

# MY02 MONITORING REPORT

Round Hill Branch Restoration Site  
Buncombe County, North Carolina  
French Broad River Basin - 06010105

DMS Project #100066

DMS Contract #7534

DMS RFP #16-007334 (Issue date: September 8, 2017)

USACE AID #: SAW 2108-01168 DWR #: 2018-1031

Monitoring Data Collected: 2023



Prepared for:

NC Department of Environmental Quality  
Division of Mitigation Services  
1652 Mail Service Center  
Raleigh, NC 27699



## Monitoring and Design Firm



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## MEMORANDUM

Date: February 21, 2024  
To: Matthew Reid, DMS Project Manager  
From: Adam Spiller, Project Manager  
KCI Associates of North Carolina, PA  
Subject: MY-02 Monitoring Report Comments  
Round Hill Branch DMS #7534, Contract 100066  
French Broad River Basin CU 06010105  
Buncombe County, North Carolina

Please find below our responses in italics to the MY-02 Monitoring Report comments from NCDMS received on January 23, 2024 for the Round Hill Branch Restoration Site.

1. Cover photo is from M1. Please update to a current MY2 photo of the site.  
*KCI Response: This change has been made.*
2. A supplemental planting is planned in early 2024 for the portions of T2 and the downstream section of RHB. Please include an update in the MY3 report and include species and quantities of planted material used. Please ensure that species selected are from the planting list in the approved Mitigation Plan.  
*KCI Response: We will be sure to include all of this information in the MY03 report. Species selected will be from the approved planting list.*
3. Please include boundary update in MY3 in regard to adjoining landowner fence issue and include photos of completed work.  
*KCI Response: Fence work is planned for March 2024. An update regarding this work will be included in the MY03 report.*
4. DMS field visit conducted in April identified landowner stockpile of logs/debris encroaching into easement near Sta: 18+00 on RHB. Please verify that this has been corrected and discussed with the landowner.  
*KCI Response: The landowner has been reminded of his responsibility towards the conservation easement. As of the end of year site visit on December 11, 2023, no further signs of encroachment were noted in this area.*
5. No areas of encroachment were identified in 2023 according to the report. There were several areas of potential mowing/scalloping encroachment identified in April 2023 along the unfenced areas along RHB. Please verify that these areas are encroachment free.  
*KCI Response: There is one area of scalloping along the T2 boundary. This area has been added to the CCPV and the visual assessment tables.*
6. T1 and T2 Hydrograph: Recommend adding consecutive days for camera observation for each graph.

*KCI Response: This change has been made.*

7. Gauge malfunctions are reported for both T1 and T2. Please verify that the gauges have been repaired/replaced and are functioning correctly.

*KCI Response: These gauges have been replaced.*

8. At the 2023 IRT Credit Release Meeting, the IRT recommended including a representative game camera photo of stream flow in future monitoring reports as an inset with the photo. date to document the supplementary data. If possible, please include or add to Photo Reference Points section.

*KCI Response: Representative stream flow photo have been added for both reaches.*

Please contact me if you have any questions or would like clarification concerning these responses.

Sincerely,



Adam Spiller  
Project Manager



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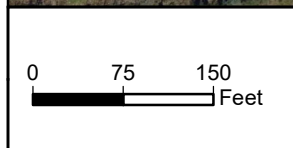
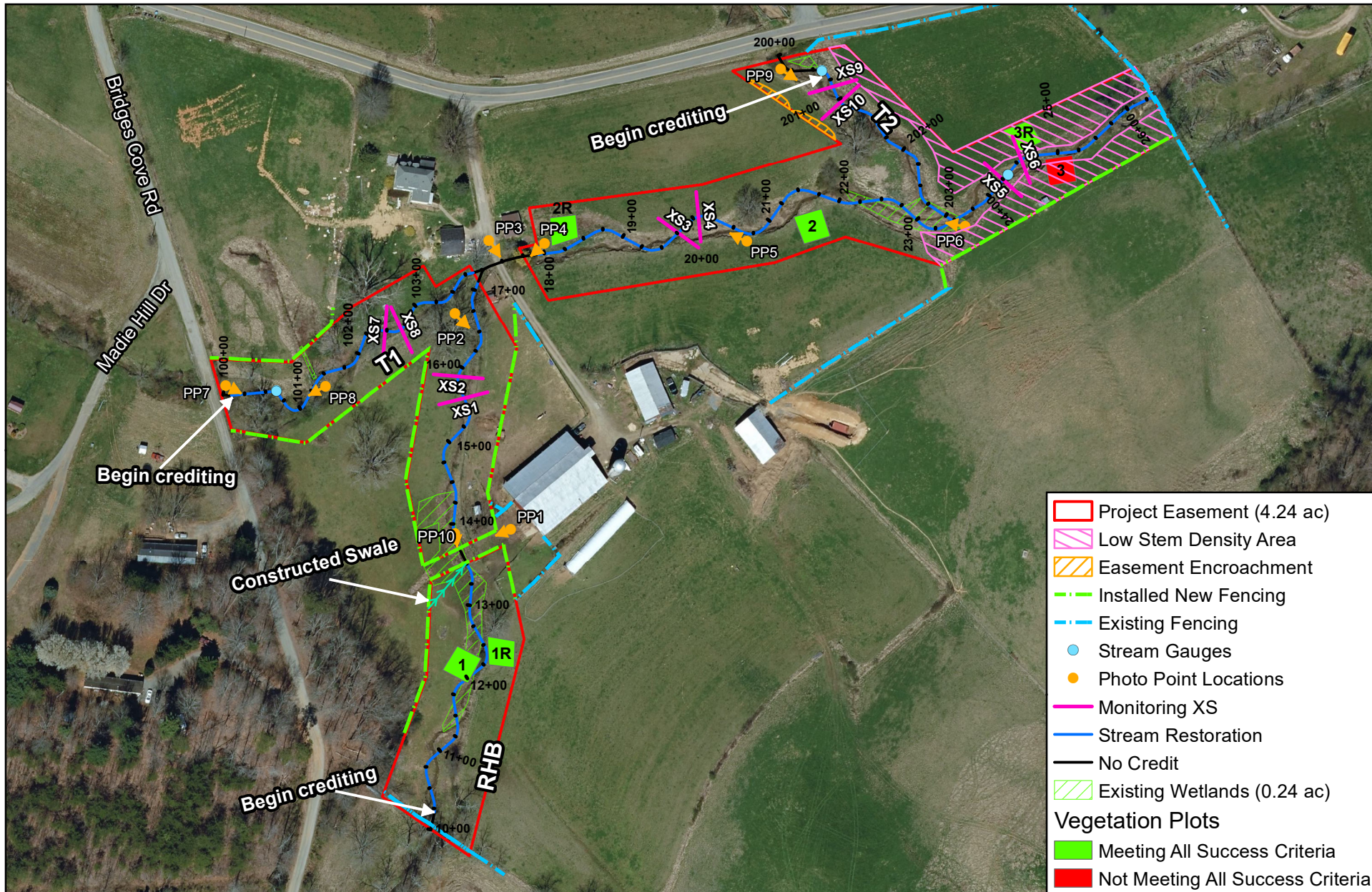
## PROJECT SUMMARY

The Round Hill Branch Restoration Site (RHBR) was completed in December 2021 and restored a total of 2,142 linear feet of stream. The RHBR is a riparian system in the French Broad River Basin (06010105 8-digit cataloging unit) in Buncombe County, North Carolina. The site's natural hydrologic regime had been substantially modified through the relocation and straightening of the existing stream channels, livestock impacts, and clearing of the riparian buffers. This site offers the chance to restore streams impacted by agriculture to a stable stream ecosystem with a functional riparian buffer and floodplain access. Site grading was initially completed in June 2021 with no major changes from the construction plans. From August 15 – 18, 2021, the site received 7.6” of rain. This large scale rain event caused a significant amount of deposition to the upper portion of RHB-1, mainly upstream of the first crossing. This deposition, along with a few areas of bank scour along RHB-2, was repaired in September 2021. These repairs involved removing the sediment that had been deposited in the stream and sloping back and reinstalling coir matting on the scoured banks. One small area of floodplain scour located on the left bank, just downstream of the confluence of RHB and T2, was left as a floodplain depression. This area has been stabilized with floodplain vegetation and is not anticipated to expand. It also acts as an ephemeral pool and provides beneficial habitat diversity to the site. Project planting was completed on December 20, 2021 and the monitoring components were installed on January 19, 2022.

**Table 1. Round Hill Branch Restoration Site (ID-100066) Project Mitigation Quantities and Credits**

Project Segment	Original Mitigation Plan Ft/Ac	As-Built Ft/ Ac	Original Mitigation Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Credits	Comments
Stream							
RHB Reach 1	705	702	Cool	R	1.00000	670.000	Crediting at full 30'-width buffer (STA 10+21); 20' exception for crossing STA 13+51 to 13+71; exception at crossing STA 17+11 to 17+26
RHB Reach 2	622	590	Cool	R	1.00000	555.000	No credit (limited widths/crossing) from STA 17+26 to 17+92
RHB Reach 3	284	284	Cool	R	1.00000	284.000	
T1	387	384	Cool	R	1.00000	375.000	Crediting begins at full 30'-width buffer (STA 100+09; no credit at crossing from STA 103+84 to 103+97
T2	258	253	Cool	R	1.00000	258.000	Crediting begins at full 30'-width buffer (200+53)
					<b>Total:</b>	<b>2,142.000</b>	
<b>Project Credits</b>							
Restoration Level	Stream			Riparian Wetland	Non-Riparian Wetland	Coastal Marsh	
	Warm	Cool	Cold				
Restoration		2142.000					
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation							
<b>Total</b>		<b>2142.000</b>					





**CURRENT CONDITIONS PLANVIEW  
ROUND HILL BRANCH RESTORATION SITE  
BUNCOMBE COUNTY, NC**

N  
Image Source: NC OneMap  
2019 Orthoimagery.

