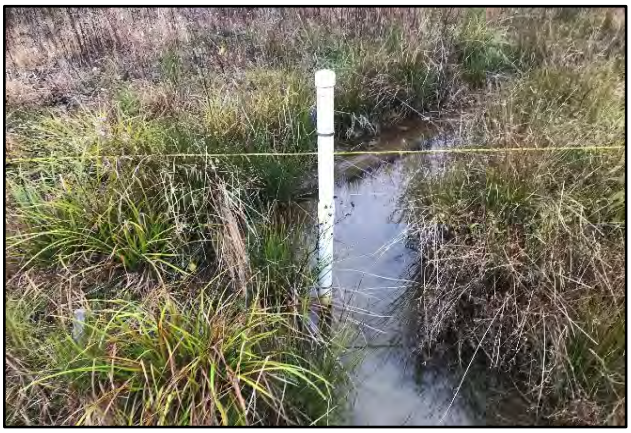
	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1085.64	1085.57	1085.58				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.08	1.09				
Thalweg Elevation	1084.50	1084.43	1084.36				
LTOB Elevation	1085.64	1085.66	1085.69				
LTOB Max Depth	1.14	1.23	1.33				
LTOB Cross Sectional Area	4.63	5.61	5.83				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

XS15 - UT1

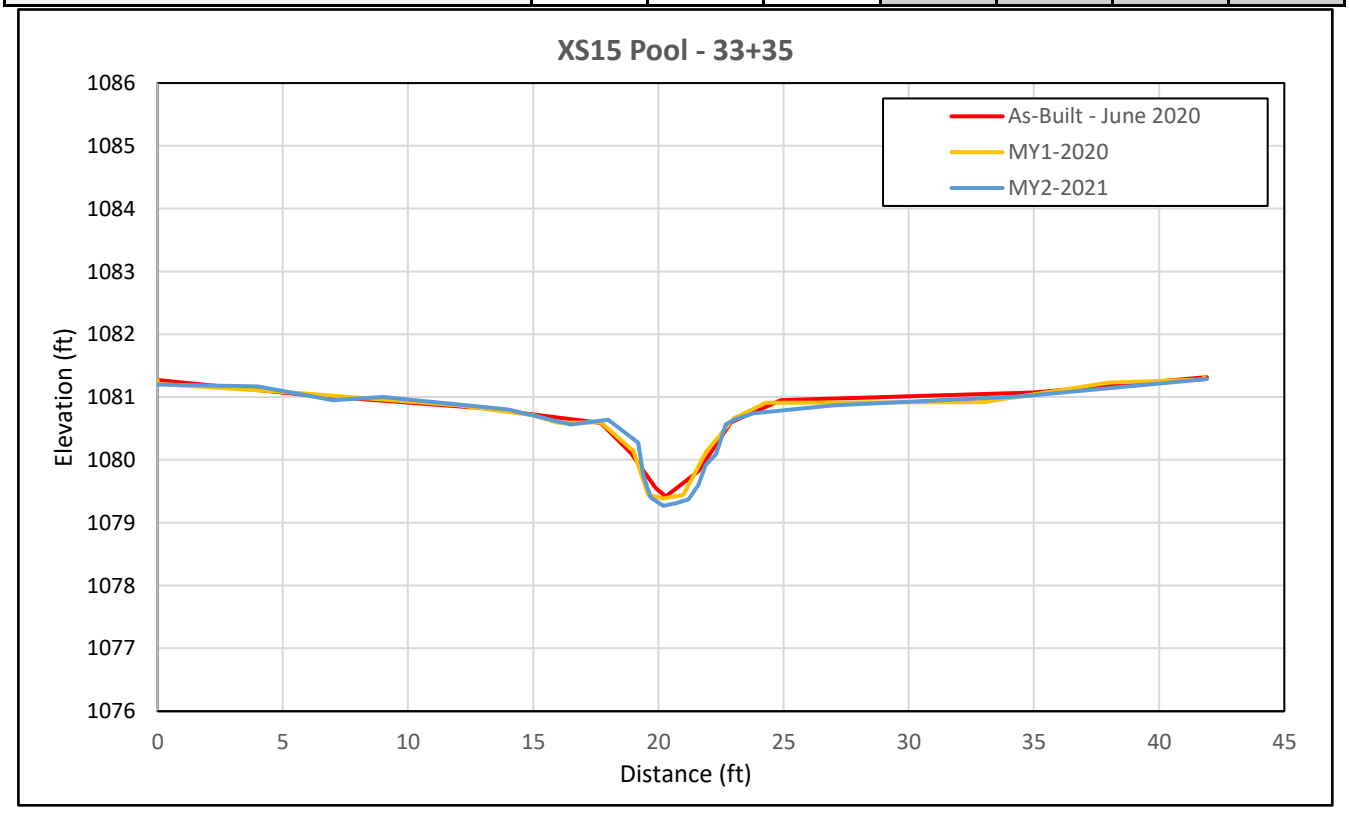
Station 33+35 - Pool



XS15 looking upstream

XS15 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1080.95	1080.95	1081.26				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.98	0.69				
Thalweg Elevation	1079.42	1079.39	1079.27				
LTOB Elevation	1080.95	1080.91	1080.64				
LTOB Max Depth	1.53	1.52	1.37				
LTOB Cross Sectional Area	6.90	6.40	3.76				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

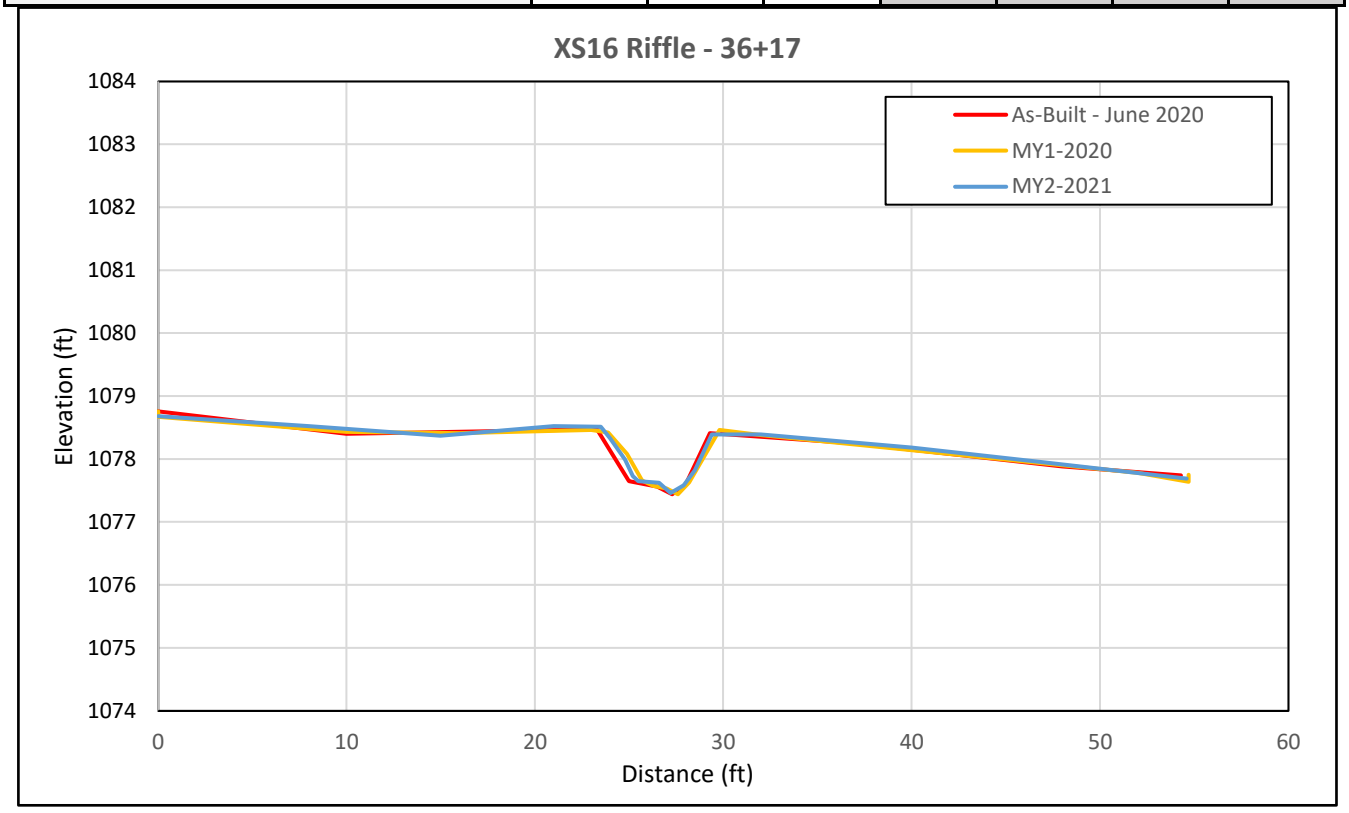
XS16 - UT1

Station 36+17 - Riffle

XS16 looking upstream

XS16 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1078.41	1078.47	1078.47				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	0.99	0.92				
Thalweg Elevation	1077.44	1077.44	1077.46				
LTOB Elevation	1078.41	1078.46	1078.39				
LTOB Max Depth	0.97	1.02	0.93				
LTOB Cross Sectional Area	3.69	3.65	3.23				
Entrenchment Ratio	>9.12	>9.27	>9.81				



Cross Section Plot - MY2 - November 2021

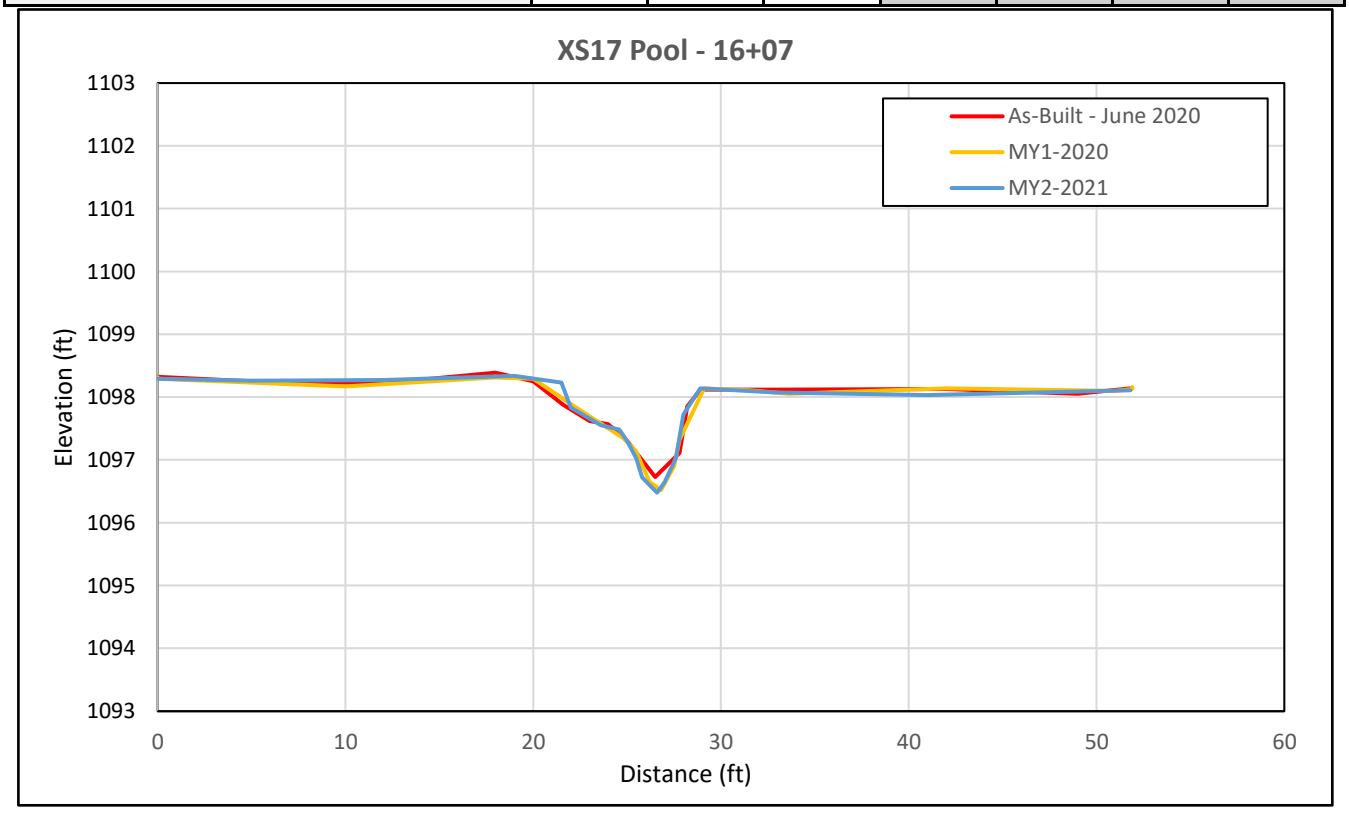
XS17 - UT2

Station 16+07 - Pool

XS17 looking upstream

XS17 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1098.12	1098.08	1098.10				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.04	1.03				
Thalweg Elevation	1096.73	1096.52	1096.48				
LTOB Elevation	1098.12	1098.14	1098.14				
LTOB Max Depth	1.39	1.62	1.66				
LTOB Cross Sectional Area	5.42	5.90	5.72				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