**Table 2. Round Hill Branch Restoration Site (ID-100066) Goals, Performance and Results**

<b>Goal</b>	<b>Objective/Treatment</b>	<b>Likely Functional Uplift</b>	<b>Performance Criteria</b>	<b>Measurement</b>	<b>Cumulative Monitoring Results</b>
Restore channelized and livestock-impacted streams to stable C and B-type channels	Relocate or stabilize channelized and/or incised streams to connect to a floodplain or floodprone area	Hydraulics	4 bankfull events in 4 separate years; 30 consecutive days of flow	1 pressure transducer on RHB-2; 2 pressure transducers and cameras on T1 and T2	2 bankfull events and both reaches recorded >30 consecutive days of flow in 2023
	Install a cross-section sized to the bankfull discharge	Geomorphology	BHR<1.2, ER>2.2	10 cross-sections; annual visual inspection	All XS with BHR<1.2 and ER>2.2
	Create bedform diversity with pools, riffles, and habitat structures	Geomorphology	Percent riffle and pool, pool-to-pool spacing, and facet slopes as designed	Longitudinal profile in MY00, annual visual inspection	No signs of instability
Restore a forested riparian buffer to provide bank stability, filtration, and shading	Fence out livestock to reduce nutrient, bacterial, and sediment impacts from adjacent grazing and farming practices to the project tributaries.	Geomorphology	No change >10% in cross-section measurements between monitoring events	10 cross-sections; annual visual inspection	No change >10% in any XS
		Physiochemical	Fencing installed as designed, vegetation meeting success criteria	Estimated reductions based on converted land use	Fencing installed
	Plant the site with native trees and shrubs and a herbaceous seed mix	Geomorphology and Species composition	260 stems/acre and average height of 6' after 5 years, 210 stems/acre and average height of 8' after 7 years; at least 4 species from the approved planting plan in each plot w/ no species making up >50% of the stems	6 vegetation monitoring plots	5/6 plots >260 stems/acre, 5/6 plots >4 native species



**Table 3. Round Hill Branch Restoration Site (ID-100066) Project Attribute Table**

Project Name	Round Hill Branch Restoration Site		
County	Buncombe County		
Project Area (acres)	4.24		
Project Coordinates (latitude and longitude decimal degrees)	35.6305 N and -82.7369 W		
<b>Project Watershed Summary Information</b>			
Physiographic Province	Mountain		
River Basin	French Broad		
USGS Hydrologic Unit 8-digit	06010105		
DWR Sub-basin	04-03-02		
Project Drainage Area (acres)	471		
Project Drainage Area Percentage of Impervious Area	3%		
Land Use Classification	Forest (62%), Pasture/Farmland (25%), Low-density Residential Development (12%), and Roads (1%).		
<b>Reach Summary Information</b>			
<b>Parameters</b>			
Pre-project length (feet)	2,214		
Post-project (feet)	2,289		
Valley confinement (Confined, moderately confined, unconfined)	Partially confined to confined		
Drainage area (acres)	471 acres		
Perennial, Intermittent, Ephemeral	Intermittent - Perennial		
NCDWR Water Quality Classification	C (Aquatic life, secondary recreation)		
Dominant Stream Classification (existing)	F4/G4/E4		
Dominant Stream Classification (proposed)	B4/C4		
Dominant Evolutionary class (Simon) if applicable	Stage IV		
<b>Wetland Summary Information</b>			
<b>Parameters</b>	<b>W1 &amp; W3</b>	<b>W2</b>	<b>W4</b>
Pre-project (acres)	0.17 & 0.01	0.10	0.10
Post-project (acres)	0.17 & 0.01	0.10	0.10
Wetland Type (non-riparian, riparian)	Riparian	Riparian	Riparian
Mapped Soil Series	Tate Loam	French Loam	Tate Loam
Soil Hydric Status	No	No	No
<b>Regulatory Considerations</b>			
<b>Parameters</b>	<b>Applicable?</b>	<b>Resolved?</b>	<b>Supporting Docs?</b>
Water of the United States - Section 404	Yes	Yes	SAW-2018-01168
Water of the United States - Section 401	Yes	Yes	DWR# 18-1031
Endangered Species Act	Yes	Yes	USFWS
Historic Preservation Act	No	N/A	N/A
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A



## **MONITORING RESULTS**

The MY02 vegetation monitoring was conducted August 1, 2023. Five of the six vegetation monitoring plots achieved all of the success criteria. Plot 3 had only 2 native hardwood species and 208 stems/acre. This area of the site, which includes the very bottom of the main stem and the area around T2, did not see as robust growth of the planted woody stems as the rest of the site during the first two years. KCI is planning a supplemental planting in this area of the site, which will take place in the winter before the 2024 growing season. Despite this small area of poor vigor, the site as a whole is well vegetated with many healthy woody stems and a thick and diverse herbaceous layer.

The MY02 cross-section survey found that the stream was functioning as designed with some small variation as is typical for stream restoration projects. Several of the cross-sections showed signs of aggradation, particularly along the tributaries. This is a result of the large sediment source from the unbuffered reaches just upstream of the project. KCI does not believe that these small amounts of aggradation are signs of instability in the streams, but rather just the natural movement of sediment through the system.

During 2023, the gauge on RHB recorded 2 bankfull events. The stream gauge on T1 recorded a maximum of 36 consecutive days of flow, while the flow camera on T1 recorded a maximum of 102 consecutive days of flow. The gauge on T2 recorded a maximum of 136 consecutive days of flow, while the camera on this reach recorded 115 consecutive days of flow. Differences in the number of days recorded by the cameras from those recorded by the gauges are generally due to the cameras becoming obscured by vegetation during the growing season or the stream flowing at levels too low for the gauges to accurately record.

There are two issue areas in terms of fencing with adjoining landowners. One area is at the top of Round Hill Branch where there is existing fence located approximately 5 feet inside of the conservation easement. The second area is at the bottom of Round Hill Branch where an existing fence pole is within the conservation easement. KCI has addressed these issues with the adjacent landowners and is planning to move the fence to the appropriate location in early 2024. The site boundaries were inspected on December 11, 2023. Besides the ongoing issue described above, no other areas of encroachment were noted.

## **REFERENCES**

- NCDENR, Ecosystem Enhancement Program. 2009. Upper Yadkin Pee-Dee River Basin Restoration Priorities 2009. Raleigh, NC.  
[https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed\\_Planning/Yadkin\\_River\\_Basin/2009%20Upper%20Yadkin%20RBRP\\_Final%20Final%2C%2026feb%2709.pdf](https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Yadkin_River_Basin/2009%20Upper%20Yadkin%20RBRP_Final%20Final%2C%2026feb%2709.pdf)
- NCDEQ, Division of Mitigation Services. June 2017. "As-built Baseline Monitoring Report Format, Data and Content Requirement."  
[https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/6\\_AB\\_Baseline\\_Rep\\_Templ\\_June%202017.pdf](https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/6_AB_Baseline_Rep_Templ_June%202017.pdf)
- NCIRT. October 24, 2016. "Wilmington District Stream and Wetland Compensatory Mitigation Update." <https://saw-reg.usace.army.mil/PN/2016/Wilmington-District-Mitigation-Update.pdf>
- USACE, Sprecher, S. W.; Warne, A. G. 2000. "Accessing and Using Meteorological Data to Evaluate Wetland Hydrology."  
<https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/ADA378910.xhtml>

# **APPENDIX A**

## Visual Assessment Data

Table 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment

Assessment Date: 12/11/2023

Reach RHB-1  
 Assessed Stream Length 702  
 Assessed Bank Length 1404

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

Table 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment

Assessment Date: 12/11/2023

Reach RHB-2  
 Assessed Stream Length 590  
 Assessed Bank Length 1180

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

Table 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment

Assessment Date: 12/11/2023

Reach RHB-3  
 Assessed Stream Length 284  
 Assessed Bank Length 568

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

Table 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment

Assessment Date: 12/11/2023

Reach T1  
 Assessed Stream Length 385  
 Assessed Bank Length 770

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
<b>Bank</b>	<b>Surface Scour/Bare Bank</b>	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	<b>Toe Erosion</b>	Bank toe eroding to the extent that bank failure appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	<b>Bank Failure</b>	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
<b>Totals</b>					0	100%
<b>Structure</b>	<b>Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	4	4		100%
	<b>Bank Protection</b>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in DMS monitoring guidance document)	4	4		100%

Table 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment

Assessment Date 12/11/2023

Reach T2  
 Assessed Stream Length 253  
 Assessed Bank Length 506

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
<b>Bank</b>	<b>Surface Scour/Bare Bank</b>	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	<b>Toe Erosion</b>	Bank toe eroding to the extent that bank failure appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	<b>Bank Failure</b>	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
<b>Totals</b>					0	100%
<b>Structure</b>	<b>Grade Control</b>	Grade control structures exhibiting maintenance of grade across the sill.	5	5		100%
	<b>Bank Protection</b>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in DMS monitoring guidance document)	5	5		100%



**Table 5. Round Hill Branch Restoration Site (ID-100066) Visual Vegetation Assessment**

Assessment Date

12/11/2023

**Planted acreage 3.68**

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10 acres	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10acres	0.56	15.1%
<b>Total</b>			0.56	15.1%
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10 acres	0.00	0.0%
<b>Cumulative Total</b>			0.56	15.1%

**Easement Acreage 4.24**

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.	0.00 acres	0.00	0.0%
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	0.016	0.4%

**Photo Reference Photos**



PP1 – MY-00 – 1/18/22



PP1 – MY-02 – 12/8/23



PP2 – MY-00 – 1/18/22



PP2 – MY-02 – 12/8/23



PP3 – MY-00 – 1/18/22



PP3 – MY-02 – 12/8/23





PP4 – MY-00 – 1/18/22



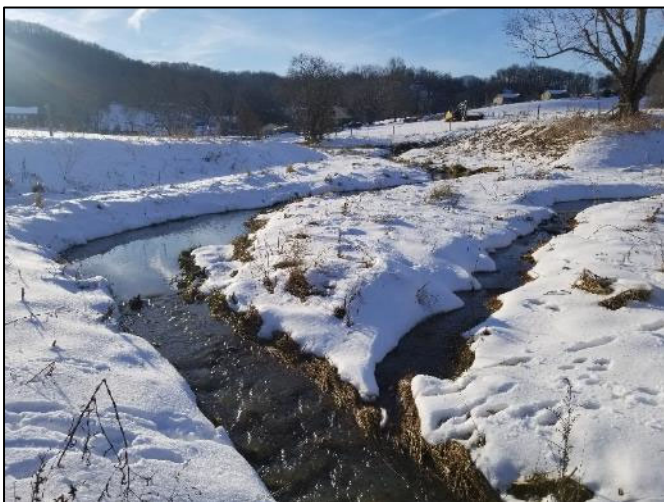
PP4 – MY-02 – 12/8/23



PP5 – MY-00 – 1/18/22



PP5 – MY-02 – 12/8/23

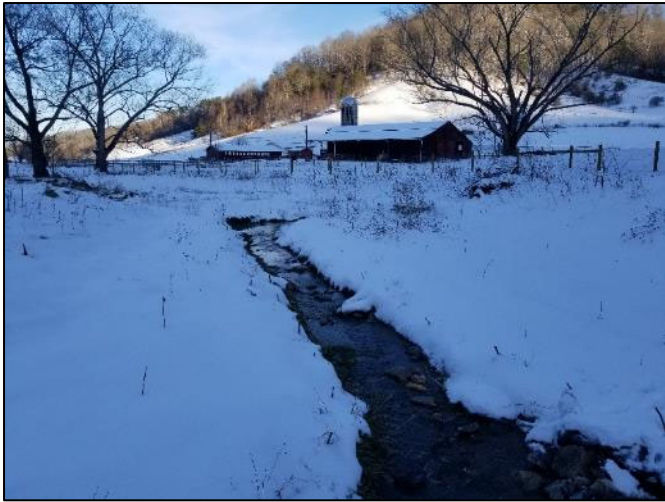


PP6 – MY-00 – 1/18/22



PP6 – MY-02 – 12/8/23





PP7 – MY-00 – 1/18/22



PP7 – MY-02 – 12/8/23



PP8 – MY-00 – 1/18/22



PP8 – MY-02 – 12/8/23



PP9 – MY-00 – 1/18/22



PP9 – MY-02 – 12/8/23



## Vegetation Monitoring Plot Photos



Vegetation Plot 1 – MY-02 – 8/1/23



Vegetation Plot 2 – MY-02 – 8/1/23



Vegetation Plot 3 – MY-02 – 8/1/23



Vegetation Plot 1R – MY-02 – 8/1/23



Vegetation Plot 2R – MY-02 – 8/1/23



Vegetation Plot 3R – MY-02 – 8/1/23



## Representative Stream Flow Photos



T1 high flow – 2/17/23



T1 normal flow – 3/10/23



T2 high flow – 2/17/23



T2 normal flow – 3/10/23

# **APPENDIX B**

## Vegetation Plot Data

Table 6. Vegetation Plot Data  
Round Hill Branch Restoration Site (ID-100066)