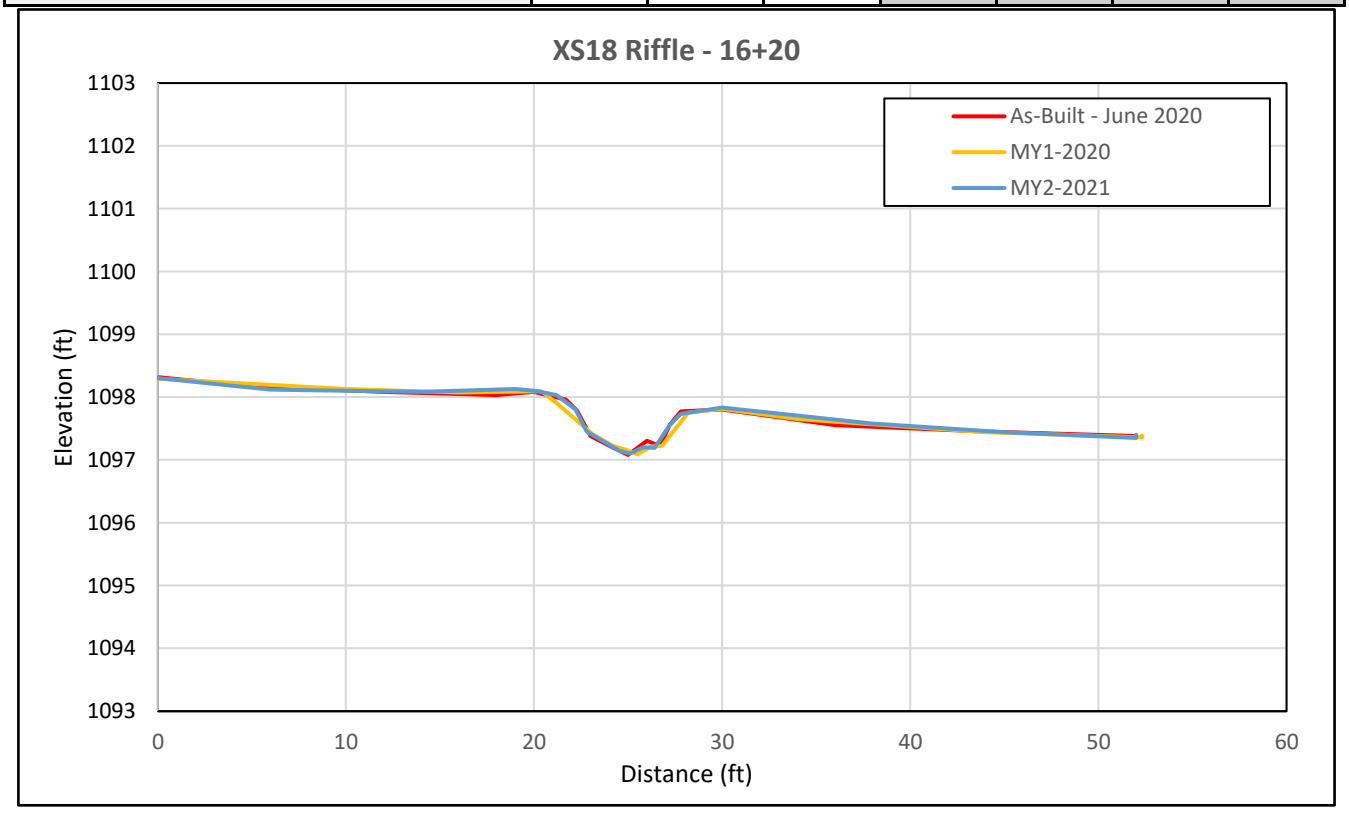
XS18 - UT2

Station 16+20 - Riffle

XS18 looking upstream

XS18 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1097.77	1097.72	1097.76				
Bank Height Ratio - Based on AB-Bankfull Area	1.04	1.13	1.10				
Thalweg Elevation	1097.08	1097.09	1097.10				
LTOB Elevation	1097.80	1097.81	1097.83				
LTOB Max Depth	0.72	0.72	0.73				
LTOB Cross Sectional Area	2.61	3.02	2.90				
Entrenchment Ratio	>9.48	>8.17	>9.3				



Cross Section Plot - MY2 - November 2021

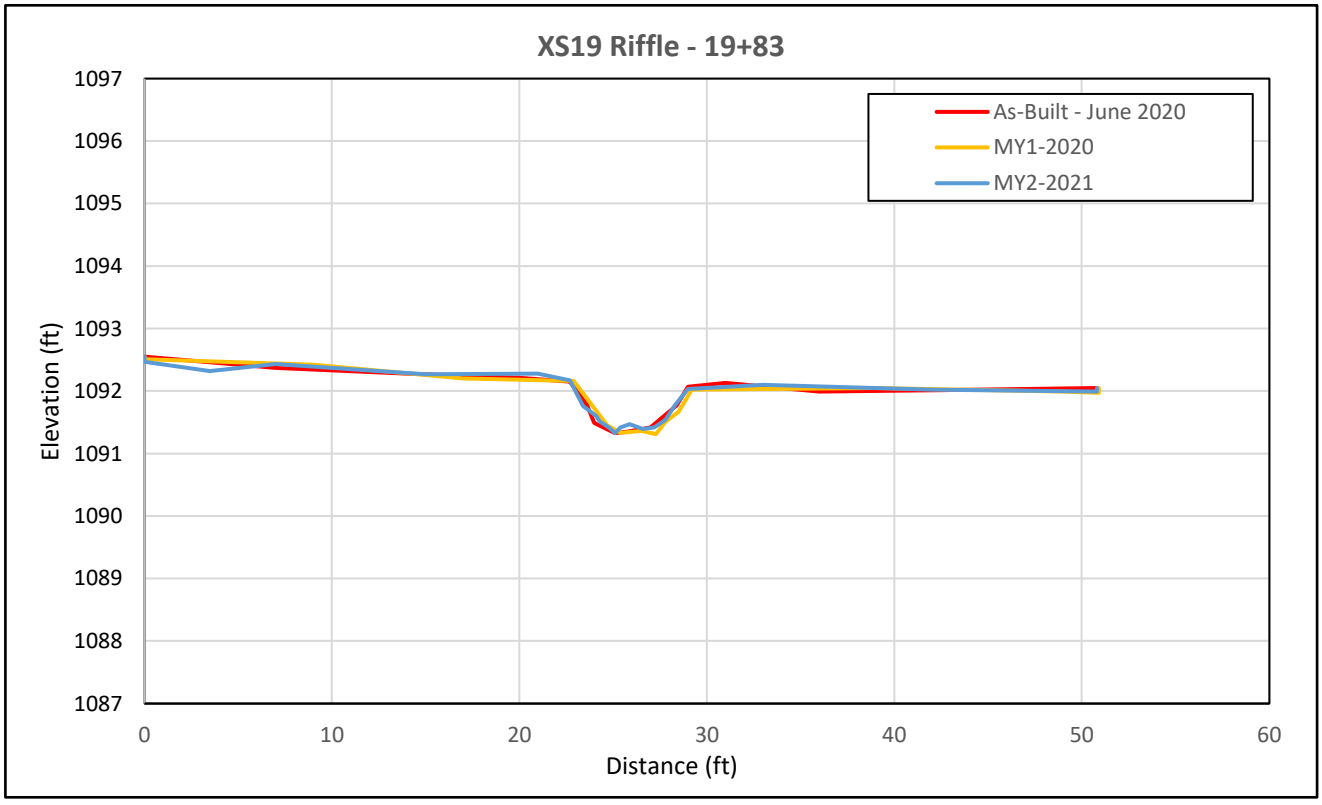
XS19 - UT2

Station 19+83 - Riffle

XS19 looking upstream

XS19 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1092.07	1092.04	1092.07				
Bank Height Ratio - Based on AB-Bankfull Area	1.08	1.01	1.04				
Thalweg Elevation	1091.33	1091.31	1091.33				
LTOB Elevation	1092.13	1092.05	1092.10				
LTOB Max Depth	0.80	0.74	0.77				
LTOB Cross Sectional Area	3.52	3.20	3.35				
Entrenchment Ratio	>8.32	>8.56	>8.32				



Cross Section Plot - MY2 - November 2021

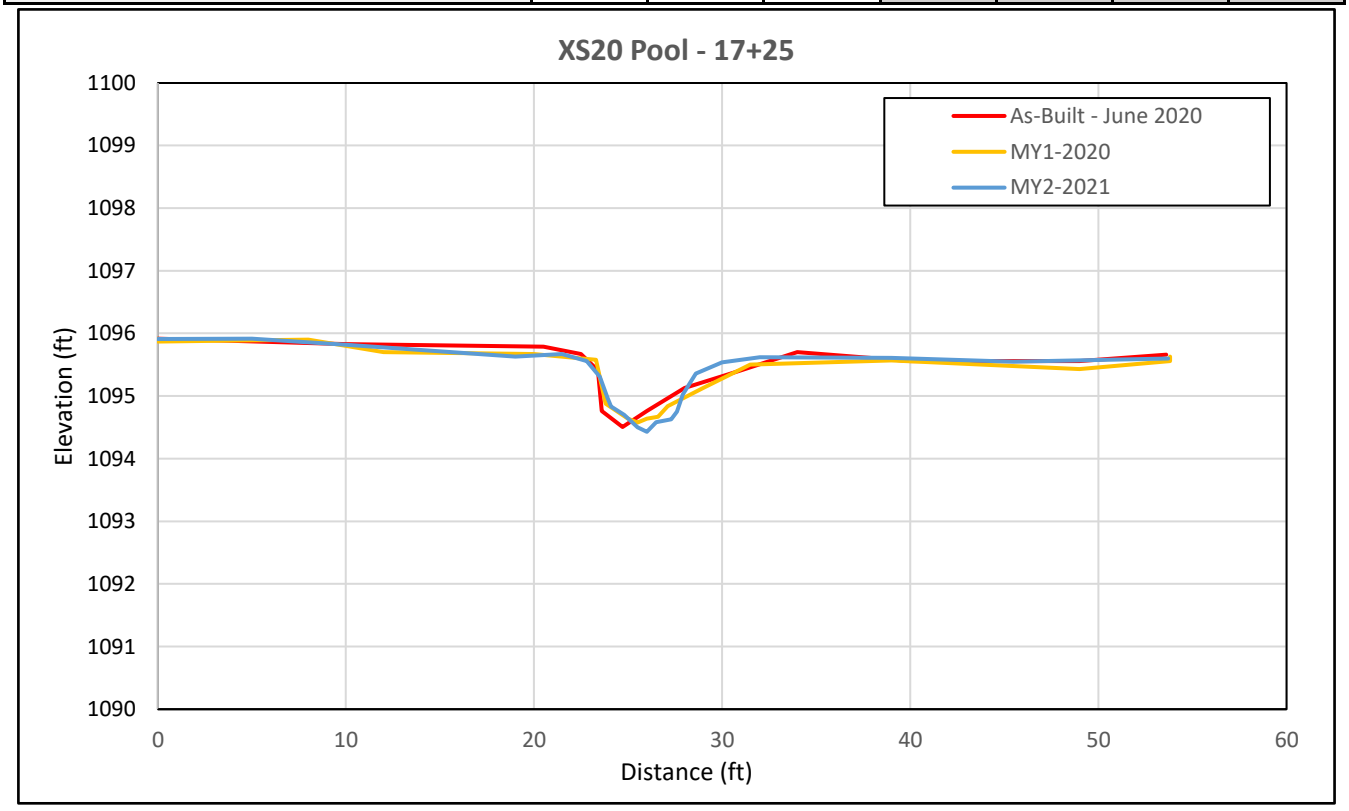
XS20 - UT3 Reach 1

Station 17+25 - Pool

XS20 looking upstream

XS20 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1095.67	1095.56	1095.64				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.11	1.03				
Thalweg Elevation	1094.51	1094.58	1094.43				
LTOB Elevation	1095.67	1095.67	1095.67				
LTOB Max Depth	1.16	1.09	1.24				
LTOB Cross Sectional Area	5.72	9.02	6.71				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

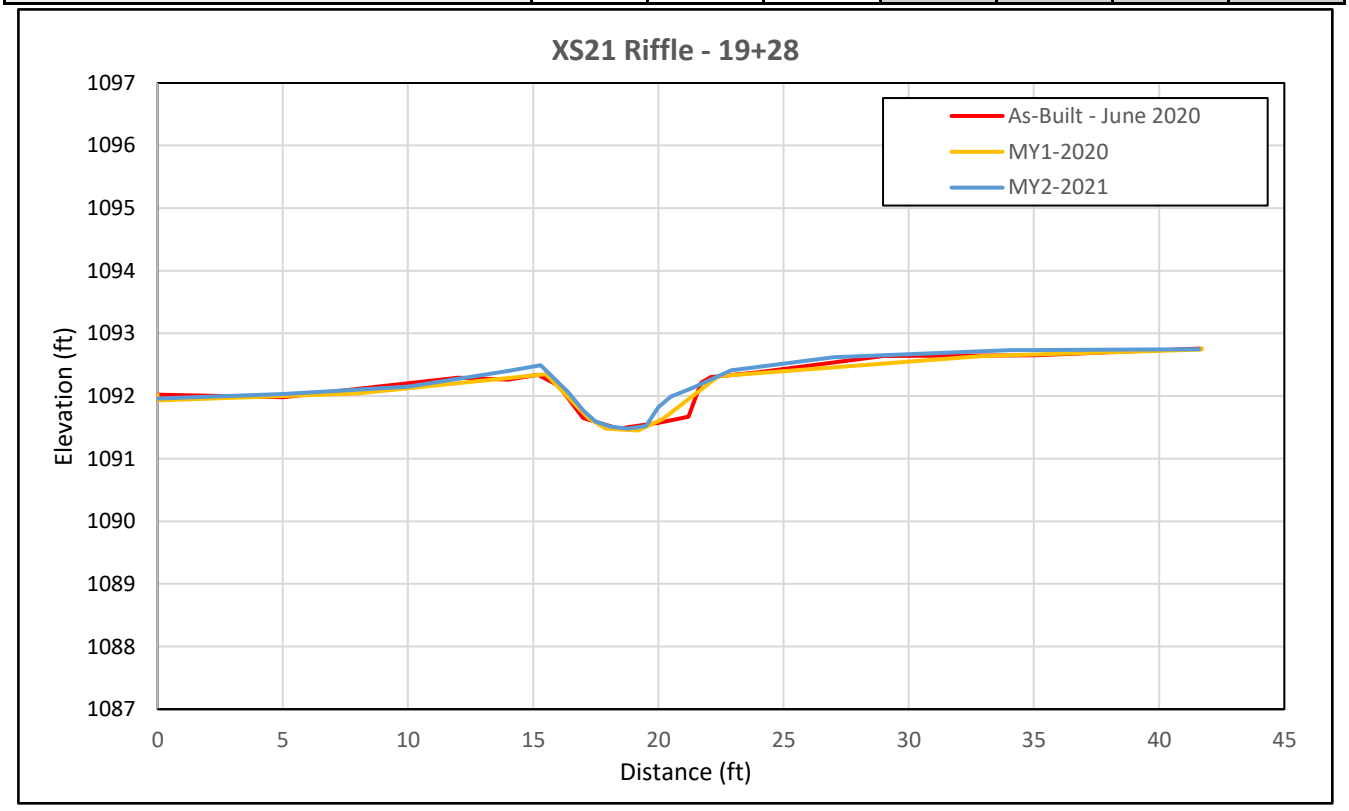
XS21 - UT3 Reach 1

Station 19+28 - Riffle

XS21 looking upstream

XS21 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1092.21	1092.24	1092.32				
Bank Height Ratio - Based on AB-Bankfull Area	1.12	1.11	1.10				
Thalweg Elevation	1091.48	1091.45	1091.48				
LTOB Elevation	1092.30	1092.32	1092.41				
LTOB Max Depth	0.82	0.87	0.93				
LTOB Cross Sectional Area	3.71	3.71	3.75				
Entrenchment Ratio	>7.06	>6.11	>7.1				



Cross Section Plot - MY2 - November 2021

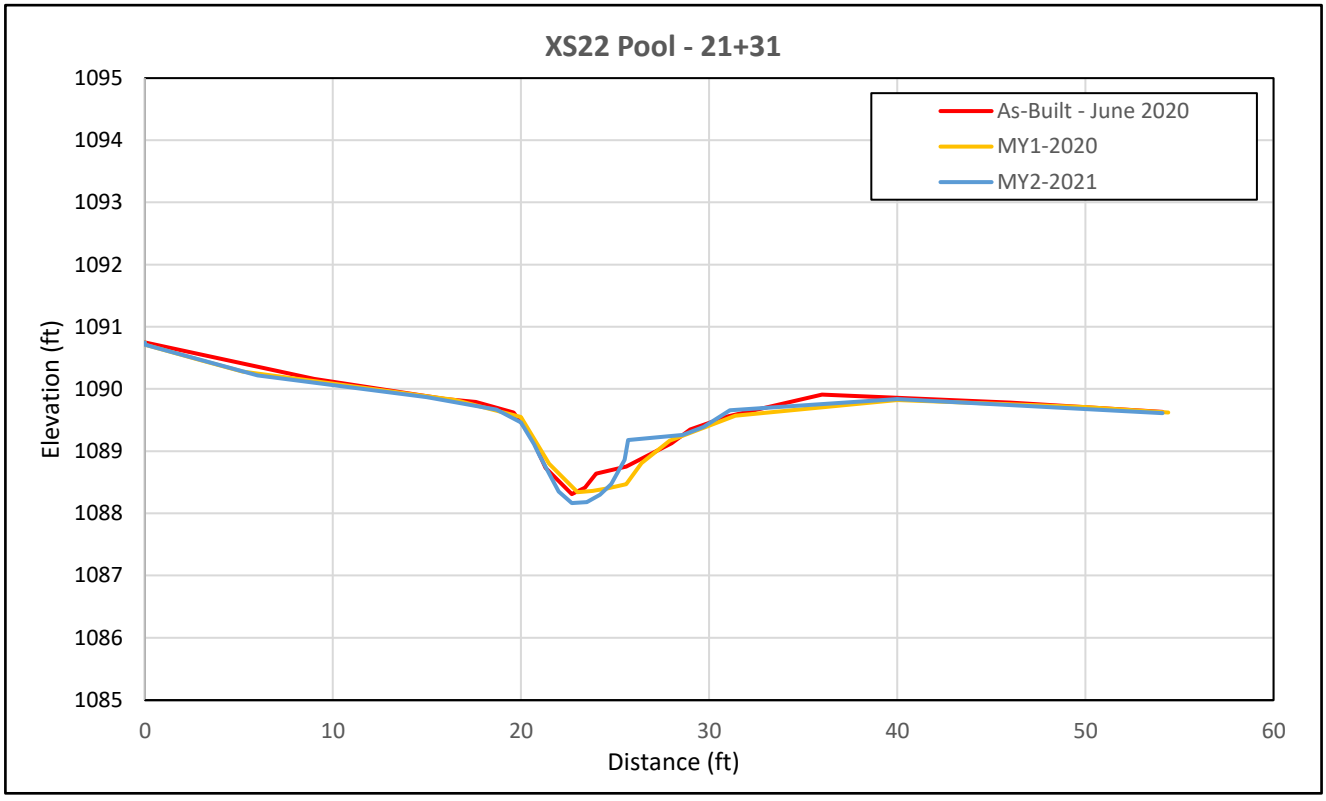
XS22 - UT3 Reach 2

Station 21+31 - Pool

XS22 looking upstream

XS22 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1089.56	1089.52	1089.55				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.04	1.08				
Thalweg Elevation	1088.31	1088.34	1088.17				
LTOB Elevation	1089.56	1089.57	1089.66				
LTOB Max Depth	1.25	1.23	1.49				
LTOB Cross Sectional Area	6.88	7.47	8.19				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

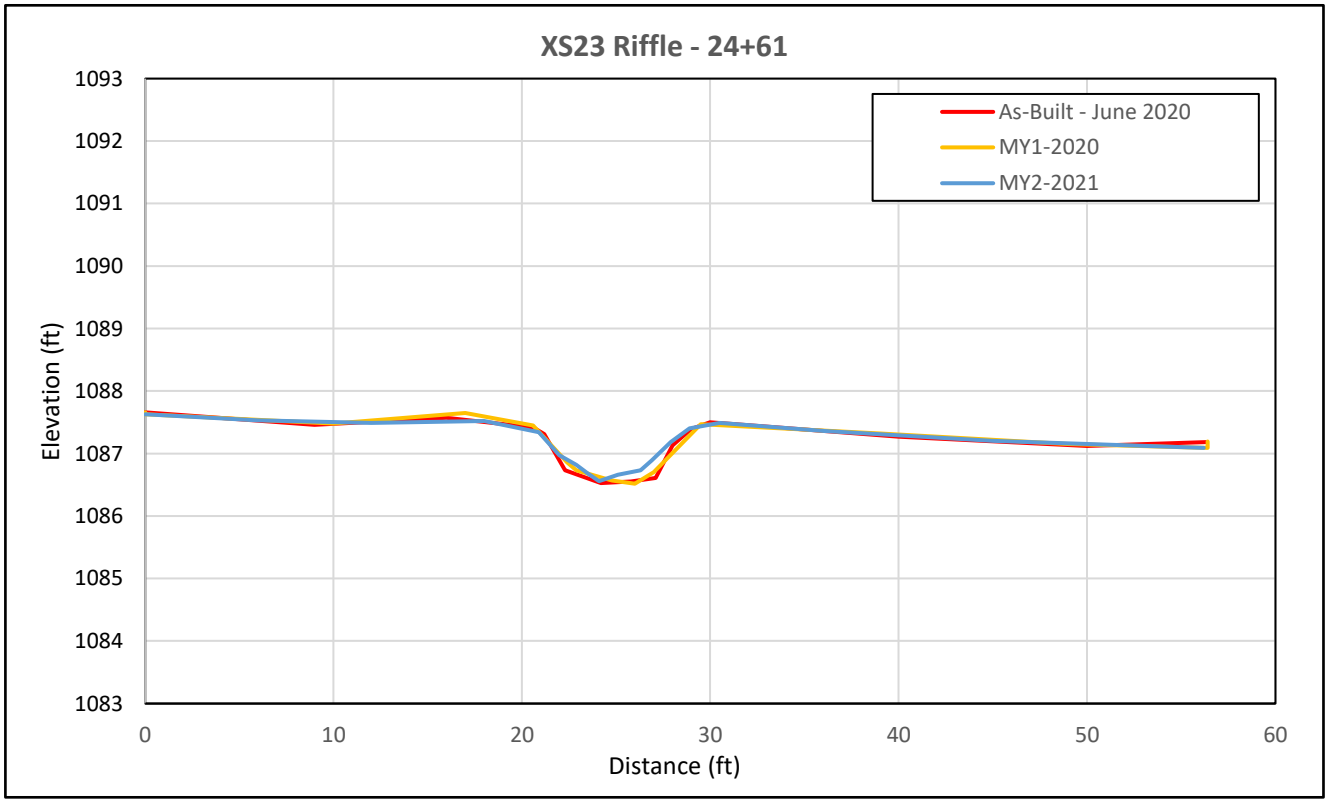
XS23- UT3 Reach 2

Station 24+61 - Riffle

XS23 looking upstream

XS23 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1087.39	1087.41	1087.48				
Bank Height Ratio - Based on AB-Bankfull Area	1.13	1.06	1.01				
Thalweg Elevation	1086.53	1086.52	1086.56				
LTOB Elevation	1087.50	1087.47	1087.49				
LTOB Max Depth	0.97	0.95	0.93				
LTOB Cross Sectional Area	5.95	5.40	5.03				
Entrenchment Ratio	>6.85	>6.34	>6.42				



Cross Section Plot - MY2 - November 2021

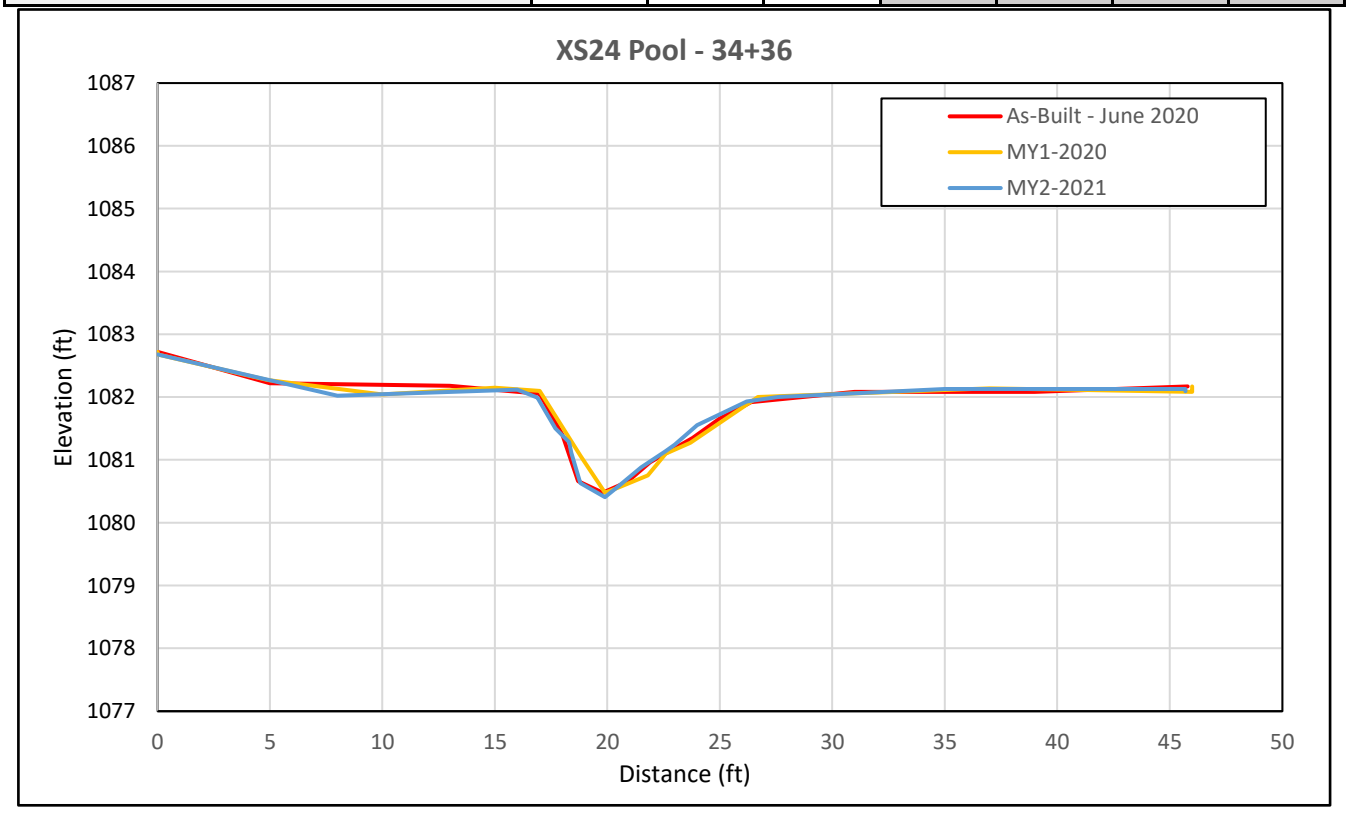
XS24 - UT3 Reach 2

Station 34+36 - Pool

XS24 looking upstream

XS24 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1081.92	1081.94	1081.95				
Bank Height Ratio - Based on AB-Bankfull Area	1.11	1.04	1.03				
Thalweg Elevation	1080.48	1080.48	1080.41				
LTOB Elevation	1082.08	1082.00	1082.00				
LTOB Max Depth	1.60	1.52	1.59				
LTOB Cross Sectional Area	8.93	7.59	7.54				
Entrenchment Ratio	N/A	N/A	N/A				



Cross Section Plot - MY2 - November 2021

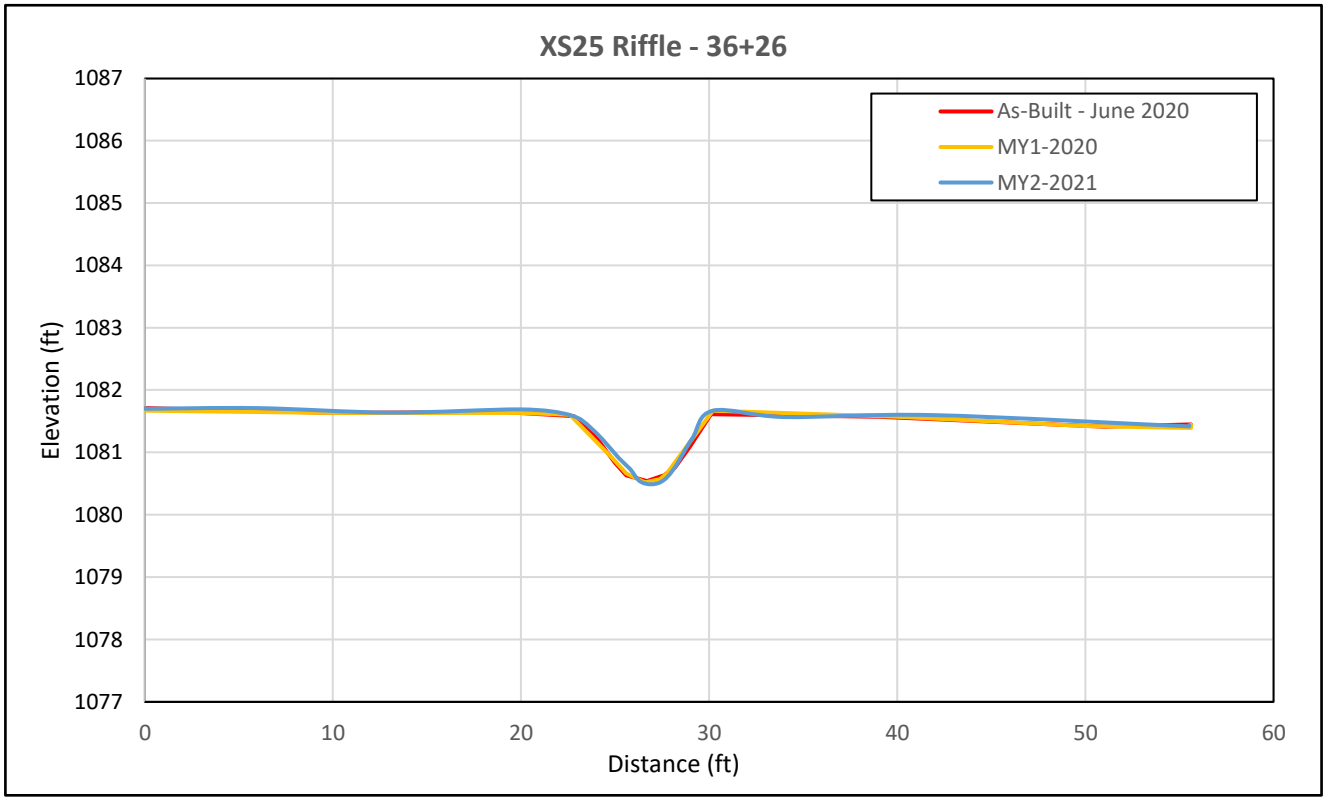
XS25 - UT3 Reach 2

Station 36+26 - Riffle

XS25 looking upstream

XS25 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1081.58	1081.59	1081.62				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.01	0.98				
Thalweg Elevation	1080.54	1080.52	1080.49				
LTOB Elevation	1081.58	1081.60	1081.60				
LTOB Max Depth	1.04	1.08	1.11				
LTOB Cross Sectional Area	4.54	4.65	4.41				
Entrenchment Ratio	>7.7	>7.48	>7.63				