	Scientific Name	Common Name	Tree/S hrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 1 R	Veg Plot 2 R	Veg Plot 3 R
					Planted	Total	Planted	Total	Planted	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	<i>Aesculus flava</i>	yellow buckeye	Tree	FACU			2	2				1	2
	<i>Alnus serrulata</i>	hazel alder	Tree	OBL	1	1	1	1			3	1	
	<i>Carya glabra</i>	pignut hickory	Tree	FACU			1	1	1	1			
	<i>Liriodendron tulipifera</i>	tuliptree	Tree	FACU				1					
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC	3	3					1		3
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	6	6			4	4	6	1	1
	<i>Quercus alba</i>	white oak	Tree	FACU			2	2					
	<i>Quercus falcata</i>	southern red oak	Tree	FACU								2	
	<i>Quercus rubra</i>	northern red oak	Tree	FACU	1	1	3	3				3	
	<i>Salix nigra</i>	black willow	Tree	OBL	6	7					2		1
<i>Ulmus americana</i>	American elm	Tree	FACW										1
Sum	Performance Standard				17	18	9	10	5	5	12	8	8
Post Mitigation Plan Species	<b><i>Juglans nigra</i></b>	<i>black walnut</i>	<i>Tree</i>	<i>FACU</i>		1							
	<b><i>Prunus serotina</i></b>	<i>black cherry</i>	<i>Tree</i>	<i>FACU</i>				3					
Sum	Proposed Standard				17	18	9	10	5	5	12	8	8
Mitigation Plan Performance Standard	Current Year Stem Count					18		10		5	12	8	8
	Stems/Acre					729		405		121	486	324	324
	Species Count					5		6		2	4	5	5
	Dominant Species Composition (%)					37		23		80	50	38	38
	Average Plot Height (ft.)					3		2		3	4	2	2
	% Invasives					0		0		0	0	0	0

- 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.

Planted Acreage	3.68
Date of Initial Plant	2021-12-20
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	
Date of Current Survey	2023-08-01
Plot size (ACRES)	0.0247

Table 7. Vegetation Performance Standards Summary Table  
Round Hill Branch Restoration Site (ID-100066)

Vegetation Performance Standards Summary Table												
	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	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	729	3	5	0	405	2	6	0	121	3	2	0
Monitoring Year 1	810	2	5	0	445	2	6	0	243	2	3	0
Monitoring Year 0	810	1	4	0	769	1	8	0	769	1	6	0
	Veg Plot Group 1 R				Veg Plot Group 2 R				Veg Plot Group 3 R			
	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	486	4	4	0	324	2	5	0	324	2	5	0
Monitoring Year 1	364	1	3	0	283	1	5	0	486	1	5	0
Monitoring Year 0												

\*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.

# APPENDIX C

## Stream Geomorphology Data



**Table 8. Baseline Stream Data Summary  
Round Hill Branch, RHB-1**

Parameter	Pre-Existing Condition (applicable)					Design		Monitoring Baseline (MY0)		
	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
<b>Riffle Only</b>										
Bankfull Width (ft)	5.2	6.0	6.0	6.8	4	9.8		13.3		1
Floodprone Width (ft)	18.5	33.4	27.5	60+	4	40	52	56.9		1
Bankfull Mean Depth (ft)	0.9	1.0	1.0	1.2	4	0.8		0.7		1
Bankfull Max Depth (ft)	1.2	1.5	1.5	1.9	4	1.3		1.5		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	5.4	6.0	6.1	6.3	4	7.6		8.9		1
Width/Depth Ratio	4.3	6.1	6.2	7.6	4	12.6		19.8		1
Entrenchment Ratio	2.7	6.0	4.6	12.3	4	4.1	5.3	4.3		1
Bank Height Ratio	1.0	1.2	1.2	1.3	4	1.0		1.0		1
Max part size (mm) mobilized at bankfull	48					52		39		
Rosgen Classification	F4/E4					C4/B4c		C4/B4c		
Bankfull Discharge (cfs)	27.9					39.2		39.2		
Sinuosity (ft)	1.07					1.1		1.1		
Water Surface Slope (Channel) (ft/ft)	0.020					0.021		0.020		
Other										

**Table 8. Baseline Stream Data Summary  
Round Hill Branch, RHB-2**

Parameter	Pre-Existing Condition (applicable)					Design		Monitoring Baseline (MY0)		
	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
<b>Riffle Only</b>										
Bankfull Width (ft)	5.5				1	11.4		9.7		1
Floodprone Width (ft)	35.0				1	44	65	73.9		1
Bankfull Mean Depth (ft)	1.3				1	0.9		0.6		1
Bankfull Max Depth (ft)	1.6				1	1.4		1.1		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	7.1				1	10.2		6.1		1
Width/Depth Ratio	4.2				1	12.8		15.5		1
Entrenchment Ratio	6.4				1	3.9	5.7	7.6		1
Bank Height Ratio	1.0				1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	57					39		30		
Rosgen Classification	F4/E4					C4/B4c		C4/B4c		
Bankfull Discharge (cfs)	35.5					47.5		47.5		
Sinuosity (ft)	1.05					1.2		1.2		
Water Surface Slope (Channel) (ft/ft)	0.020					0.014		0.016		
Other										

**Table 8. Baseline Stream Data Summary  
Round Hill Branch, RHB-3**

Parameter	Pre-Existing Condition (applicable)					Design		Monitoring Baseline (MY0)		
	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
<b>Riffle Only</b>										
Bankfull Width (ft)	11.5				1	11.8		12.3		1
Floodprone Width (ft)	29.4				1	38	55	56.1		1
Bankfull Mean Depth (ft)	0.8				1	0.9		0.7		1
Bankfull Max Depth (ft)	2.1				1	1.5		1.5		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	9.0				1	11.2		8.6		1
Width/Depth Ratio	14.6				1	12.5		17.7		1
Entrenchment Ratio	2.6				1	3.2	4.7	4.5		1
Bank Height Ratio	1.0				1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	34					47		32		
Rosgen Classification	F4/E4					C4/B4c		C4/B4c		
Bankfull Discharge (cfs)	42.7					55.6		55.6		
Sinuosity (ft)	1.12					1.1		1.1		
Water Surface Slope (Channel) (ft/ft)	0.018					0.017		0.016		
Other										

**Table 8. Baseline Stream Data Summary  
Round Hill Branch, T1**

Parameter	Pre-Existing Condition (applicable)					Design		Monitoring Baseline (MY0)		
	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
<b>Riffle Only</b>										
Bankfull Width (ft)	3.8			4.1	2	6.8		6.6		1
Floodprone Width (ft)	7.9	19.0		30.0	2	35	45	50.2		1
Bankfull Mean Depth (ft)	0.7	0.7		0.7	2	0.5		0.5		1
Bankfull Max Depth (ft)	0.9	1.0		1.1	2	0.9		0.9		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	2.5	2.7		2.9	2	3.7		3.5		1
Width/Depth Ratio	5.8	5.9		5.9	2	12.7		12.2		1
Entrenchment Ratio	1.9	4.9		7.9	2	5.1	6.6	7.6		1
Bank Height Ratio	1.0	1.4		1.7	2	1.0		1.0		1
Max part size (mm) mobilized at bankfull	34					29		26		
Rosgen Classification	F4					C4/B4c		C4/B4c		
Bankfull Discharge (cfs)	10.0					14.2		14.2		
Sinuosity (ft)	1.10					1.13		1.13		
Water Surface Slope (Channel) (ft/ft)	0.020					0.019		0.017		
Other										

**Table 8. Baseline Stream Data Summary  
Round Hill Branch, T2**

Parameter	Pre-Existing Condition (applicable)					Design		Monitoring Baseline (MY0)		
	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
<b>Riffle Only</b>										
Bankfull Width (ft)	9.7				1	6.4		6.2		1
Floodprone Width (ft)	11.8				1	27	34	36.1		1
Bankfull Mean Depth (ft)	0.3				1	0.5		0.5		1
Bankfull Max Depth (ft)	0.8				1	0.8		0.8		1
Bankfull Cross Sectional Area (ft <sup>2</sup> )	3.3				1	3.1		3.1		1
Width/Depth Ratio	28.1				1	13.2		12.6		1
Entrenchment Ratio	1.2				1	4.2	5.3	5.8		1
Bank Height Ratio	1.0				1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	31					48		54		
Rosgen Classification	G4					B4/C4b		B4/C4b		
Bankfull Discharge (cfs)	10.3					14.0		14.0		
Sinuosity (ft)	1.06					1.13		1.13		
Water Surface Slope (Channel) (ft/ft)	0.031					0.031		0.037		
Other										

Round Hill Branch Restoration Site (ID-100066)

	Cross Section 1 (Riffle - RHB-1)							Cross Section 2 (Pool - RHB-1)							Cross Section 3 (Riffle - RHB-2)						
	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 Area	2168.8	2169.0	2169.0					2168.0	2168.0	2168.0					2161.1	2161.2	2161.5				
Bank Height Ratio - Based on AB Bankfull Area	1.0	0.9	1.0					---	---	---					1.0	1.1	1.0				
Thalweg Elevation	2167.3	2167.4	2167.4					2165.8	2165.8	2165.9					2160.1	2159.9	2159.8				
LTOB Elevation	2168.8	2168.8	2169.0					2168.0	2168.1	2168.1					2161.1	2161.3	2161.2				
LTOB Max Depth (ft)	1.5	1.4	1.6					2.1	2.3	2.1					1.1	1.4	1.3				
LTOB Cross Sectional Area (ft <sup>2</sup> )	8.9	6.9	8.8					15.5	17.0	16.1					6.1	7.2	6.8				
	Cross Section 4 (Pool - RHB-2)							Cross Section 5 (Riffle - RHB-3)							Cross Section 6 (Pool - RHB-3)						
	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 Area	2160.7	2161.4	2161.5					2154.4	2154.5	2154.4					2153.8	2154.1	2153.9				
Bank Height Ratio - Based on AB Bankfull Area	---	---	---					1.0	1.0	1.0					---	---	---				
Thalweg Elevation	2157.5	2157.5	2157.6					2152.9	2152.9	2152.9					2150.6	2151.3	2150.7				
LTOB Elevation	2160.7	2160.7	2160.6					2154.4	2154.4	2154.5					2153.8	2153.8	2154.0				
LTOB Max Depth (ft)	3.2	3.2	3.0					1.5	1.5	1.5					3.2	2.6	3.3				
LTOB Cross Sectional Area (ft <sup>2</sup> )	29.7	18.6	18.0					8.6	7.9	8.8					26.4	21.9	27.5				
	Cross Section 7 (Riffle - T1)							Cross Section 8 (Pool - T1)							Cross Section 9 (Riffle - T2)						
	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 Area	2167.7	2167.9	2167.9					2167.2	2167.7	2167.8					2162.5	2162.6	2162.9				
Bank Height Ratio - Based on AB Bankfull Area	1.0	0.9	1.0					---	---	---					1.0	1.0	0.3				
Thalweg Elevation	2166.8	2166.8	2166.8					2165.4	2166.0	2166.1					2161.7	2161.9	2162.0				
LTOB Elevation	2167.7	2167.8	2167.9					2167.2	2167.5	2167.4					2162.5	2162.6	2162.5				
LTOB Max Depth (ft)	0.9	1.0	1.1					1.8	1.5	1.3					0.8	0.7	0.5				
LTOB Cross Sectional Area (ft <sup>2</sup> )	3.5	2.9	3.6					10.2	9.0	6.1					3.1	3.2	1.1				
	Cross Section 10 (Pool - T2)																				
	MY0	MY1	MY2	MY3	MY5	MY7	MY+														
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2161.4	2161.6	2161.9																		
Bank Height Ratio - Based on AB Bankfull Area	---	---	---																		
Thalweg Elevation	2159.8	2159.8	2160.2																		
LTOB Elevation	2161.4	2161.4	2161.5																		
LTOB Max Depth (ft)	1.6	1.6	1.3																		
LTOB Cross Sectional Area (ft <sup>2</sup> )	6.8	5.8	3.9																		

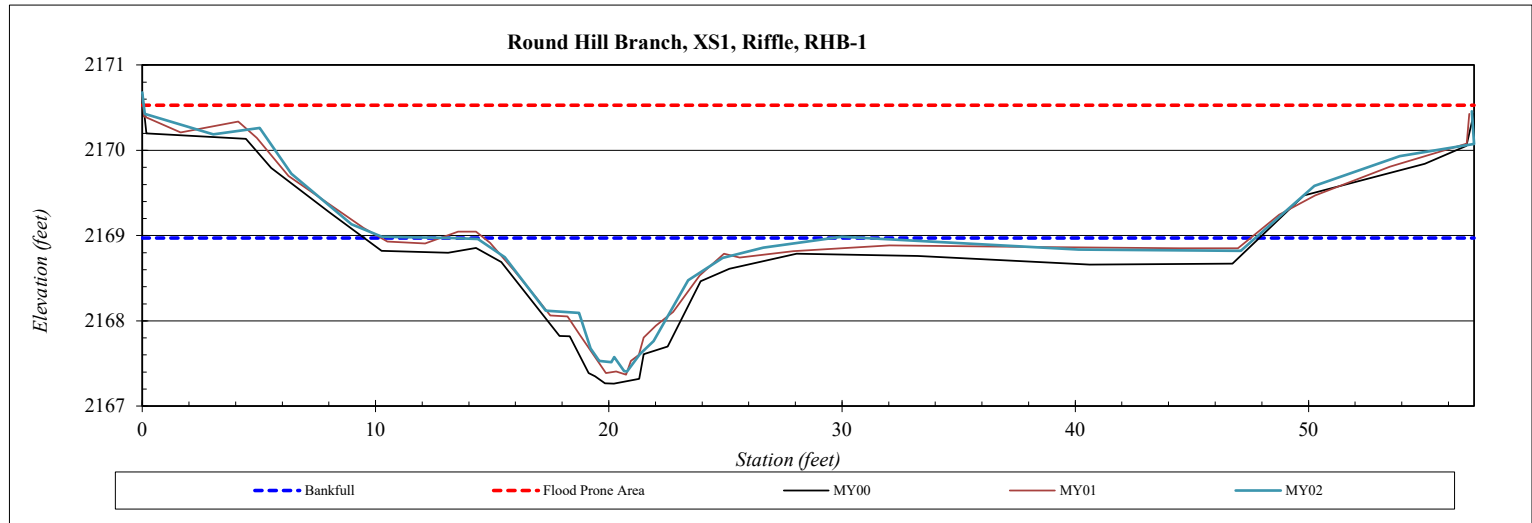
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS1
<b>Drainage Area (sq mi):</b>	0.46
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation
0.0	2170.68
0.1	2170.43
3.0	2170.19
5.0	2170.26
6.4	2169.73
9.0	2169.13
10.3	2168.99
13.3	2168.97
14.4	2168.96
15.5	2168.75
17.3	2168.12
18.7	2168.09
19.2	2167.68
19.6	2167.53
20.1	2167.52
20.2	2167.58
20.7	2167.41
20.8	2167.41
21.3	2167.61
21.9	2167.76
23.4	2168.48
24.9	2168.74
26.6	2168.86
30.0	2168.99
40.1	2168.84
47.1	2168.82
50.3	2169.58
53.9	2169.93
57.1	2170.07
57.0	2170.46

SUMMARY DATA	
<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2168.97
<b>Bankfull Cross-Sectional Area:</b>	8.9
<b>LTOB Cross-Sectional Area:</b>	8.8
<b>Bankfull Width:</b>	15.2
<b>Flood Prone Area Elevation:</b>	2170.53
<b>Flood Prone Width:</b>	56.9
<b>LTOB Max Depth</b>	1.6
<b>LTOB Mean Depth</b>	0.6
<b>W / D Ratio:</b>	26.3
<b>Entrenchment Ratio:</b>	3.7
<b>Bank Height Ratio:</b>	1.0
<b>Thalweg Elevation:</b>	2167.41



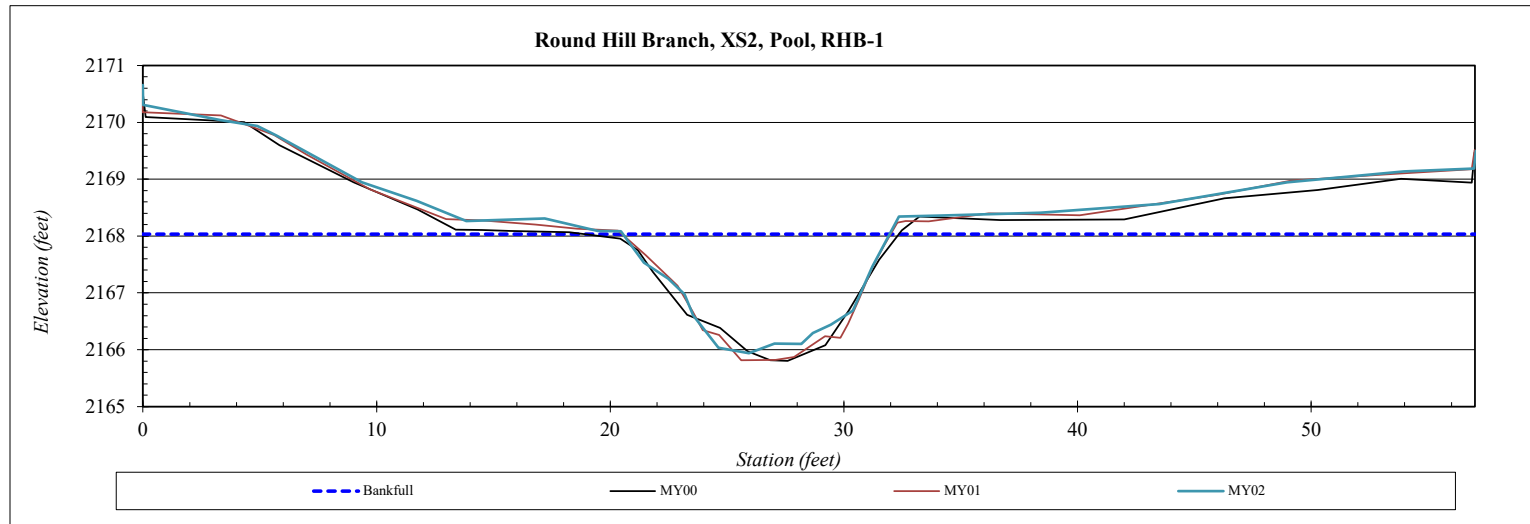
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS2
<b>Drainage Area (sq mi):</b>	0.46
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation
0.0	2170.65
0.0	2170.31
3.3	2170.04
4.9	2169.94
5.7	2169.77
9.4	2168.95
11.7	2168.62
13.8	2168.26
17.2	2168.31
19.5	2168.09
20.5	2168.09
21.4	2167.53
22.5	2167.25
23.2	2166.97
23.5	2166.61
24.6	2166.03
25.9	2165.94
27.0	2166.11
28.2	2166.10
28.7	2166.29
29.4	2166.44
30.4	2166.69
31.2	2167.47
32.4	2168.34
34.1	2168.36
38.4	2168.41
43.5	2168.56
49.0	2168.94
54.0	2169.14
57.0	2169.19
57.0	2169.50

SUMMARY DATA	
<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2168.03
<b>Bankfull Cross-Sectional Area:</b>	15.5
<b>LTOB Cross-Sectional Area:</b>	16.1
<b>Bankfull Width:</b>	11.4
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>LTOB Max Depth</b>	2.1
<b>LTOB Mean Depth</b>	1.4
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---
<b>Thalweg Elevation:</b>	2165.94