Cross Section Plot - MY2 - November 2021

XS26 - UT3 Reach 2

Station 43+26 - Pool

XS26 looking upstream

XS26 looking downstream

	MY0	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation - Based on AB Bankfull Area	1077.31	1077.29	1077.20				
Bank Height Ratio - Based on AB-Bankfull Area	1.00	1.01	1.10				
Thalweg Elevation	1075.90	1075.60	1075.84				
LTOB Elevation	1077.31	1077.31	1077.34				
LTOB Max Depth	1.41	1.71	1.5				
LTOB Cross Sectional Area	7.58	7.84	9.12				
Entrenchment Ratio	N/A	N/A	N/A				

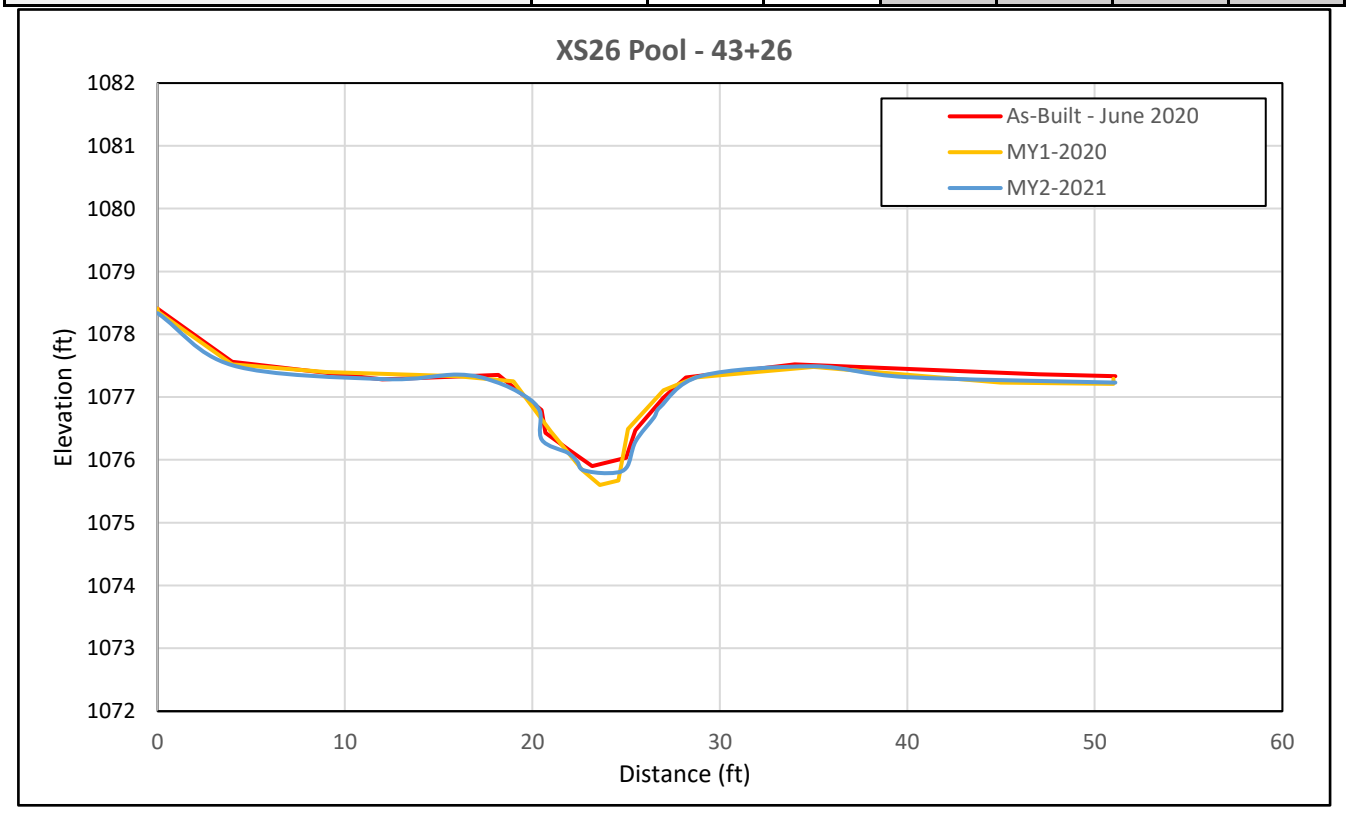


Table 8a. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 1 (2742 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	4	7	4.6	4.3	5.0	5.1	5.7	0.6	4	5.6	6.1	-	6.6	-	-	5.6	6.1	6.6	6.0	6.6	7.0	7.0	-	3
Floodprone Width (ft)				5.7	7.3	7.0	9.7	1.9	4	13.4	18.9	-	24.4	-	-	13.4	18.9	24.4	49.7	52.1	52.2	54.3	-	3
Bankfull Mean Depth (ft)	0.5	0.8	0.7	0.5	0.5	0.5	0.6	0.1	4	0.4	0.6	-	0.7	-	-	0.4	0.5	0.7	0.6	0.6	0.6	0.6	-	3
[1]Bankfull Max Depth (ft)				0.7	0.7	0.7	0.8	0.1	4	1.2	1.3	-	1.4	-	-	0.6	0.7	0.8	0.8	0.9	0.8	1.0	-	3
Bankfull Cross Sectional Area (ft^2)	3.1	4.8	3.1	2.0	2.6	2.7	3.1	0.5	4	2.2	3.4	-	4.6	-	-	3.2	3.2	3.2	3.7	3.8	3.9	3.9	-	3
Width/Depth Ratio				8.5	10.0	9.7	12.0	1.5	4	10.0	12.0	-	14	-	-	10.0	12.0	14.0	9.6	11.6	12.5	12.6	-	3
Entrenchment Ratio				1.2	1.5	1.4	1.9	0.3	4	2.2	3.1	-	4.0	-	-	2.2	3.1	4.0	7.1	7.9	7.5	9.1	-	3
[1]Bank Height Ratio				5.6	8.4	7.7	12.5	3.1	4	1.0	1.0	-	1	-	-	1.0	1.05	1.1	1.0	1.0	1.0	1.1	-	3
Profile																								
Riffle Length (ft)				5.0	26.2	20.7	94.4	23.0	13	Total riffle length 60-70% of reach length						5.0	29.0	41.0	5.3	15.1	14.3	39.1	6.2	56
Riffle Slope (ft/ft)				0.012	0.044	0.038	0.084	0.025	13	-	-	-	-	-	-	0.009	0.024	0.075	0.008	0.037	0.034	0.086	0.019	56
Pool Length (ft)				5.8	11.3	9.5	22.0	4.6	13	Total pool length 30-40% of reach length						3.0	11.0	16.0	7.4	21.2	20.9	39.1	8.0	56
Pool Max depth (ft)				0.8	1.0	1.0	1.4	0.1	4	0.8	1.6	-	2.5	-	-	1.1	1.2	1.9	1.0	1.5	1.4	2.2	0.3	57
Pool Spacing (ft)				9.6	24.00	20.3	59.9	12.7	25	18	33.5	-	49	-	-	18.0	33.5	49.0	19.0	38.4	40.0	71.3	8.8	72
Pattern																								
Channel Beltwidth (ft)				6.2	16.9	16.5	34.1	7.5	18	18.3	27.5	-	36.6	-	-	18.3	27.5	36.6	12.7	28.4	30.4	37.0	6.5	67
Radius of Curvature (ft)				5.3	11.1	12.3	18.3	3.6	20	12.2	16.8	-	21.4	-	-	12.2	16.8	21.4	9.3	14.8	14.3	21.3	2.1	69
Rc:Bankfull width (ft/ft)				1.1	2.2	2.4	3.6	0.7	20	2.0	2.8	-	3.5	-	-	2.0	2.8	3.5	1.4	2.2	2.2	3.2	0.4	69
Meander Wavelength (ft)				24.3	45.7	41.8	79.0	14.2	18	42.7	58.0	-	73.2	-	-	30.5	51.9	73.2	35.7	60.0	61.4	73.4	8.9	71
Meander Width Ratio				4.8	9.1	8.3	15.7	14.2	18	3.0	4.5	-	6.0	-	-	3.0	4.5	6.0	1.9	4.3	4.6	5.6	1.5	67
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.66												0.56			0.65					
Max part size (mm) mobilized at bankfull				72												72			111					
Stream Power (transport capacity) lb/s				10												9			9					
Additional Reach Parameters																								
Rosgen Classification				G4->F4						C4						Cb4			C4					
Bankfull Velocity (fps)	1.0	10.8	5.8	3.2												2.5			2.1					
Bankfull Discharge (cfs)	4	40	18.1	8 to 16												8								
Valley length (ft)				1840						-						2158								
Channel Thalweg length (ft)				2373						-						2805			2805					
Sinuosity (ft)				1.29						1.2-1.4						1.3			1.3					
Water Surface Slope (Channel) (ft/ft)				0.021						-						0.018			0.018					
BF slope (ft/ft)				0.021						-						0.018			0.018					
[3]Bankfull Floodplain Area (acres)				0.310						-						0.9			0.9					
[4]% of Reach with Eroding Banks				80%						-														
Channel Stability or Habitat Metric				0.58						-														
Biological or Other				-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 8b. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 2 (1009 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	4	7	3.8	2.5	3.5	3.5	4.5	-	2	4.7	5.1	-	5.5	-	-	4.7	5.1	5.5	5.5	5.8	5.8	6.1	-	2
Floodprone Width (ft)				6.5	9.3	9.3	12.0	-	2	11.2	15.8	-	20.4	-	-	11.2	15.8	20.4	50.8	51.4	51.4	52.0	-	2
Bankfull Mean Depth (ft)	0.5	0.8	0.6	0.5	0.7	0.7	0.9	-	2	0.3	0.5	-	0.6	-	-	0.3	0.4	0.6	0.4	0.5	0.5	0.5	-	2
[1]Bankfull Max Depth (ft)				0.7	0.9	0.9	1.0	-	2	1.1	1.8	-	2.4	-	-	0.5	0.6	0.7	0.7	0.7	0.7	0.7	-	2
Bankfull Cross Sectional Area (ft^2)	2	3	2.2	2.1	2.2	2.2	2.3	-	2	1.4	2.4	-	3.3	-	-	11.2	15.8	20.4	2.4	2.8	2.8	3.1	-	2
Width/Depth Ratio				2.8	6.2	6.2	9.5	-	2	10.0	12.0	-	14	-	-	10.0	12.0	14.0	12.0	12.2	12.2	12.5	-	2
Entrenchment Ratio				1.5	3.2	3.2	4.8	-	2	2.2	3.1	-	4.0	-	-	2.2	3.1	4.0	8.3	8.9	8.9	9.5	-	2
[1]Bank Height Ratio				4.0	7.5	7.5	10.9	-	2	1.0	1.0	-	1.0	-	-	1.0	1.0	1.1	1.0	1.1	1.1	1.1	-	2
Profile																								
Riffle Length (ft)				6.6	19.3	14.0	35.9	11.8	7	Total riffle length 60-70% of reach length						22.0	25.0	32.0	5.0	16.4	18.0	27.1	6.0	25
Riffle Slope (ft/ft)				0.015	0.027	0.023	0.047	0.011	7	-	-	-	-	-	-	0.011	0.027	0.045	0.02	0.045	0.043	0.083	0.017	25
Pool Length (ft)				7.1	10.6	8.5	20.3	4.7	8	Total pool length 30-40% of reach length						6.0	10.0	21.0	5.1	14.5	14.3	21.9	4.2	26
Pool Max depth (ft)				0.7	0.8	0.8	1.5	0.3	2	0.6	1.4	-	2.1	-	-	0.9	1.0	1.6	0.8	1.2	1.1	1.8	0.2	26
Pool Spacing (ft)				13.3	23.6	18.9	44.8	10.3	15	20.4	28.1	-	35.7	-	-	15.3	28.1	40.8	24.9	36.0	35.0	42.0	2.8	27
Pattern																								
Channel Beltwidth (ft)				4.8	7.9	7.3	12.3	2.2	15	15.3	23.0	-	30.6	-	-	15.3	23.0	30.6	23.2	27.2	27.5	32.6	2.5	27
Radius of Curvature (ft)				4.8	8.0	7.8	13.8	2.1	16	10.2	14.0	-	17.9	-	-	10.2	14.1	17.9	10.6	12.7	12.4	15.9	1.7	28
Rc:Bankfull width (ft/ft)				1.4	2.3	2.2	3.9	0.6	16	2.0	2.8	-	3.5	-	-	2.0	2.8	3.5	1.8	2.2	2.1	2.7	0.3	28
Meander Wavelength (ft)				13.6	37.4	37.0	68.3	18.7	15	35.7	48.5	-	61.2	-	-	25.5	43.4	61.2	40.4	54.4	52.9	92.0	9.2	28
Meander Width Ratio				3.9	10.7	10.6	19.5	18.7	15	3.0	4.5	-	6.0	-	-	3.0	4.5	6.0	4.0	4.7	4.7	5.6	1.5	27
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				1.1												0.5			0.62					
Max part size (mm) mobilized at bankfull				67												67			107					
Stream Power (transport capacity) lb/s				13												10			10					
Additional Reach Parameters																								
Rosgen Classification				Channelized E4						Cb						Cb4			Cb4					
Bankfull Velocity (fps)	1.0	10.8	5.9	3.7												3.6			2.9					
Bankfull Discharge (cfs)	4	40	13.0	8												8								
Valley length (ft)				374						-						1358								
Channel Thalweg length (ft)				397						-						1060			1060					
Sinuosity (ft)				1.06						1.2 to 1.4						1.34			1.3					
Water Surface Slope (Channel) (ft/ft)				0.026						-						0.022			0.0208					
BF slope (ft/ft)				0.026						-						0.022			0.0208					
[3]Bankfull Floodplain Area (acres)				0.1						-						0.5			0.5					
[4]% of Reach with Eroding Banks				70%						-														
Channel Stability or Habitat Metric				0.24						-														
Biological or Other				-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 8c. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 3 R1 (994 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	4	7	4.6	4.1	4.9	4.9	5.8	-	3	4.7	5.1	-	5.5	-	-	5.6	6.1	6.6	5.9	5.9	5.9	5.9	-	1
Floodprone Width (ft)				5.8	11.4	7.6	20.7	-	3	11.2	15.8	-	20.4	-	-	13.4	18.9	24.4	41.6	41.6	41.6	41.6	-	1
Bankfull Mean Depth (ft)	0.5	0.8	0.7	0.4	0.6	0.7	0.7	-	3	0.3	0.5	-	0.6	-	-	0.4	0.5	0.7	0.5	0.5	0.5	0.5	-	1
[1]Bankfull Max Depth (ft)				0.6	1.0	1.0	1.4	-	3	1.1	1.8	-	2.4	-	-	0.6	0.7	0.8	0.7	0.7	0.7	0.7	-	1
Bankfull Cross Sectional Area (ft^2)	3.1	4.8	3.1	2.3	3.0	2.9	3.7	-	3	1.4	2.4	-	3.3	-	-	3.2	3.2	3.2	3.2	3.2	3.2	3.2	-	1
Width/Depth Ratio				5.9	9.0	6.6	14.4	-	3	10.0	12.0	-	14	-	-	10.0	12.0	14.0	11.1	11.1	11.1	11.1	-	1
Entrenchment Ratio				1.0	2.5	1.6	5.0	-	3	2.2	3.1	-	4.0	-	-	2.2	3.1	4.0	7.1	7.1	7.1	7.1	-	1
[1]Bank Height Ratio				2.7	4.2	4.0	5.8	-	3	1.0	1.0	-	1	-	-	1.0	1.05	1.1	1.1	1.1	1.1	1.1	-	1
Profile																								
Riffle Length (ft)				9.1	34.4	32.4	89.8	25.6	10	Total riffle length 60-70% of reach length						11.0	31.0	46.0	6.4	16.6	14.7	32.3	8.1	22
Riffle Slope (ft/ft)				0.001	0.029	0.030	0.051	0.015	10	-	-	-	-	-	-	0.016	0.027	0.064	0.020	0.047	0.044	0.089	0.018	22
Pool Length (ft)				7.7	17.9	16.3	29.8	7.5	10	Total pool length 30-40% of reach length						7.0	11.0	18.0	5.0	13.6	13.1	25.6	5.3	23
Pool Max depth (ft)				0.9	1.0	1.0	1.0	0.2	3	0.6	1.4	-	2.1	-	-	1.1	1.2	1.9	0.8	1.3	1.3	1.7	0.3	23
Pool Spacing (ft)				14.5	27.2	22.8	55.6	12.2	23	20.4	28.1	-	35.7	-	-	18.0	33.5	49.0	33.0	45.1	44.0	56.0	6.1	18
Pattern																								
Channel Beltwidth (ft)				6.0	12.8	8.7	37.0	8.6	21	15.3	23.0	-	30.6	-	-	18.3	27.5	36.6	16.4	31.0	32.4	39.3	5.5	20
Radius of Curvature (ft)				5.7	11.0	11.7	22.7	4.1	27	10.2	14.0	-	17.9	-	-	12.2	16.8	21.4	12.4	15.0	14.9	20.9	2.2	21
Rc:Bankfull width (ft/ft)				1.2	2.2	2.4	4.6	0.8	27	2.0	2.8	-	3.5	-	-	2.0	2.8	3.5	2.1	2.6	2.5	3.6	0.4	21
Meander Wavelength (ft)				16.7	34.9	31.7	68.3	14.7	23	35.7	48.5	-	61.2	-	-	30.5	51.9	73.2	57.6	73.3	70.0	117.0	14.3	20
Meander Width Ratio				3.4	7.1	6.4	13.8	14.7	23	3.0	4.5	-	6.0	-	-	3.0	4.5	6.0	2.8	5.3	5.5	6.7	2.3	20
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.58												0.62			0.69					
Max part size (mm) mobilized at bankfull				62												62			116					
Stream Power (transport capacity) lb/s				9												11			12					
Additional Reach Parameters																								
Rosgen Classification				F4						Cb						Cb4			Cb4					
Bankfull Velocity (fps)	1.0	10.8	4.2	3												2.8			2.9					
Bankfull Discharge (cfs)	4	40	13.0	9												9								
Valley length (ft)				1385						-						802								
Channel Thalweg length (ft)				1814						-						994			994					
Sinuosity (ft)				1.31						1.2 to 1.4						1.24			1.2					
Water Surface Slope (Channel) (ft/ft)				0.016						-						0.02			0.0209					
BF slope (ft/ft)				0.016						-						0.02			0.0209					
[3]Bankfull Floodplain Area (acres)				0.4						-						0.3			0.3					
[4]% of Reach with Eroding Banks				60%						-														
Channel Stability or Habitat Metric				0.55						-														
Biological or Other				-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 8d. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - UT 3 R2 (2421 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	5	9	5.7							4.7	5.1	-	5.5	-	-	6.8	7.3	7.8	7.2	7.7	7.7	8.2	-	2
Floodprone Width (ft)										11.2	15.8	-	20.4	-	-	16.1	22.6	29.2	55.6	56.0	56.0	56.3	-	2
Bankfull Mean Depth (ft)	0.8	1.2	0.9							0.3	0.5	-	0.6	-	-	0.5	0.6	0.8	0.6	0.6	0.6	0.6	-	2
[1]Bankfull Max Depth (ft)										1.1	1.8	-	2.4	-	-	0.7	0.8	0.9	0.9	1.0	1.0	1.0	-	2
Bankfull Cross Sectional Area (ft^2)	4	5	4.4							1.4	2.4	-	3.3	-	-	4.4	4.4	4.4	4.5	4.7	4.7	4.9	-	2
Width/Depth Ratio										10.0	12.0	-	14	-	-	10.0	12.0	14.0	11.5	12.7	12.7	13.9	-	2
Entrenchment Ratio										2.2	3.1	-	4.0	-	-	2.2	3.1	4.0	6.9	7.3	7.3	7.7	-	2
[1]Bank Height Ratio										1.0	1.0	-	1	-	-	1.0	1.05	1.1	1.0	1.1	1.1	1.1	-	2
Profile																								
Riffle Length (ft)										Total riffle length 60-70% of reach length						12.0	41.0	57.0	5.0	18.1	16.2	39.3	9.8	40
Riffle Slope (ft/ft)										-	-	-	-	-	-	0.004	0.01	0.018	0.004	0.022	0.018	0.063	0.016	40
Pool Length (ft)										Total pool length 30-40% of reach length						8.0	15.0	22.0	7.9	17.4	16.2	38.3	6.4	41
Pool Max depth (ft)										0.6	1.4	-	2.1	-	-	1.3	1.4	2.2	1.2	1.6	1.6	2.5	0.2	41
Pool Spacing (ft)										20.4	28.1	-	35.7	-	-	29.2	86.0	58.4	43.0	55.6	56.0	70.0	6.0	43
Pattern																								
Channel Beltwidth (ft)										15.3	23.0	-	30.6	-	-	25.6	42	58.4	26.5	42.1	42.1	56.6	6.9	43
Radius of Curvature (ft)										10.2	14.0	-	17.9	-	-	14.6	20.1	25.6	15.7	18.6	19.0	23.0	1.7	45
Rc:Bankfull width (ft/ft)										2.0	2.8	-	3.5	-	-	2.0	2.8	3.5	2.0	2.4	2.5	3.0	0.3	45
Meander Wavelength (ft)										35.7	48.5	-	61.2	-	-	51.1	69.4	87.6	66.9	81.9	81.2	130.3	10.9	44
Meander Width Ratio										3.0	4.5	-	6.0	-	-	3.5	5.8	8.0	3.4	5.4	5.5	7.3	1.8	43
Transport parameters																								
Reach Shear Stress (competency) lb/f^2																0.25			0.24					
Max part size (mm) mobilized at bankfull																62			54					
Stream Power (transport capacity) lb/s																7			7					
Additional Reach Parameters																								
Rosgen Classification										C4						C4			C4					
Bankfull Velocity (fps)	2.3	22.5	5.9													3.9			3.6					
Bankfull Discharge (cfs)	9	90	25.8													17								
Valley length (ft)										-						1802								
Channel Thalweg length (ft)										-						2523			2523					
Sinuosity (ft)										1.2 to 1.4						1.4			1.4					
Water Surface Slope (Channel) (ft/ft)										-						0.0067			0.0063					
BF slope (ft/ft)										-						0.0067			0.0063					
[3]Bankfull Floodplain Area (acres)										-						0.9			0.9					
[4]% of Reach with Eroding Banks										-														
Channel Stability or Habitat Metric										-														
Biological or Other										-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 8e. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - Moores Fork R1 (1573 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	20	30	22.5	30.7	30.7	30.7	30.7	-	1	21.9	23.9	-	25.9	-	-	21.9	23.9	25.9	33.2	33.2	33.2	33.2	-	1
Floodprone Width (ft)				35.0	35.0	35.0	35.0	-	1	52.6	74.1	-	95.6	-	-	52.6	74.1	95.6	43.0	43.0	43.0	43.0	-	1
Bankfull Mean Depth (ft)	1.8	3	2.4	1.7	1.7	1.7	1.7	-	1	1.6	2.1	-	2.6	-	-	1.6	2.1	2.6	1.8	1.8	1.8	1.8	-	1
[1]Bankfull Max Depth (ft)				2.7	2.7	2.7	2.7	-	1	1.2	1.3	-	1.4	-	-	2.3	3.0	3.8	2.4	2.4	2.4	2.4	-	1
Bankfull Cross Sectional Area (ft^2)	40	50	47.8	51.6	51.6	51.6	51.6	-	1	35.0	51.2	-	67.3	-	-	47.7	47.7	47.7	61.1	61.1	61.1	61.1	-	1
Width/Depth Ratio				18.2	18.2	18.2	18.2	-	1	10.0	12.0	-	14	-	-	10.0	12.0	14.0	18.1	18.1	18.1	18.1	-	1
Entrenchment Ratio				1.1	1.1	1.1	1.1	-	1	2.2	3.1	-	4.0	-	-	2.2	3.1	4.0	1.3	1.3	1.3	1.3	-	1
[1]Bank Height Ratio				3.2	3.2	3.2	3.2	-	1	1.0	1.0	-	1	-	-	1.0	1.05	1.1	1.2	1.2	1.2	1.2	-	1
Profile																								
Riffle Length (ft)				20.3	48.1	32.0	126.8	36.5	8	Total riffle length 60-70% of reach length						20.3	32.0	126.8	79	108.3	89	190	38.77	7
Riffle Slope (ft/ft)				0.002	0.013	0.013	0.025	0.007	8	-	-	-	-	-	-	0.002	0.013	0.025	0.002	0.005	0.004	0.009	0.002	7
Pool Length (ft)				30.9	61.8	55.4	98.0	20.8	8	Total pool length 30-40% of reach length						30.9	55.4	98.0	40	94.57	97	150	30.77	7
Pool Max depth (ft)				0.8	3.4	3.4	1.4	-	1	3.2	6.2	-	9.1	-	-	0.8	3.4	1.4	5.11	6.14	6.17	7.28	0.792	7
Pool Spacing (ft)				16.3	76.5	64.6	199.2	41.0	21	95.6	131.5	-	167.3	-	-	16.3	64.6	199.2	111	206.1	187.2	330.6	71.09	6
Pattern																								
Channel Beltwidth (ft)				31.2	37.9	35.5	85.1	8.1	44	83.7	137.4	-	191.2	-	-	31.2	35.5	85.1	31.2	37.9	35.5	85.1	8.1	44
Radius of Curvature (ft)				18.1	32.0	26.6	85.1	15.9	47	47.8	65.7	-	83.7	-	-	18.1	26.6	85.1	18.1	32.0	26.6	85.1	15.9	47
Rc:Bankfull width (ft/ft)				0.6	1.0	0.9	2.8	0.5	47	2.0	2.8	-	3.5	-	-	0.6	0.9	2.8	0.6	0.96	0.9	2.8	0.5	47
Meander Wavelength (ft)				14.8	76.4	52.6	281.1	66.0	45	167.3	227.1	-	286.8	-	-	14.8	52.6	281.1	14.8	76.4	52.6	281.1	66.0	45
Meander Width Ratio				0.5	2.5	1.7	9.2	2.1	45	3.5	5.8	-	8.0	-	-	0.5	1.7	9.2	0.5	2.3	1.7	9.2	2.0	45
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.4												0.46			0.26					
Max part size (mm) mobilized at bankfull				90												90			56					
Stream Power (transport capacity) lb/s				37												35			22					
Additional Reach Parameters																								
Rosgen Classification				F4						C4						C4			B4					
Bankfull Velocity (fps)	2.5	20.0	5.4	3.1												3.1			2.5					
Bankfull Discharge (cfs)	100	800	259.8	150												150								
Valley length (ft)				1470						-						1470								
Channel Thalweg length (ft)				1573						-						1573			1573					
Sinuosity (ft)				1.07						1.2 to 1.4						1.07			1.07					
Water Surface Slope (Channel) (ft/ft)				0.003						-						0.003			0.0023					
BF slope (ft/ft)				0.003						-						0.003			0.0023					
[3]Bankfull Floodplain Area (acres)				1.2						-						2.5			2.5					
[4]% of Reach with Eroding Banks				33%						-														
Channel Stability or Habitat Metric				0.20						-														
Biological or Other				-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 8f. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - Moores Fork R2 (1998 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	20	30	22.5	28.5	30.8	30.8	33.0	-	2	21.9	23.9	-	25.9	-	-	21.9	23.9	25.9	20.2	20.7	20.7	21.3	-	2
Floodprone Width (ft)				45.0	45.5	45.5	46.0	-	2	52.6	74.1	-	95.6	-	-	52.6	74.1	95.6	81.2	>88.6	>88.6	>88.6	-	2
Bankfull Mean Depth (ft)	1.8	3	2.4	1.4	1.6	1.6	1.7	-	2	1.6	2.1	-	2.6	-	-	1.6	2.1	2.6	1.6	1.6	1.6	1.7	-	2
[1]Bankfull Max Depth (ft)				2.1	2.3	2.3	2.5	-	2	1.2	1.3	-	1.4	-	-	2.3	3.0	3.8	2.4	2.5	2.5	2.5	-	2
Bankfull Cross Sectional Area (ft^2)	40	50	47.8	47.0	47.9	47.9	48.8	-	2	35.0	51.2	-	67.3	-	-	47.7	47.7	47.7	33.7	33.9	33.9	34.1	-	2
Width/Depth Ratio				16.6	19.9	19.9	23.2	-	2	10.0	12.0	-	14	-	-	10.0	12.0	14.0	12.0	12.7	12.7	13.4	-	2
Entrenchment Ratio				1.4	1.5	1.5	1.6	-	2	2.2	3.1	-	4.0	-	-	2.2	3.1	4.0	4.0	>4.14	>4.14	>4.14	-	2
[1]Bank Height Ratio				2.7	2.9	2.9	3.0	-	2	1.0	1.0	-	1	-	-	1.0	1.05	1.1	1.0	1.1	1.1	1.1	-	2
Profile																								
Riffle Length (ft)				15.3	66.6	53.7	179.0	50.1	9	Total riffle length 60-70% of reach length						29.0	121.0	167.0	73.6	113.0	118.1	169.4	28.7	13
Riffle Slope (ft/ft)				0.006	0.011	0.007	0.024	0.007	9	-	-	-	-	-	-	0.004	0.005	0.007	0.004	0.005	0.006	0.007	7.7E-04	13
Pool Length (ft)				15.3	71.2	71.6	147.0	38.6	9	Total pool length 30-40% of reach length						26.0	45.0	67.0	38.0	57.5	59.0	67.0	7.1	13
Pool Max depth (ft)				0.8	3.1	3.1	1.4	0.2	2	3.2	6.2	-	9.1	-	-	4.2	4.6	7.3	2.7	3.3	3.4	3.8	0.3	13
Pool Spacing (ft)				54.0	122.7	89.1	287.6	70.2	13	95.6	131.5	-	167.3	-	-	96.0	143.5	191.0	134.0	178.7	173.0	271.0	36.6	12
Pattern																								
Channel Beltwidth (ft)				47.4	85.9	75.3	174.1	40.2	9	83.7	137.4	-	191.2	-	-	83.7	137.5	191.2	83.7	126.2	126.7	176.7	24.8	10
Radius of Curvature (ft)				33.7	86.3	88.7	159.1	37.1	9	47.8	65.7	-	83.7	-	-	47.8	65.8	83.7	46.4	60.8	60.4	81.4	12.0	13
Rc:Bankfull width (ft/ft)				1.1	2.8	2.9	5.2	1.2	9	2.0	2.8	-	3.5	-	-	2.0	2.8	3.5	2.2	2.9	2.9	3.9	0.6	13
Meander Wavelength (ft)				214.5	296.9	303.9	414.1	75.2	9	167.3	227.1	-	286.8	-	-	167.3	138.1	286.8	188.0	246.7	243.5	304.0	33.2	10
Meander Width Ratio				7.0	9.7	9.9	13.5	2.4	9	3.5	5.8	-	8.0	-	-	3.5	5.8	8.0	4.0	6.1	6.1	8.5	1.6	10
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.4												0.46			0.39					
Max part size (mm) mobilized at bankfull				90												90			76					
Stream Power (transport capacity) lb/s				37												35			37					
Additional Reach Parameters																								
Rosgen Classification				F4						C4						C4			C4					
Bankfull Velocity (fps)	2.5	20.0	5.4	3.1												3.1			4.4					
Bankfull Discharge (cfs)	100	800	259.8	150												150								
Valley length (ft)				1808						-						1700								
Channel Thalweg length (ft)				2007						-						2176			2176					
Sinuosity (ft)				1.11						1.2 to 1.4						1.28			1.28					
Water Surface Slope (Channel) (ft/ft)				0.004						-						0.0037			0.0039					
BF slope (ft/ft)				0.004						-						0.0037			0.0039					
[3]Bankfull Floodplain Area (acres)				1.9						-						2.9			2.9					
[4]% of Reach with Eroding Banks				30%						-														
Channel Stability or Habitat Metric				0.26						-														
Biological or Other				-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 8g. Baseline Stream Data Summary
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023) - Moores Fork R3 (384 feet)