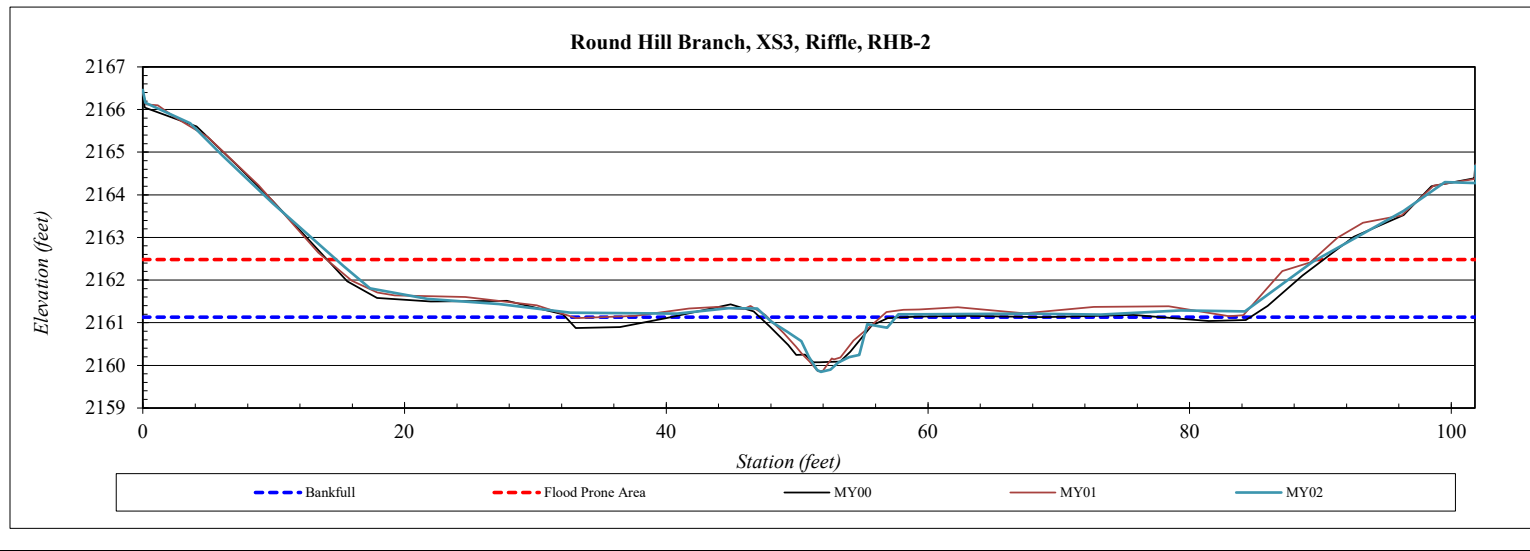
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS3
<b>Drainage Area (sq mi):</b>	0.59
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation
0.0	2166.46
0.2	2166.16
3.6	2165.68
6.1	2164.93
9.9	2163.79
15.4	2162.32
17.4	2161.80
21.8	2161.56
27.2	2161.44
32.7	2161.24
40.8	2161.21
44.7	2161.34
47.0	2161.33
48.0	2161.02
49.2	2160.80
50.3	2160.57
50.9	2160.20
51.5	2159.89
51.8	2159.84
52.5	2159.90
53.1	2160.06
54.0	2160.20
54.7	2160.25
55.4	2160.97
56.9	2160.88
57.7	2161.19
59.7	2161.20
67.6	2161.22
73.2	2161.19
79.3	2161.29
84.2	2161.26
89.4	2162.43
96.4	2163.62
99.5	2164.30
101.9	2164.27
101.9	2164.68

SUMMARY DATA	
<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2161.13
<b>Bankfull Cross-Sectional Area:</b>	6.1
<b>LTOB Cross-Sectional Area:</b>	6.8
<b>Bankfull Width:</b>	9.9
<b>Flood Prone Area Elevation:</b>	2162.48
<b>Flood Prone Width:</b>	75.0
<b>LTOB Max Depth</b>	1.3
<b>LTOB Mean Depth</b>	0.7
<b>W / D Ratio:</b>	14.5
<b>Entrenchment Ratio:</b>	7.6
<b>Bank Height Ratio:</b>	1.0
<b>Thalweg Elevation:</b>	2159.84

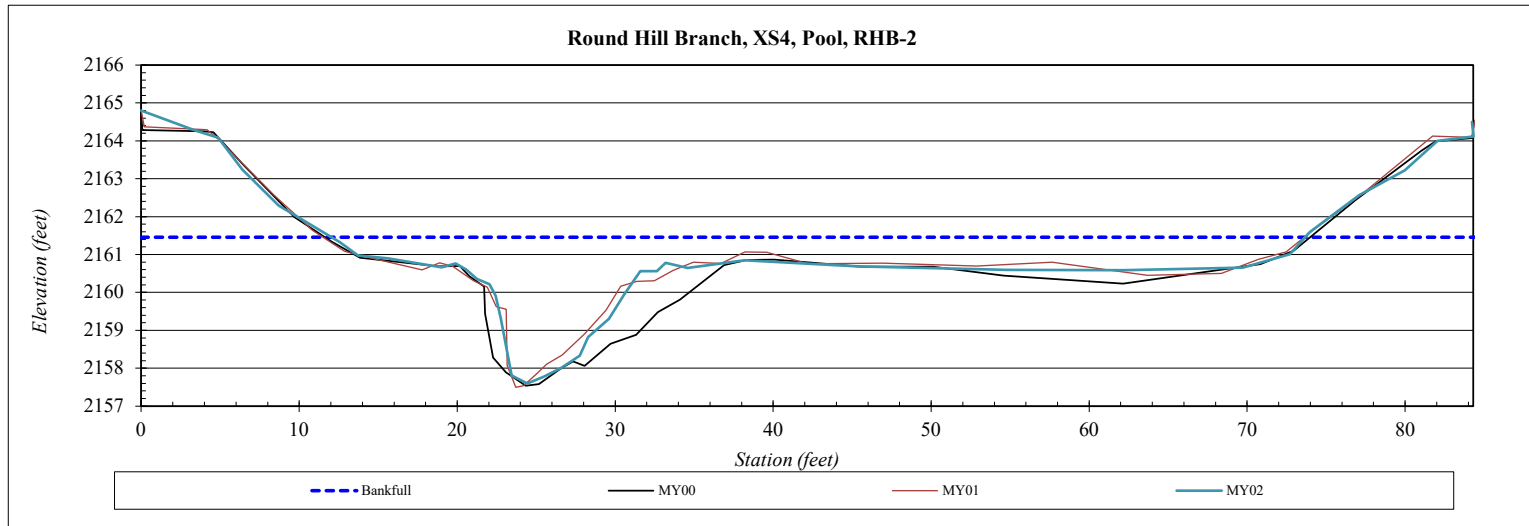


## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS4
<b>Drainage Area (sq mi):</b>	0.59
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation	Station	Elevation	SUMMARY DATA	
0.0	2164.80	82.1	2164.00	<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2161.45
3.4	2164.28	84.3	2164.11	<b>Bankfull Cross-Sectional Area:</b>	29.7
4.9	2164.09	84.2	2164.50	<b>LTOB Cross-Sectional Area:</b>	18.0
6.4	2163.25			<b>Bankfull Width:</b>	13.3
8.7	2162.30			<b>Flood Prone Area Elevation:</b>	---
12.6	2161.32			<b>Flood Prone Width:</b>	---
13.7	2160.98			<b>LTOB Max Depth</b>	3.0
15.6	2160.90			<b>LTOB Mean Depth</b>	1.4
19.0	2160.66			<b>W / D Ratio:</b>	---
19.9	2160.76			<b>Entrenchment Ratio:</b>	---
20.6	2160.60			<b>Bank Height Ratio:</b>	---
21.2	2160.36			<b>Thalweg Elevation:</b>	2157.60
22.1	2160.22				
22.4	2159.91				
22.8	2159.32				
23.4	2157.81				
24.4	2157.60				
25.5	2157.77				
26.6	2158.01				
27.8	2158.33				
28.3	2158.82				
29.6	2159.31				
30.6	2159.94				
31.6	2160.56				
32.6	2160.56				
33.2	2160.78				
34.6	2160.64				
38.2	2160.85				
45.3	2160.68				
54.8	2160.60				
62.2	2160.59				
69.7	2160.66				
72.7	2161.01				
74.0	2161.59				
77.1	2162.57				
80.0	2163.22				



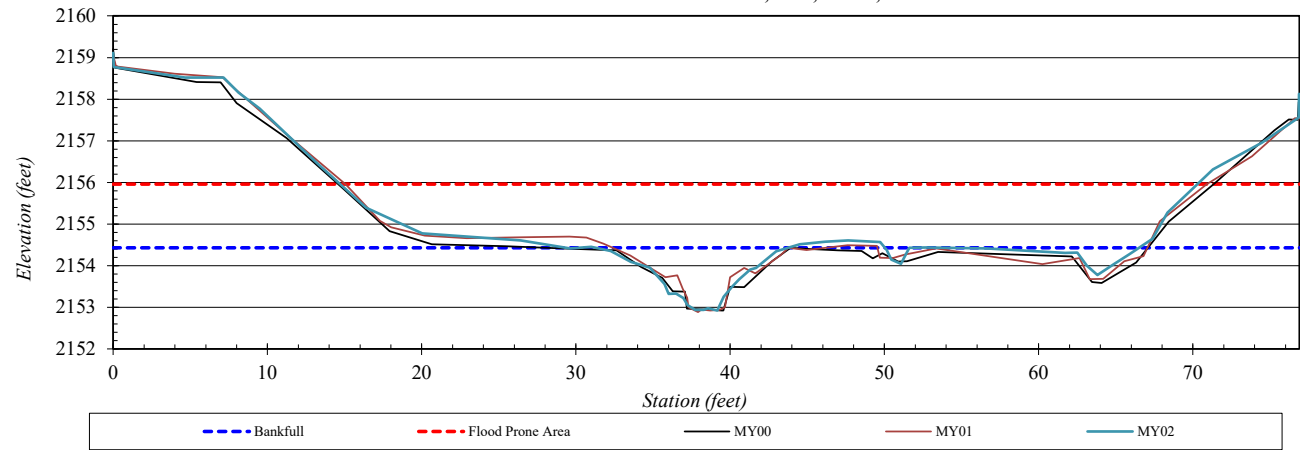
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS5
<b>Drainage Area (sq mi):</b>	0.74
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation	Station	Elevation	SUMMARY DATA	
0.0	2159.11	50.1	2154.39	<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2154.43
0.0	2158.77	50.4	2154.15	<b>Bankfull Cross-Sectional Area:</b>	8.6
0.0	2158.78	51.1	2154.05	<b>LTOB Cross-Sectional Area:</b>	8.8
4.7	2158.52	51.6	2154.43	<b>Bankfull Width:</b>	12.5
7.1	2158.52	52.7	2154.44	<b>Flood Prone Area Elevation:</b>	2155.96
8.1	2158.16	56.6	2154.42	<b>Flood Prone Width:</b>	55.6
9.5	2157.78	61.7	2154.31	<b>LTOB Max Depth</b>	1.5
13.3	2156.45	62.5	2154.31	<b>LTOB Mean Depth</b>	0.7
16.4	2155.39	63.1	2154.00	<b>W / D Ratio:</b>	17.8
20.0	2154.78	63.8	2153.78	<b>Entrenchment Ratio:</b>	4.4
26.4	2154.61	64.8	2154.03	<b>Bank Height Ratio:</b>	1.0
29.6	2154.41	65.9	2154.28	<b>Thalweg Elevation:</b>	2152.93
31.0	2154.45	67.4	2154.64		
32.3	2154.35	68.4	2155.28		
33.6	2154.10	71.3	2156.31		
34.8	2153.95	74.5	2156.96		
35.7	2153.56	76.9	2157.56		
36.0	2153.33	76.9	2158.13		
36.5	2153.33				
37.0	2153.23				
37.2	2153.06				
37.7	2152.94				
37.9	2152.94				
38.3	2152.94				
38.6	2152.98				
39.2	2152.93				
39.6	2153.25				
40.1	2153.49				
40.6	2153.68				
41.3	2153.91				
41.7	2153.94				
43.0	2154.34				
44.5	2154.51				
46.2	2154.58				
47.6	2154.61				
49.7	2154.57				

**Round Hill Branch, XS5, Riffle, RHB-3**

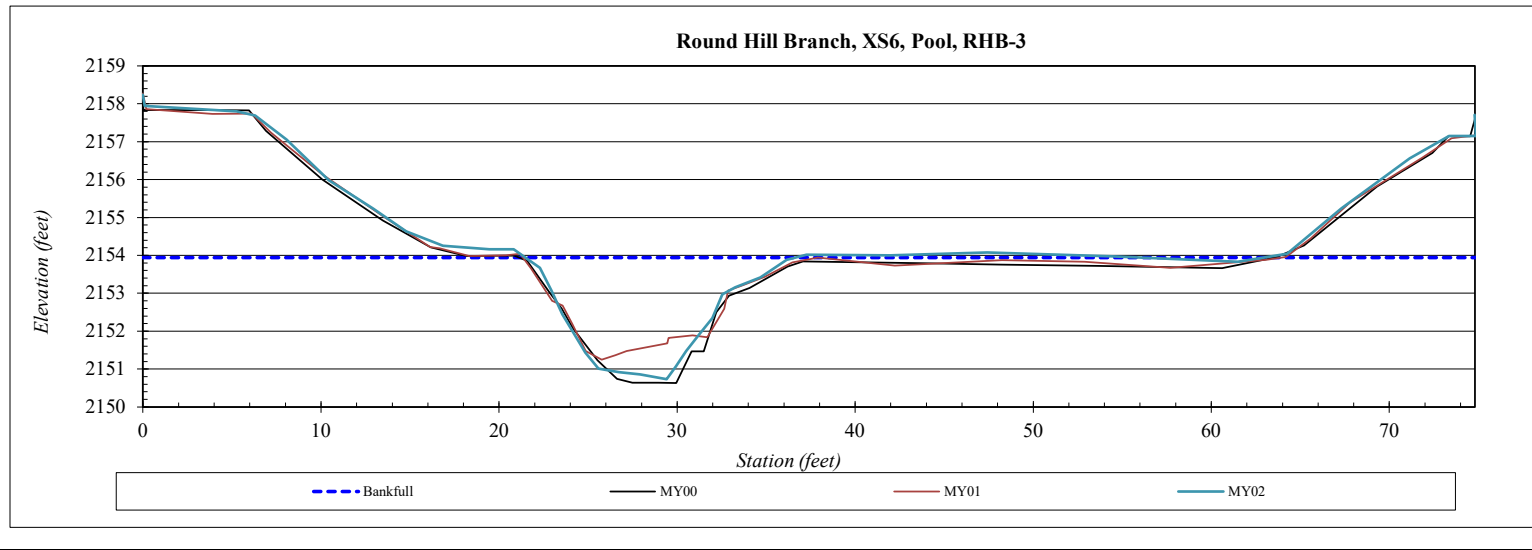


## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS6
<b>Drainage Area (sq mi):</b>	0.74
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation	Station	Elevation	SUMMARY DATA	
0.0	2158.24	74.9	2157.15	<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2153.94
0.1	2157.94	74.8	2157.70	<b>Bankfull Cross-Sectional Area:</b>	26.4
5.2	2157.80			<b>LTOB Cross-Sectional Area:</b>	27.5
6.3	2157.69			<b>Bankfull Width:</b>	15.2
8.1	2157.05			<b>Flood Prone Area Elevation:</b>	---
10.4	2155.99			<b>Flood Prone Width:</b>	---
12.9	2155.23			<b>LTOB Max Depth</b>	3.3
14.8	2154.63			<b>LTOB Mean Depth</b>	1.8
16.9	2154.25			<b>W / D Ratio:</b>	---
19.5	2154.17			<b>Entrenchment Ratio:</b>	---
20.8	2154.16			<b>Bank Height Ratio:</b>	---
22.3	2153.67			<b>Thalweg Elevation:</b>	2150.74
22.9	2153.07				
23.6	2152.45				
24.8	2151.44				
25.6	2151.01				
26.7	2150.92				
27.9	2150.86				
29.4	2150.74				
29.9	2151.07				
30.5	2151.48				
31.2	2151.90				
32.0	2152.34				
32.5	2152.97				
33.3	2153.16				
34.7	2153.42				
36.1	2153.89				
37.3	2154.02				
42.0	2154.00				
47.4	2154.07				
54.4	2153.97				
61.5	2153.83				
64.3	2154.04				
67.3	2155.24				
71.2	2156.56				
73.3	2157.15				





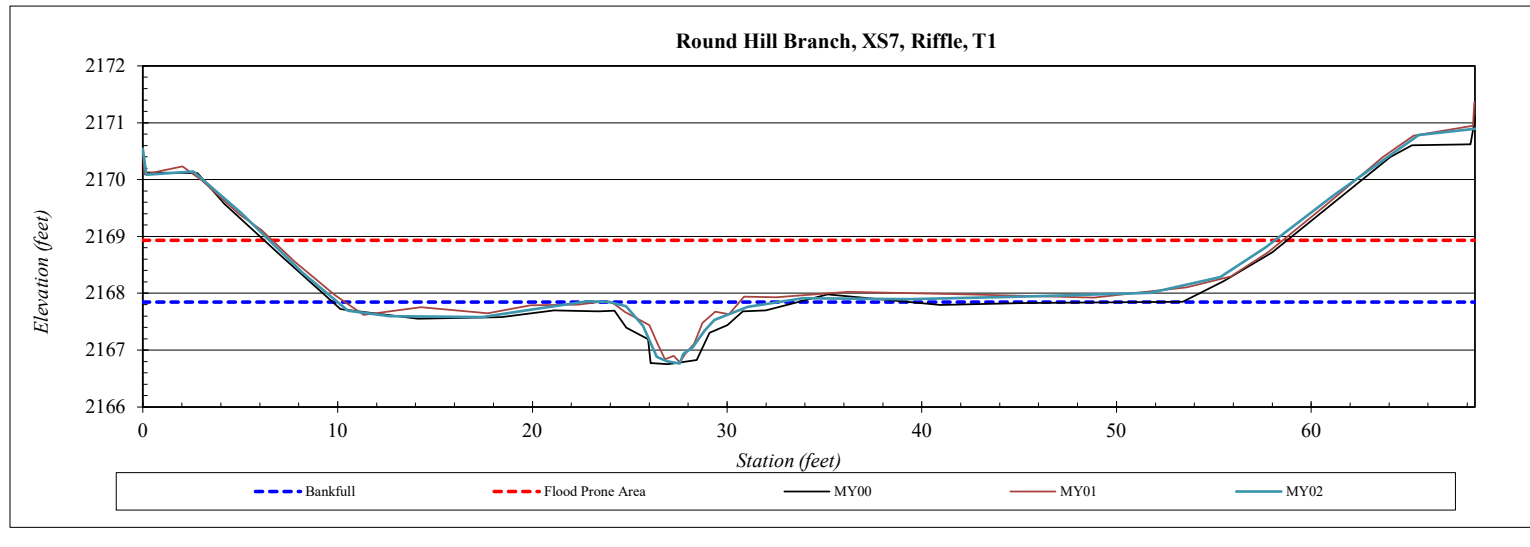
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS7
<b>Drainage Area (sq mi):</b>	0.11
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation
0.0	2170.54
0.2	2170.08
2.6	2170.14
5.1	2169.41
8.2	2168.36
10.5	2167.69
12.7	2167.60
17.4	2167.58
20.2	2167.73
22.8	2167.86
23.9	2167.85
24.8	2167.77
25.7	2167.43
26.4	2166.88
26.9	2166.80
27.6	2166.77
27.7	2166.94
28.2	2167.05
28.8	2167.34
29.3	2167.53
31.1	2167.76
33.9	2167.91
39.3	2167.90
45.8	2167.95
51.7	2168.01
55.3	2168.29
57.7	2168.81
61.2	2169.73
65.5	2170.78
68.6	2170.90
68.5	2171.32

SUMMARY DATA	
<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2167.85
<b>Bankfull Cross-Sectional Area:</b>	3.5
<b>LTOB Cross-Sectional Area:</b>	3.6
<b>Bankfull Width:</b>	7.9
<b>Flood Prone Area Elevation:</b>	2168.93
<b>Flood Prone Width:</b>	51.6
<b>LTOB Max Depth</b>	1.1
<b>LTOB Mean Depth</b>	0.5
<b>W / D Ratio:</b>	17.5
<b>Entrenchment Ratio:</b>	6.5
<b>Bank Height Ratio:</b>	1.0
<b>Thalweg Elevation:</b>	2166.77