Parameter	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only	LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)	20	30	22.5	22.8	22.8	22.8	22.8	-	1	21.9	23.9	-	25.9	-	-	21.9	23.9	25.9	20.9	20.9	20.9	20.9	-	1
Floodprone Width (ft)				144.4	144.4	144.4	144.4	-	1	52.6	74.1	-	95.6	-	-	52.6	74.1	95.6	106.9	106.9	106.9	106.9	-	1
Bankfull Mean Depth (ft)	1.8	3	2.4	2.3	2.3	2.3	2.3	-	1	1.6	2.1	-	2.6	-	-	1.6	2.1	2.6	1.6	1.6	1.6	1.6	-	1
[1]Bankfull Max Depth (ft)				3.2	3.2	3.2	3.2	-	1	1.2	1.3	-	1.4	-	-	2.3	3.0	3.8	2.6	2.6	2.6	2.6	-	1
Bankfull Cross Sectional Area (ft^2)	40	50	47.8	52.4	52.4	52.4	52.4	-	1	35.0	51.2	-	67.3	-	-	47.7	47.7	47.7	33.7	33.7	33.7	33.7	-	1
Width/Depth Ratio				9.9	9.9	9.9	9.9	-	1	10.0	12.0	-	14	-	-	10.0	12.0	14.0	13.0	13.0	13.0	13.0	-	1
Entrenchment Ratio				6.3	6.3	6.3	6.3	-	1	2.2	3.1	-	4.0	-	-	2.2	3.1	4.0	5.0	5.0	5.0	5.0	-	1
[1]Bank Height Ratio				1.4	1.4	1.4	1.4	-	1	1.0	1.0	-	1	-	-	1.0	1.05	1.1	1.0	1.0	1.0	1.0	-	1
Profile																								
Riffle Length (ft)				24.5	45.0	44.1	67.2	21.3	4	Total riffle length 60-70% of reach length						29.0	121.0	167.0	20.0	63.7	54.2	126.7	41.7	4
Riffle Slope (ft/ft)				0.003	0.009	0.008	0.016	0.006	4	-	-	-	-	-	-	0.004	0.005	0.007	0.004	0.006	0.005	0.011	0.003	4
Pool Length (ft)				16.4	41.4	33.6	92.0	30.0	5	Total pool length 30-40% of reach length						26.0	45.0	67.0	30	40	40	50	8.6	4
Pool Max depth (ft)				0.8	4.6	4.6	1.4	-	1	3.2	6.2	-	9.1	-	-	4.2	4.6	7.3	2.1	3.2	3.4	4.0	0.7	4
Pool Spacing (ft)				21.6	67.1	70.2	101.5	30.6	8	95.6	131.5	-	167.3	-	-	96.0	143.5	191.0	77.0	107.5	100.0	153.0	28.5	4
Pattern																								
Channel Beltwidth (ft)				23.2	30.8	28.1	53.7	8.9	10	83.7	137.4	-	191.2	-	-	83.7	137.5	191.2	63.9	63.9	63.9	63.9	-	1
Radius of Curvature (ft)				17.0	26.5	26.5	47.1	7.5	13	47.8	65.7	-	83.7	-	-	47.8	65.8	83.7	50.5	63.8	70.5	70.5	-	3
Rc:Bankfull width (ft/ft)				0.7	1.2	1.2	2.1	0.3	13	2.0	2.8	-	3.5	-	-	2.0	2.8	3.5	2.4	3.1	3.4	3.4	-	3
Meander Wavelength (ft)				18.0	82.0	84.2	139.5	36.6	12	167.3	227.1	-	286.8	-	-	167.3	138.1	286.8	241.0	241.0	241.0	241.0	-	1
Meander Width Ratio				0.8	3.6	3.7	6.1	1.6	12	3.5	5.8	-	8.0	-	-	3.5	5.8	8.0	3.1	3.1	3.1	3.1	-	1
Transport parameters																								
Reach Shear Stress (competency) lb/f^2				0.4												0.46			0.27					
Max part size (mm) mobilized at bankfull				90												90			58					
Stream Power (transport capacity) lb/s				37												35			25					
Additional Reach Parameters																								
Rosgen Classification				F4						C4						C4			C4					
Bankfull Velocity (fps)	2.5	20.0	5.4	3.1												3.1			4.5					
Bankfull Discharge (cfs)	100	800	259.8	150												150								
Valley length (ft)				373						-						373								
Channel Thalweg length (ft)				380						-						384			384					
Sinuosity (ft)				1.02						1.2 to 1.4						1.03			1.03					
Water Surface Slope (Channel) (ft/ft)				0.0076						-						0.0037			0.0027					
BF slope (ft/ft)				0.0076						-						0.0037			0.0027					
[3]Bankfull Floodplain Area (acres)				1.2						-						0.6			0.6					
[4]% of Reach with Eroding Banks				25%						-														
Channel Stability or Habitat Metric				0.14						-														
Biological or Other				-						-														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 9. Monitoring Data - Cross-Section Morphology Data Table
Stewarts Creek Mitigation Project (DMS No. 100023)

	Moores Fork Reach 1																				Moores Fork Reach 2						
	Cross Section 1 (Pool)							Cross Section 2 (Riffle)							Cross Section 3 (Pool)							Cross Section 4 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1097.06	1097.29	1097.29					1094.84	1094.64	1094.32					1088.77	1088.67	1088.77					1087.94	1088.59	1088.26				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.20	1.05	1.06					1.18	1.04	1.44					1.00	1.06	1.01					1.00	0.80	1.61				
Thalweg Elevation	1094.10	1094.08	1094.13					1092.41	1091.86	1091.47					1086.14	1085.92	1085.96					1084.60	1085.18	1089.29				
LTOB[2] Elevation	1097.67	1097.46	1097.44					1095.28	1094.76	1095.57					1088.77	1088.82	1088.79					1087.94	1087.91	1089.47				
LTOB[2] Max Depth (ft)	3.57	3.38	3.31					2.87	2.90	4.10					2.63	2.90	2.83					3.34	2.73	3.18				
LTOB[2] Cross Sectional Area (ft^2)	93.76	77.33	76.98					75.98	65.20	100.49					45.04	48.74	45.43					47.12	31.39	115.69				

	Moores Fork Reach 3																				Moores Fork Reach 3						
	Cross Section 5 (Riffle)							Cross Section 6 (Pool)							Cross Section 7 (Riffle)							Cross Section 8 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1087.06	1087.32	1087.50					1084.62	1084.29	1084.51					1083.10	1083.29	1083.10					1079.97	1080.11	1080.17				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.11	1.04	1.10					1.00	1.08	1.07					1.00	0.94	1.01					1.00	0.95	0.83				
Thalweg Elevation	1084.63	1084.53	1085.47					1081.95	1081.29	1081.57					1080.56	1080.63	1080.46					1077.41	1077.37	1077.29				
LTOB[2] Elevation	1087.34	1087.43	1087.70					1084.62	1084.54	1084.72					1083.10	1083.13	1083.13					1079.97	1079.97	1079.68				
LTOB[2] Max Depth (ft)	2.71	2.9	2.23					2.67	3.25	3.15					2.54	2.50	2.67					2.56	2.60	2.39				
LTOB[2] Cross Sectional Area (ft^2)	40.53	36.65	39.54					53.58	61.60	60.33					33.72	30.17	34.27					33.89	31.07	25.77				

	Moores Fork Reach 3																				UT1						
	Cross Section 9 (Pool)							Cross Section 10 (Riffle)							Cross Section 11 (Pool)							Cross Section 12 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1080.16	1079.98	1080.07					1111.02	1111.05	1111.14					1104.40	1104.45	1104.65					1102.01	1102.14	1102.11				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.04	0.97					1.08	0.95	0.99					1.00	0.95	0.75					1.00	0.79	0.92				
Thalweg Elevation	1076.12	1075.02	104.84					1110.22	1110.23	1110.30					1103.15	1103.19	1103.13					1101.20	1101.33	1101.19				
LTOB[2] Elevation	1080.16	1080.16	1079.90					1111.09	1111.01	0.83					1104.40	1104.38	1104.28					1102.01	1101.97	1102.03				
LTOB[2] Max Depth (ft)	4.04	5.14	5.06					0.87	0.78	3.79					1.25	1.19	1.15					0.81	0.64	0.84				
LTOB[2] Cross Sectional Area (ft^2)	52.58	57.57	49.07					4.40	3.60	7.53					5.48	4.92	3.67					3.92	2.78	3.39				

	UT1																				UT1						
	Cross Section 13 (Pool)							Cross Section 14 (Pool)							Cross Section 15 (Pool)							Cross Section 16 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1088.55	1088.46	1088.51					1085.64	1085.57	1085.58					1080.95	1080.95	1081.26					1078.41	1078.47	1078.47				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.10	1.23	0.94					1.00	1.08	1.09					1.00	0.98	0.69					1.00	0.99	0.92				
Thalweg Elevation	1087.40	1087.29	1087.19					1084.50	1084.43	1084.36					1079.42	1079.39	1079.27					1077.44	1077.44	1077.46				
LTOB[2] Elevation	1088.67	1088.73	1088.43					1085.64	1085.66	1085.69					1080.95	1080.91	1080.64					1078.41	1078.46	1078.39				
LTOB[2] Max Depth (ft)	1.27	1.44	1.24					1.14	1.23	1.33					1.53	1.52	1.37					0.97	1.02	0.93				
LTOB[2] Cross Sectional Area (ft^2)	6.64	8.60	4.95					4.63	5.61	5.83					6.90	6.40	3.76					3.69	3.65	3.23				

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - Bank Height Ratio (BHR) takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.
2 - LTOB Area and Max depth - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Table 9. Monitoring Data - Cross-Section Morphology Data Table
Stewarts Creek Mitigation Project (DMS No. 100023)

	UT2																				UT3 Reach 1						
	Cross Section 17 (Pool)							Cross Section 18 (Riffle)							Cross Section 19 (Riffle)							Cross Section 20 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1098.12	1098.08	1098.10					1097.77	1097.72	1097.76					1092.07	1092.04	1092.07					1095.67	1095.56	1095.64				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.04	1.03					1.04	1.13	1.10					1.08	1.01	1.04					1.00	1.11	1.03				
Thalweg Elevation	1096.73	1096.52	1096.48					1097.08	1097.09	1097.10					1091.33	1091.31	1091.33					1094.51	1094.58	1094.43				
LTOB[2] Elevation	1098.12	1098.14	1098.14					1097.80	1097.81	1097.83					1092.13	1092.05	1092.10					1095.67	1095.67	1095.67				
LTOB[2] Max Depth (ft)	1.39	1.62	1.66					0.72	0.72	0.73					0.80	0.74	0.77					1.16	1.09	1.24				
LTOB[2] Cross Sectional Area (ft^2)	5.42	5.90	5.72					2.61	3.02	2.90					3.52	3.20	3.35					5.72	9.02	6.71				

	UT3 Reach 1							UT3 Reach 2																			
	Cross Section 21 (Riffle)							Cross Section 22 (Pool)							Cross Section 23 (Riffle)							Cross Section 24 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1092.21	1092.24	1092.32					1089.56	1089.52	1089.55					1087.39	1087.41	1087.48					1081.92	1081.94	1081.95				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.12	1.11	1.10					1.00	1.04	1.08					1.13	1.06	1.01					1.11	1.04	1.03				
Thalweg Elevation	1091.48	1091.45	1091.48					1088.31	1088.34	1088.17					1086.53	1086.52	1086.56					1080.48	1080.48	1080.41				
LTOB[2] Elevation	1092.3	1092.32	1092.41					1089.56	1089.57	1089.66					1087.50	1087.47	1087.49					1082.08	1082.00	1082				
LTOB[2] Max Depth (ft)	0.82	0.87	0.93					1.25	1.23	1.49					0.97	0.95	0.93					1.60	1.52	1.59				
LTOB[2] Cross Sectional Area (ft^2)	3.71	3.71	3.75					6.88	7.47	8.19					5.95	5.40	5.03					8.93	7.59	7.54				

	UT3 Reach 2													
	Cross Section 25 (Riffle)							Cross Section 26 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1081.58	1081.59	1081.62					1077.31	1077.29	1077.20				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.01	0.98					1.00	1.01	1.10				
Thalweg Elevation	1080.54	1080.52	1080.49					1075.90	1075.60	1075.84				
LTOB[2] Elevation	1081.58	1081.60	1081.60					1077.31	1077.31	1077.34				
LTOB[2] Max Depth (ft)	1.04	1.08	1.11					1.41	1.71	1.50				
LTOB[2] Cross Sectional Area (ft^2)	4.54	4.65	4.41					7.58	7.84	9.12				