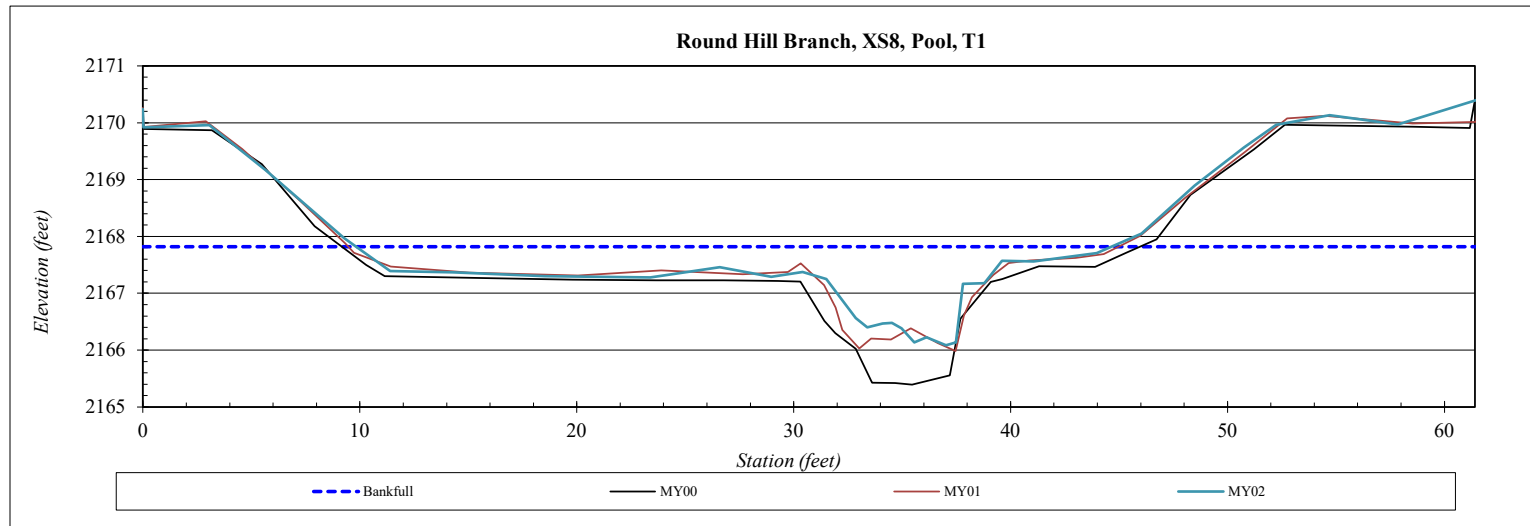
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS8
<b>Drainage Area (sq mi):</b>	0.11
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation
0.0	2170.24
0.0	2169.92
3.1	2169.96
5.6	2169.17
9.3	2167.97
11.4	2167.39
14.3	2167.37
18.5	2167.30
23.4	2167.28
26.6	2167.46
29.0	2167.29
30.4	2167.37
31.5	2167.25
32.9	2166.56
33.4	2166.40
34.1	2166.47
34.5	2166.48
35.0	2166.38
35.6	2166.14
36.1	2166.23
37.0	2166.09
37.5	2166.14
37.8	2167.16
38.8	2167.18
39.6	2167.57
41.1	2167.56
44.0	2167.71
46.0	2168.05
48.5	2168.90
50.8	2169.57
52.3	2169.96
54.7	2170.13
57.8	2169.97
61.5	2170.40

SUMMARY DATA	
<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2167.82
<b>Bankfull Cross-Sectional Area:</b>	10.2
<b>LTOB Cross-Sectional Area:</b>	6.1
<b>Bankfull Width:</b>	9.2
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>LTOB Max Depth</b>	1.3
<b>LTOB Mean Depth</b>	0.7
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---
<b>Thalweg Elevation:</b>	2166.09



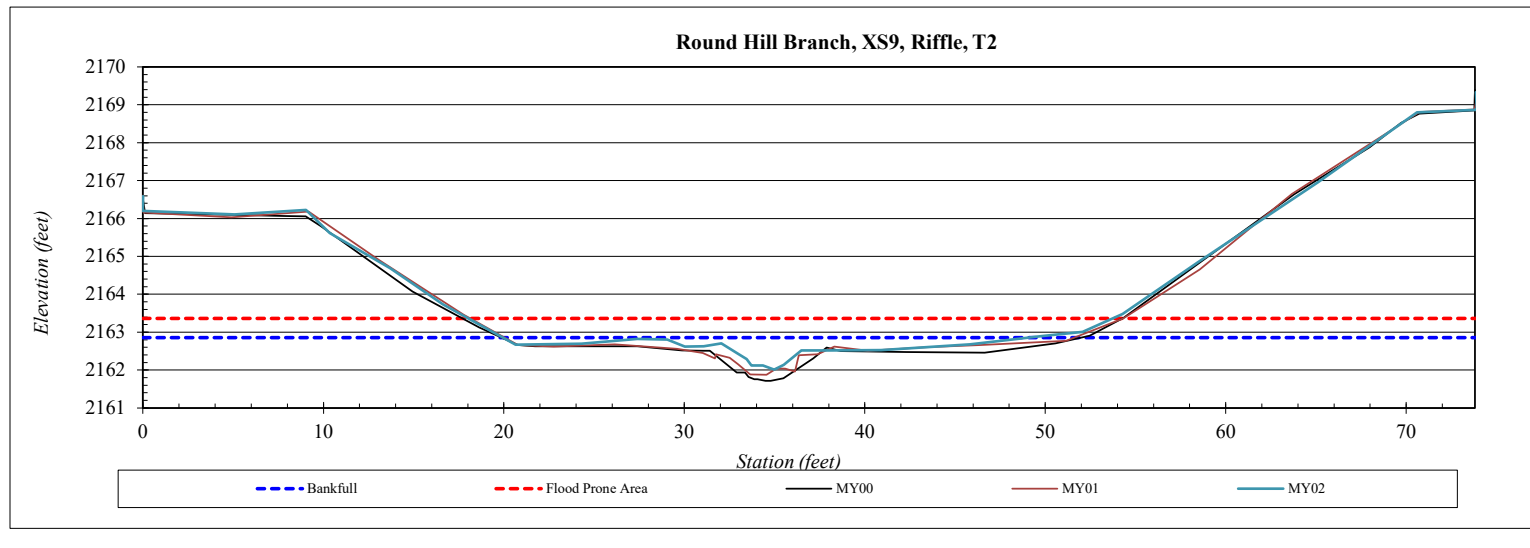
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS9
<b>Drainage Area (sq mi):</b>	0.11
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation
0.0	2166.59
0.0	2166.20
5.1	2166.10
9.0	2166.23
10.4	2165.62
13.7	2164.69
16.6	2163.73
20.6	2162.67
24.3	2162.70
27.4	2162.82
29.0	2162.81
30.0	2162.62
31.1	2162.63
32.1	2162.70
33.0	2162.43
33.5	2162.29
33.7	2162.12
34.4	2162.12
35.0	2162.01
35.5	2162.14
36.5	2162.52
38.1	2162.52
40.9	2162.53
45.8	2162.68
49.8	2162.90
52.1	2163.01
54.3	2163.48
58.5	2164.85
65.1	2166.96
70.6	2168.80
73.9	2168.87
73.9	2169.33

SUMMARY DATA	
<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2162.85
<b>Bankfull Cross-Sectional Area:</b>	3.1
<b>LTOB Cross-Sectional Area:</b>	1.1
<b>Bankfull Width:</b>	6.0
<b>Flood Prone Area Elevation:</b>	2163.36
<b>Flood Prone Width:</b>	35.7
<b>LTOB Max Depth</b>	0.5
<b>LTOB Mean Depth</b>	0.2
<b>W / D Ratio:</b>	32.2
<b>Entrenchment Ratio:</b>	5.9
<b>Bank Height Ratio:</b>	0.3
<b>Thalweg Elevation:</b>	2162.01



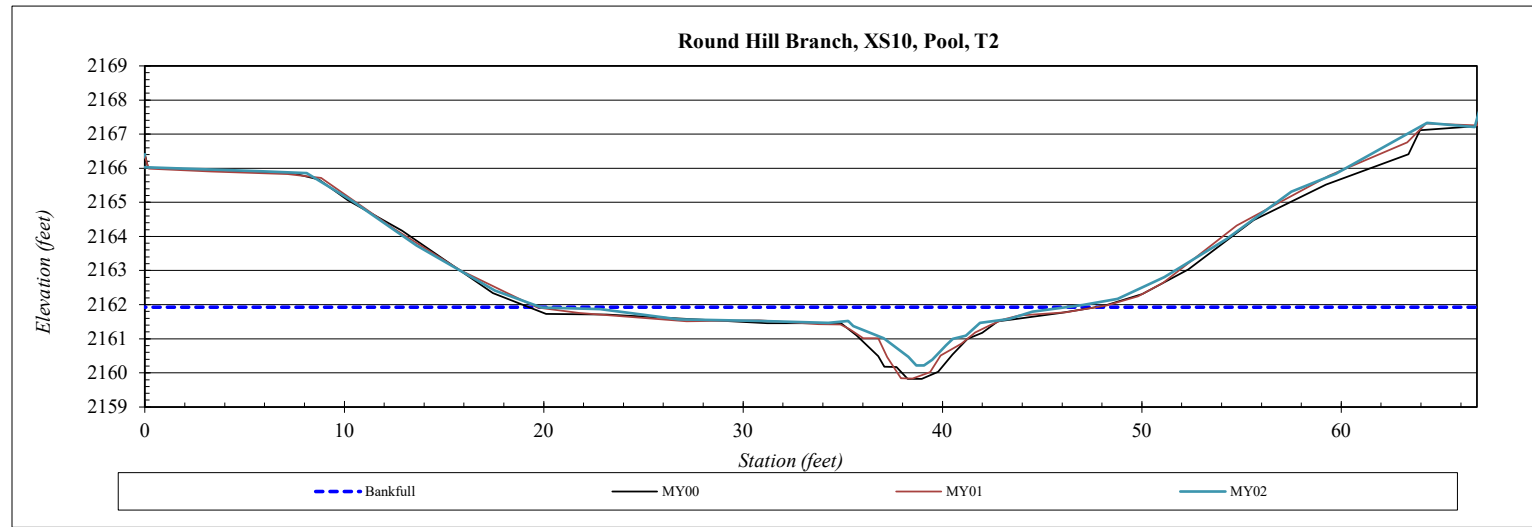
## Cross-Section Plots

<b>River Basin:</b>	French Broad
<b>Site:</b>	Round Hill Branch
<b>XS ID</b>	XS10
<b>Drainage Area (sq mi):</b>	0.11
<b>Date:</b>	8/1/2023
<b>Field Crew:</b>	TS, CK



Station	Elevation
0.0	2166.41
-0.3	2166.04
5.7	2165.91
8.1	2165.86
10.4	2165.03
13.6	2163.74
17.5	2162.42
19.9	2161.92
22.8	2161.87
26.8	2161.57
30.9	2161.52
34.3	2161.46
35.3	2161.52
35.5	2161.37
36.5	2161.14
37.0	2161.02
38.3	2160.47
38.7	2160.22
39.1	2160.21
39.5	2160.39
40.2	2160.81
40.5	2161.00
41.2	2161.09
41.9	2161.46
43.3	2161.58
44.5	2161.79
47.1	2161.99
48.8	2162.17
51.1	2162.81
54.2	2163.92
57.5	2165.31
59.7	2165.83
64.3	2167.33
66.7	2167.21
66.9	2167.64