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - Bank Height Ratio (BHR) takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.
2 - LTOB Area and Max depth - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Appendix D: Hydrologic Data

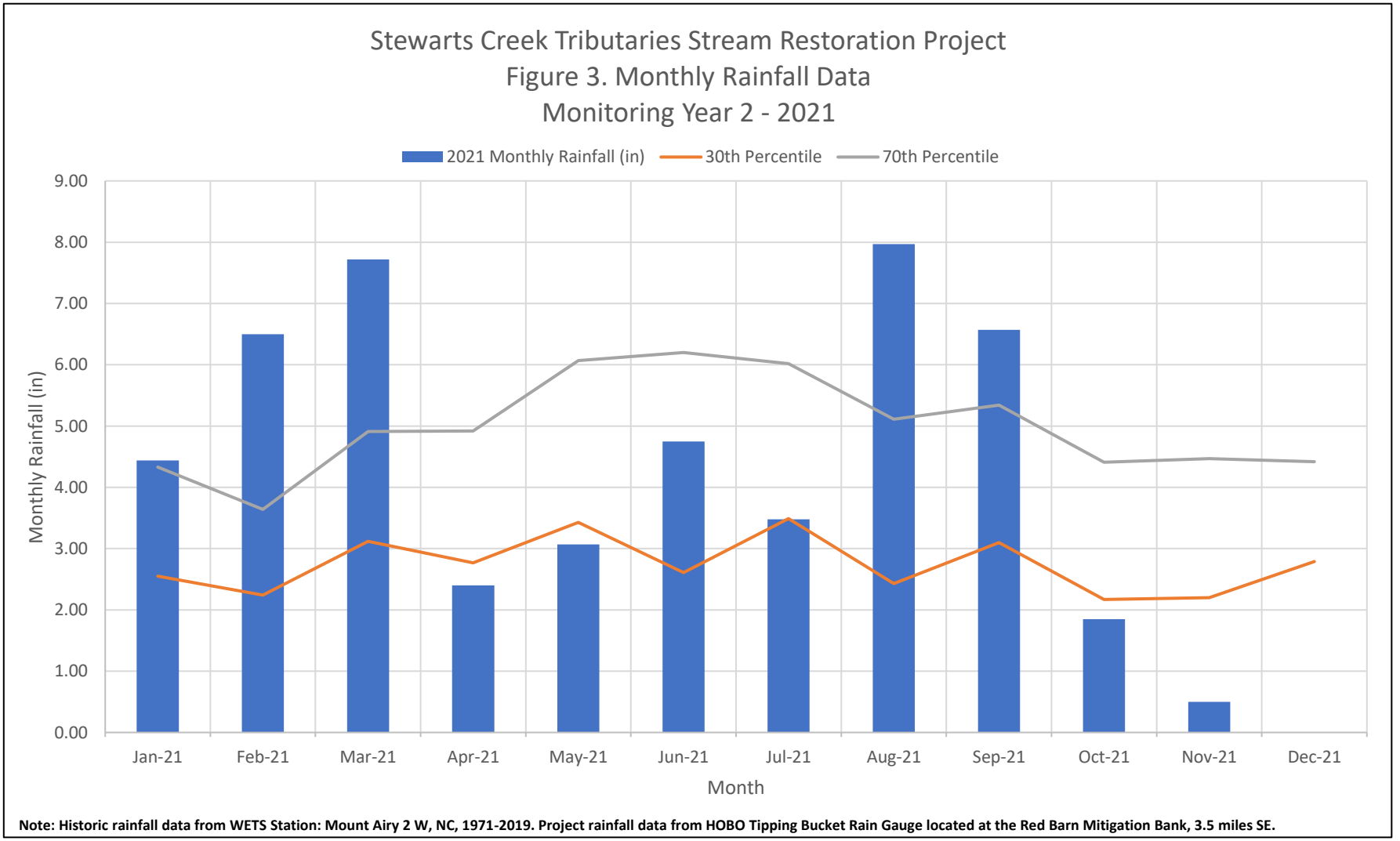
Table 10. Verification of Bankfull Events

Figure 3. Monthly Rainfall Summary Data

Precipitation and Water Level Hydrographs

Table 10. Bankfull Event Verification
Stewarts Creek Tributaries Stream Restoration Project (DMS No. 100023)

Overbank Events							
Gage ID	**MY1 (2020)**	**MY2 (2021)**	**MY3 (2022)**	**MY4 (2023)**	**MY5 (2025)**	**MY6 (2026)**	**MY7 (2027)**
UT1 - SCTSG1	5 separate events: 4/30/2020 5/27/2020-5/28/2020 8/15/2020 10/11/2020 10/29/2020	1 event 8/18/2021	-	-	-	-	-
UT1 - SCTSG2	2 separate events: 4/30/2020 10/29/2020	8 separate events 3/19/2021 4/10/2021 5/28/2021 6/12/2021 7/2/2021 7/17/2021 8/18/2021 9/22/2021	-	-	-	-	-
UT3 Reach 1 - SCTSG3	4 separate events: 7/29/2020-8/1/2020 8/5/2020-8/6/2020 10/13/2020-10/15/2020 10/29/2020	3 separate events 3/19/2021 6/12/2021 8/18/2021	-	-	-	-	-
UT3 Reach 2 - SCTSG4	11 separate events: 4/30/2020 5/23/2020 5/27/2020-5/28/2020 7/10/2020 8/3/2020 8/5/2020 8/15/2020 9/11/2020 9/29/2020 10/11/2020 10/29/2020	6 separate events 3/19/2021 4/10/2021 6/12/2021 7/18/2021 8/18/2021 9/22/2021	-	-	-	-	-
UT2 - SCTSG5	No bankfull events	1 event 8/18/2021	-	-	-	-	-

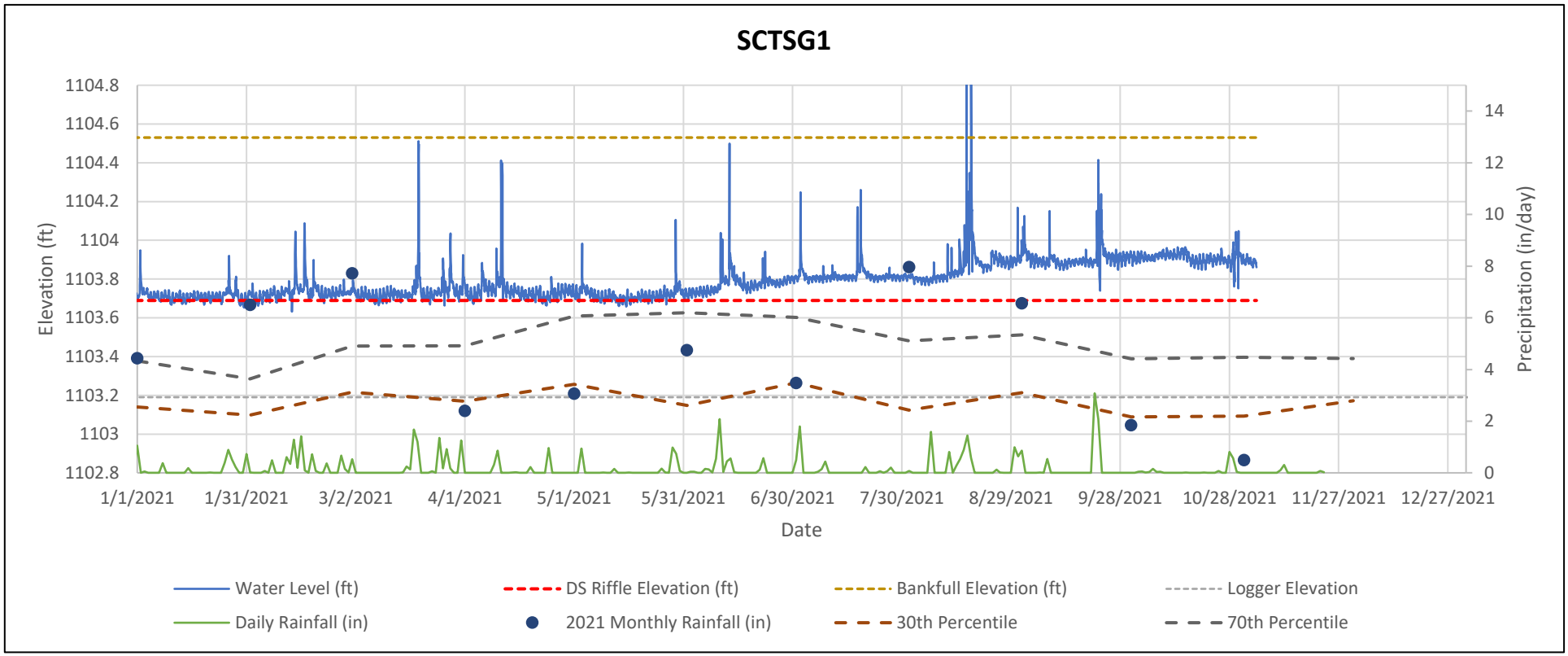


Note: Historic rainfall data from WETS Station: Mount Airy 2 W, NC, 1971-2019. Project rainfall data from HOBO Tipping Bucket Rain Gauge located at the Red Barn Mitigation Bank, 3.5 miles SE.

Rainfall Summary							
	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Annual Precip Total	67.90	49.25	-	-	-	-	-
WETS 30th Percentile	43.95	43.95	-	-	-	-	-
WETS 70th Percentile	52.86	52.86	-	-	-	-	-
Normal	N	Y	-	-	-	-	-

*Note: 2021 rainfall data does not include data from part of November or December because the gauge was last downloaded in November during MY2 monitoring.

Stewarts Creek Tributaries Stream Restoration Project
Year 2 (2021) Streamflow Data

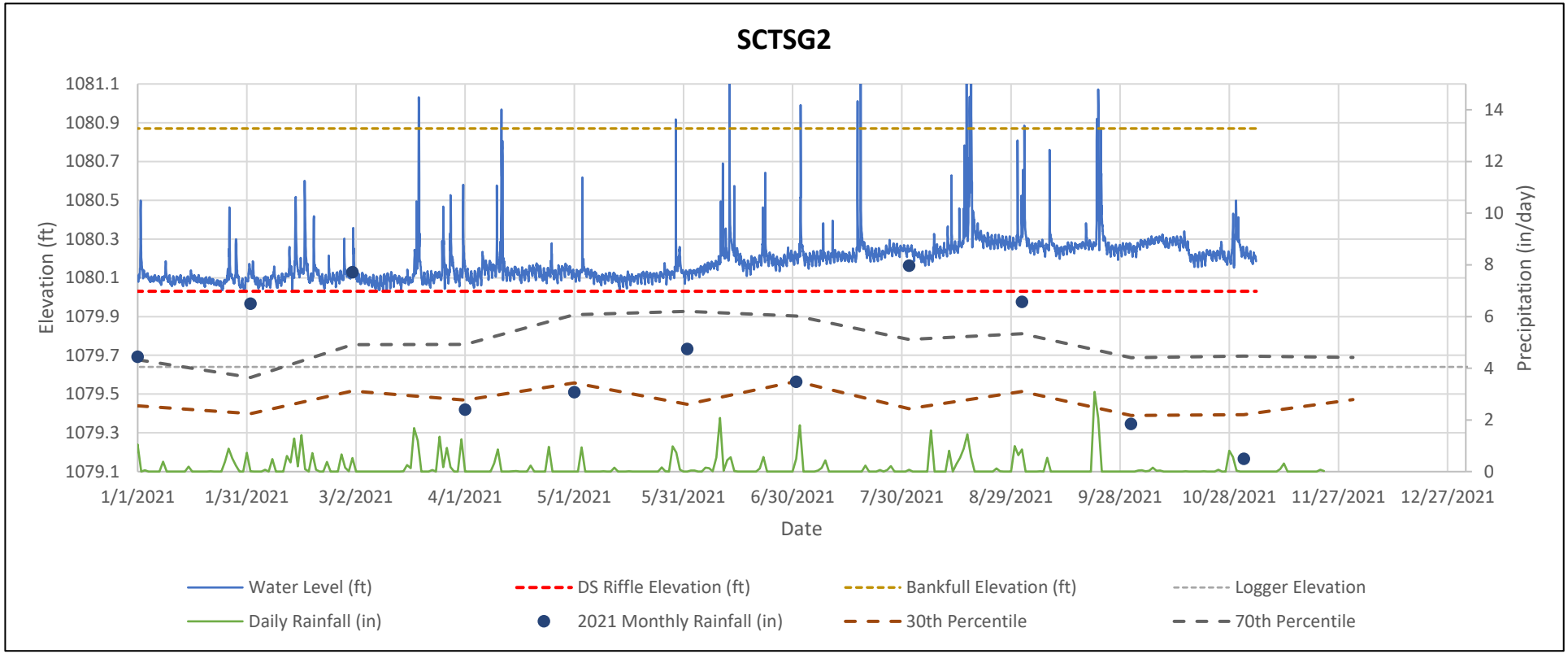


Site Info	
Stream	Stewarts Creek Tributaries Stream Restoration Project
Reach	UT1
Date Installed	4/21/2020
Serial Number	20727103
Reach Type	Perennial

-Rainfall data from HOBO Tipping Bucket Rain Gauge located at the Red Barn Mitigation Bank, 3.5 miles SE.

Year 2 (2021) Streamflow Data	
Gauge ID	SCTSG1
Start Date	1/1/2021
End Date	12/31/2021
Flow Criteria (Days)	30
Recordings Per Day	24
Logger Elevation (ft)	1103.19
Controlling Grade Elevation (ft)	1103.69
Bankfull Elevation (ft)	1104.53
Most Consecutive Days of Flow	308
Total Days of Flow	308
Max High Water Level Above Bankfull (ft)	0.50
Bankfull Events	1
Meets Flow Criteria	Yes

Stewarts Creek Tributaries Stream Restoration Project
Year 2 (2021) Streamflow Data

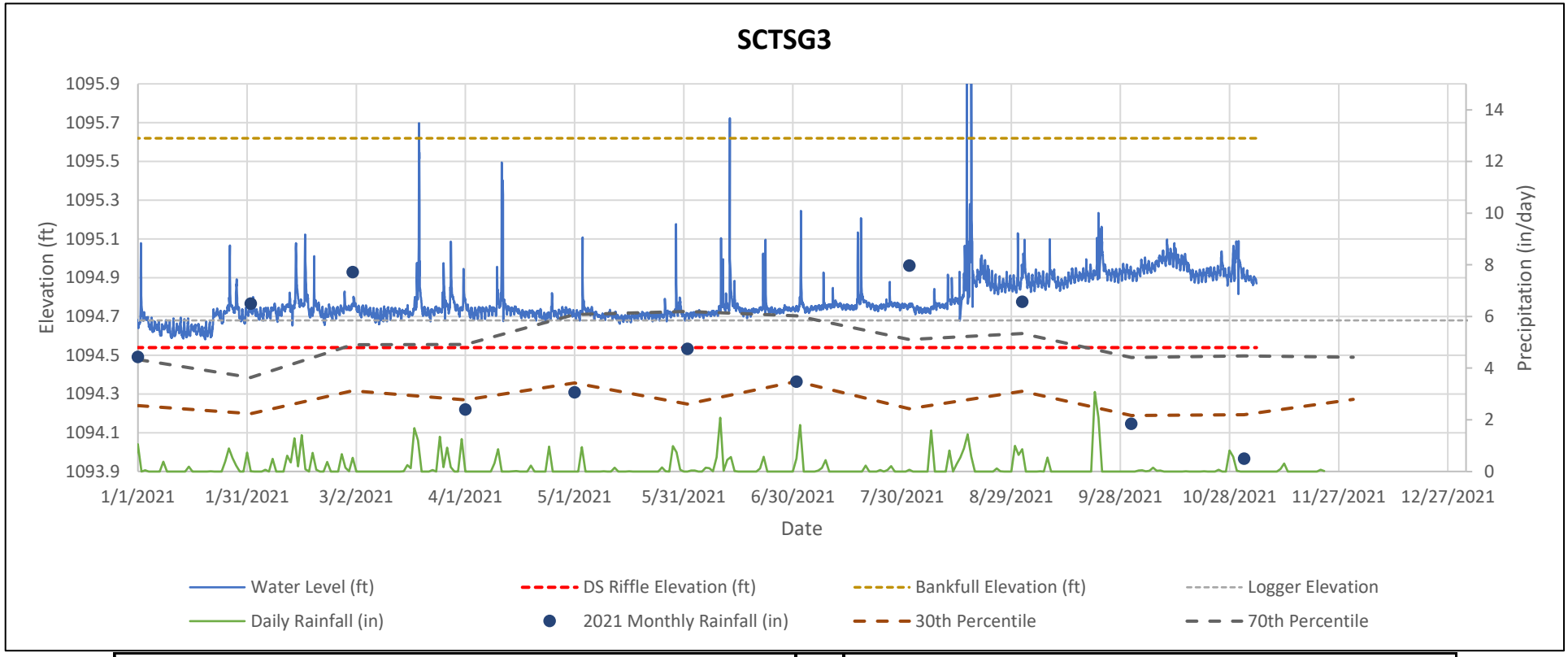


Site Info	
Stream	Stewarts Creek Tributaries Stream Restoration Project
Reach	UT1
Date Installed	4/21/2020
Serial Number	20234981
Reach Type	Perennial

-Rainfall data from HOBO Tipping Bucket Rain Gauge located at the Red Barn Mitigation Bank, 3.5 miles SE.

Year 2 (2021) Streamflow Data	
Gauge ID	SCTSG2
Start Date	1/1/2021
End Date	12/31/2021
Flow Criteria (Days)	30
Recordings Per Day	24
Logger Elevation (ft)	1079.64
Controlling Grade Elevation (ft)	1080.03
Bankfull Elevation (ft)	1080.87
Most Consecutive Days of Flow	308
Total Days of Flow	308
Max High Water Level Above Bankfull (ft)	0.88
Bankfull Events	8
Meets Success Criteria	Yes

Stewarts Creek Tributaries Stream Restoration Project
Year 2 (2021) Streamflow Data

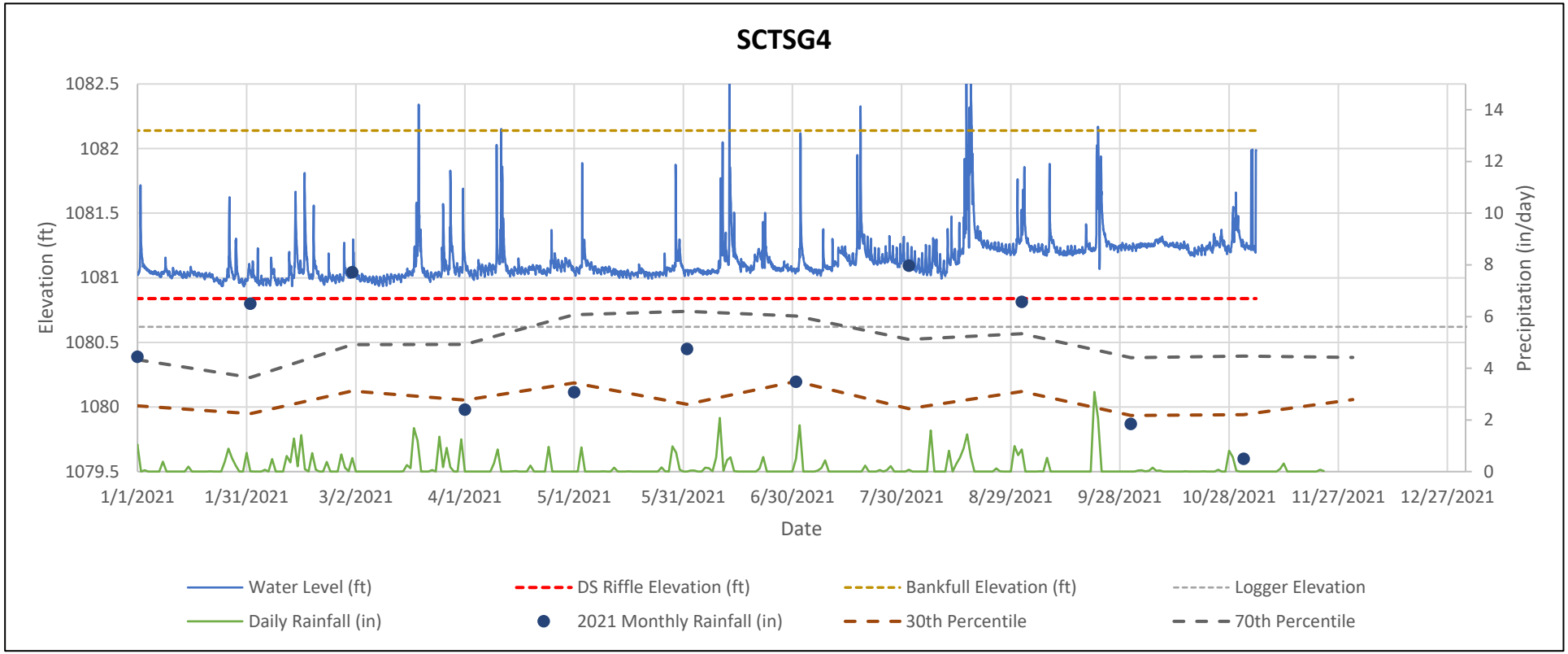


Site Info	
Stream	Stewarts Creek Tributaries Stream Restoration Project
Reach	UT3 Reach 1
Date Installed	4/21/2020
Serial Number	20234982
Reach Type	Perennial

-Rainfall data from HOBO Tipping Bucket Rain Gauge located at the Red Barn Mitigation Bank, 3.5 miles SE.

Year 2 (2021) Streamflow Data	
Gauge ID	SCTSG3
Start Date	1/1/2021
End Date	12/31/2021
Flow Criteria (Days)	30
Recordings Per Day	24
Logger Elevation (ft)	1094.55
Controlling Grade Elevation (ft)	1094.54
Bankfull Elevation (ft)	1095.62
Most Consecutive Days of Flow	290
Total Days of Flow	305
Max High Water Level Above Bankfull (ft)	0.53
Bankfull Events	3
Meets Success Criteria	Yes

Stewarts Creek Tributaries Stream Restoration Project
Year 2 (2021) Streamflow Data

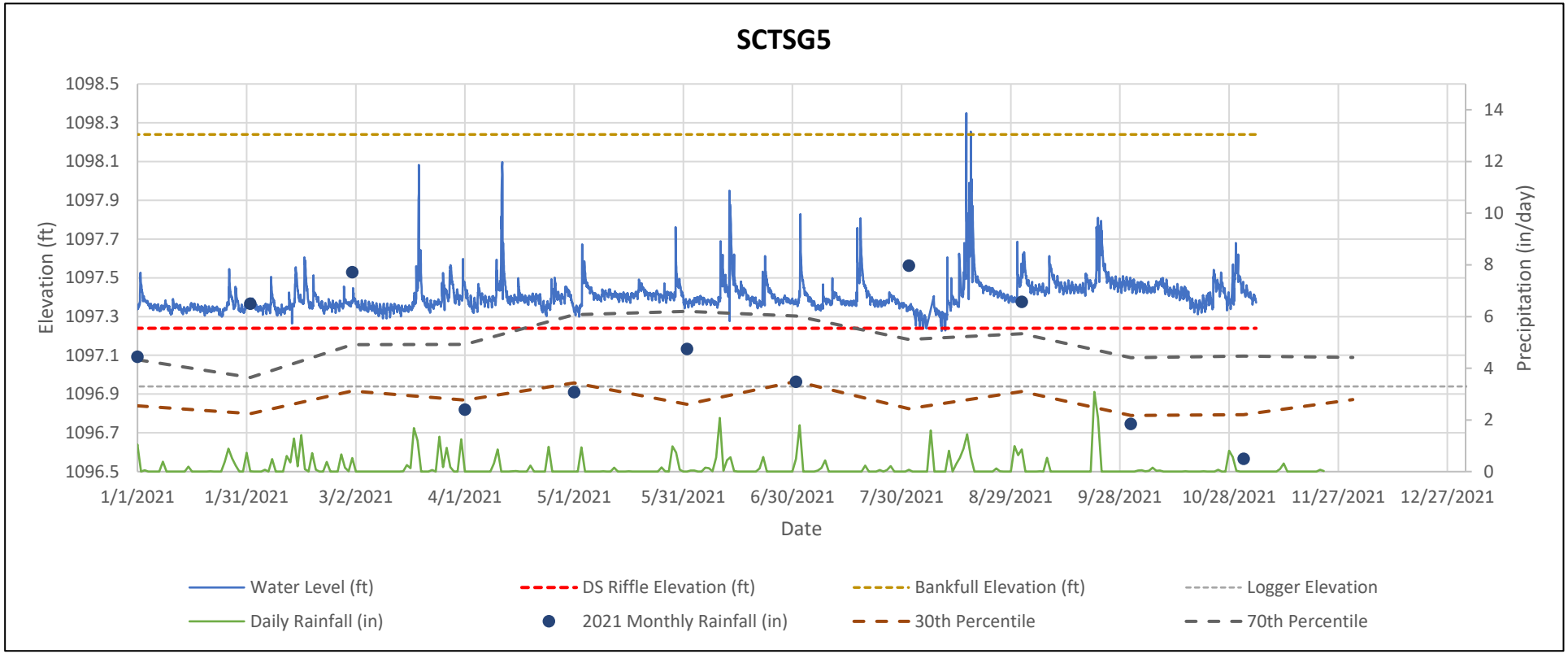


Site Info	
Stream	Stewarts Creek Tributaries Stream Restoration Project
Reach	UT3 Reach 2
Date Installed	4/21/2020
Serial Number	20234980
Reach Type	Perennial

-Rainfall data from HOBO Tipping Bucket Rain Gauge located at the Red Barn Mitigation Bank, 3.5 miles SE.

Year 2 (2021) Streamflow Data	
Gauge ID	SCTSG4
Start Date	1/1/2021
End Date	12/31/2021
Flow Criteria (Days)	30
Recordings Per Day	24
Logger Elevation (ft)	1080.62
Controlling Grade Elevation (ft)	1080.84
Bankfull Elevation (ft)	1082.14
Most Consecutive Days of Flow	308
Total Days of Flow	308
Max High Water Level Above Bankfull (ft)	0.71
Bankfull Events	6
Meets Success Criteria	Yes

Stewarts Creek Tributaries Stream Restoration Project
Year 2 (2021) Streamflow Data



Site Info	
Stream	Stewarts Creek Tributaries Stream Restoration Project
Reach	UT2
Date Installed	4/21/2020
Serial Number	20727118
Reach Type	Perennial

-Rainfall data from HOBO Tipping Bucket Rain Gauge located at the Red Barn Mitigation Site, 3.5 miles SE.

Year 2 (2021) Streamflow Data	
Gauge ID	SCTSG5
Start Date	1/1/2021
End Date	12/31/2021
Flow Criteria (Days)	30
Recordings Per Day	24
Logger Elevation (ft)	1096.94
Controlling Grade Elevation (ft)	1097.24
Bankfull Elevation (ft)	1098.24
Most Consecutive Days of Flow	217
Total Days of Flow	307
Max High Water Level Above Bankfull (ft)	0.11
Bankfull Events	1
Meets Success Criteria	Yes

Appendix E: Project Timeline and Contact Information

Table 11. Project Activity and Reporting History

Table 12. Project Contacts Table

Table 11. Project Activity and Reporting History
Stewarts Creek Tributaries Stream Restoration Project (NCDMS Project No. 100023)

Elapsed Time Since grading complete: **1 yrs 8 months**
Elapsed Time Since planting complete: **1 yrs 9 months**
Number of reporting Years: **2**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Institution Date	NA	May-17
404 permit date	NA	Jul-19
Final Mitigation Plan	2017 to 2019	May-19
Final Design – Construction Plans	2017 to 2019	Sep-19
Site Earthwork	NA	May-20
As-Built Survey Performed	May - June 2020	Jun-20
Bare root plantings	NA	Mar-20
As-built monitoring report (Year 0 Monitoring – baseline)	Jun-20	Oct-20
Year 1 Monitoring	2020	Nov-20
Year 1 Monitoring Moores Fork Repairs	NA	Aug-20
Year 2 Monitoring	2021	Dec-21
Year 2 Monitoring Supplemental Planting	NA	Apr-21
Year 3 Monitoring	2022	Dec-22
Year 4 Monitoring	2023	Dec-23
Year 5 Monitoring	2024	Dec-24
Year 6 Monitoring	2025	Dec-25
Year 7 Monitoring	2026	Dec-26

Table 12. Project Contacts Table
Stewarts Creek Tributaries Stream Restoration Project (NCDMS Project No. 100023)

Designer Primary project design POC	Ecosystem Planning and Restoration, PLLC 1150 SE Maynard Road, Suite 140 Cary, NC 27511 Kevin Tweedy, PE (919) 388-0787
Construction Contractor Construction contractor POC	Resource Environmental Solutions, LLC (Formally Carolina Environmental Contracting, Inc.) 150 Pine Ridge Rd, Mt Airy, NC 27030 Wayne Taylor
Survey Contractor Survey contractor POC	Turner Land Surveying, PLLC PO Box 148, Swannanoa, NC 28778 Lissa Turner (919) 827-0745
Planting Contractor Planting contractor POC	Bruton Natural Systems, Inc. Charlie Bruton
Seeding Contractor Contractor point of contact	Resource Environmental Solutions, LLC (Formally Carolina Environmental Contracting, Inc.) 150 Pine Ridge Rd, Mt Airy, NC 27030 Wayne Taylor
Seed Mix Sources	Green Resource
Nursery Stock Suppliers	Dykes & Son Nursery (931) 668-8833
Monitoring Performers	Ecosystem Planning and Restoration, PLLC
Stream Monitoring POC	Erin Bennett, EPR (919) 388-0787
Vegetation Monitoring POC	Tom Barrett, EPR (919) 388-0787