SUMMARY DATA	
<b>Bankfull Elevation (ft) - Based on AB-Bankfull Area</b>	2161.92
<b>Bankfull Cross-Sectional Area:</b>	6.8
<b>LTOB Cross-Sectional Area:</b>	3.9
<b>Bankfull Width:</b>	6.3
<b>Flood Prone Area Elevation:</b>	---
<b>Flood Prone Width:</b>	---
<b>LTOB Max Depth</b>	1.3
<b>LTOB Mean Depth</b>	0.6
<b>W / D Ratio:</b>	---
<b>Entrenchment Ratio:</b>	---
<b>Bank Height Ratio:</b>	---
<b>Thalweg Elevation:</b>	2160.21





# **APPENDIX D**

## Hydrologic Data

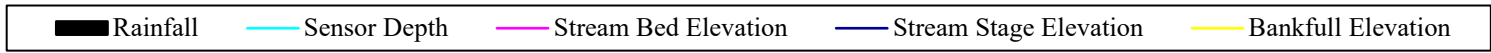
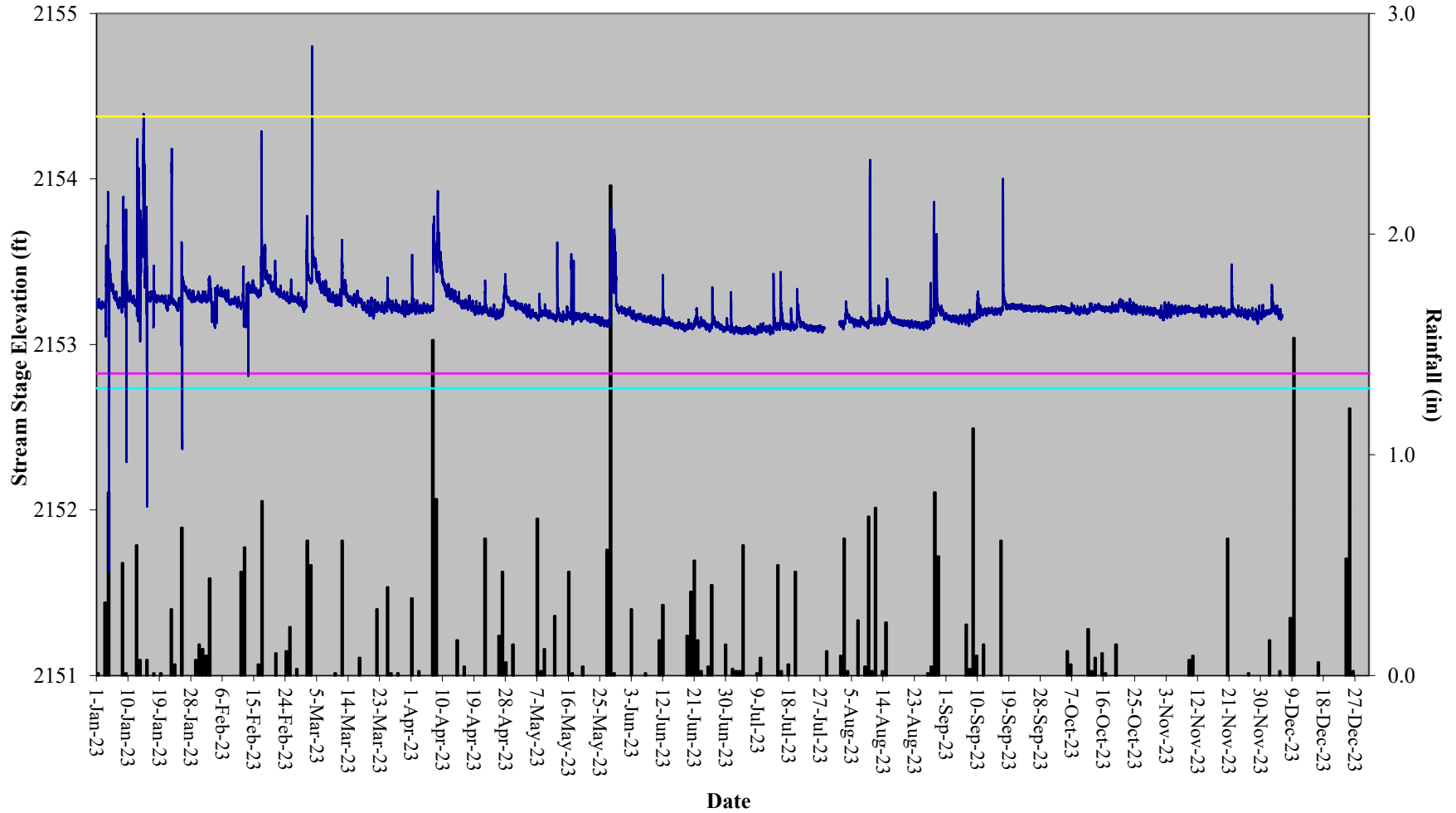
<b>Table 10. Rainfall Summary, Round Hill Branch Restoration Site (ID-100066)</b>							
	<b>MY1 2022</b>	<b>MY2 2023</b>	<b>MY3 2024</b>	<b>MY4 2025</b>	<b>MY5 2026</b>	<b>MY6 2027</b>	<b>MY7 2028</b>
Annual Precip Total	40.27	39.43					
WETS 30th Percentile	29.73	29.73					
WETS 70th Percentile	53.88	53.88					
Normal	Yes	Yes					

<b>Table 11. Overbank Events, Round Hill Branch Restoration Site (ID-100066)</b>							
<b>Gage ID</b>	<b>MY1 2022</b>	<b>MY2 2023</b>	<b>MY3 2024</b>	<b>MY4 2025</b>	<b>MY5 2026</b>	<b>MY6 2027</b>	<b>MY7 2028</b>
RHB	10	2					

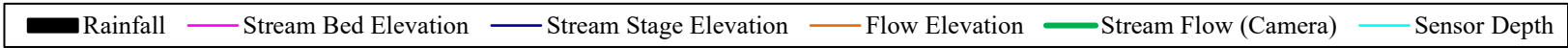
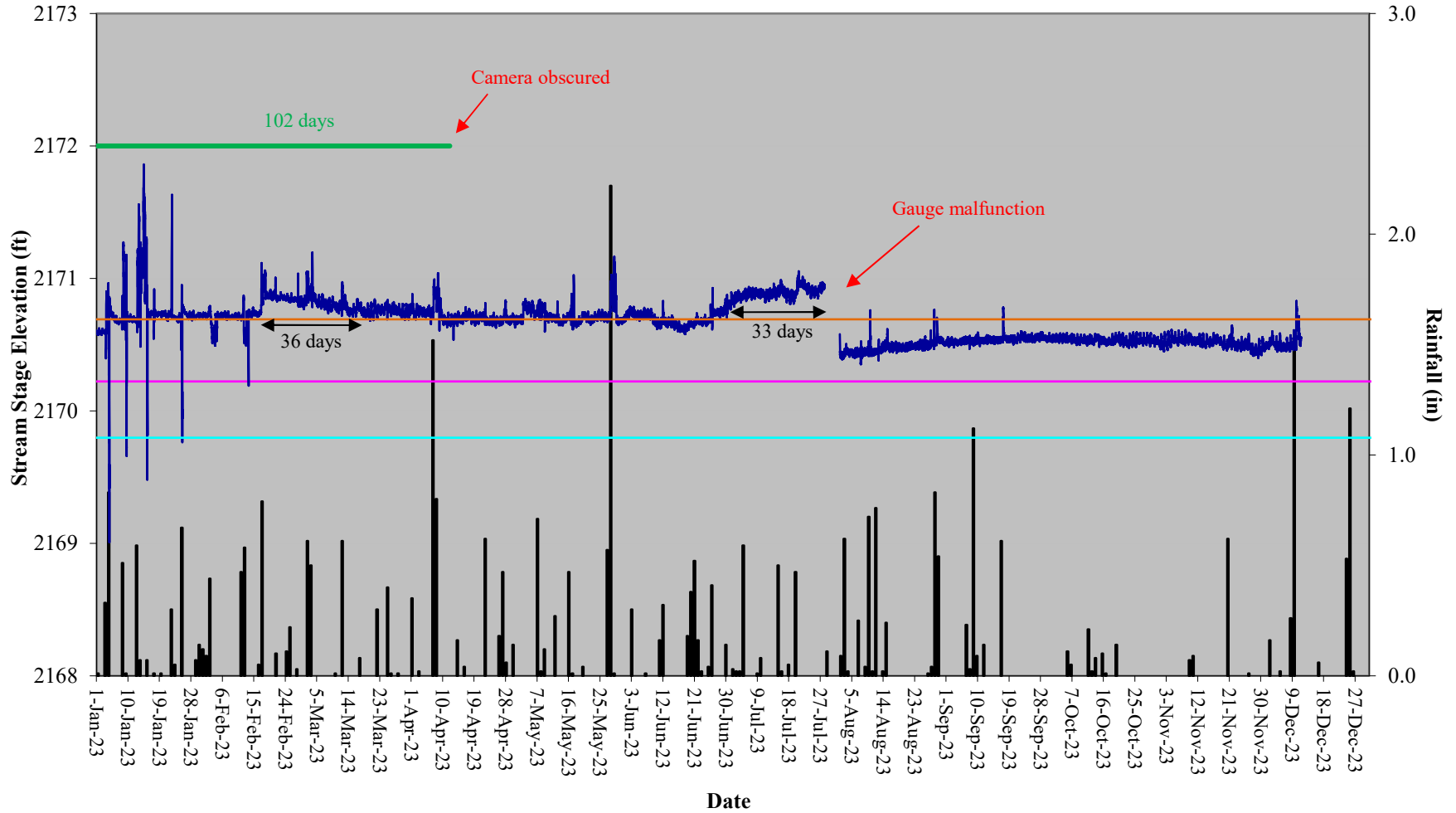
<b>Table 12. Stream Flow Criteria Attainment, Round Hill Branch Restoration Site (ID-100066)</b>							
	Greater than 30 Days of Flow/Max Consecutive Days						
<b>Reach</b>	<b>MY1 2022</b>	<b>MY2 2023</b>	<b>MY3 2024</b>	<b>MY4 2025</b>	<b>MY5 2026</b>	<b>MY6 2027</b>	<b>MY7 2028</b>
UT1 (Gauge)	No/21*	Yes/36					
UT1 (Camera)	Yes/181	Yes/102					
UT2 (Gauge)	Yes/209	Yes/136					
UT2 (Camera)	Yes/83	Yes/115					

\*Gauge malfunction

# Round Hill Branch Creek Restoration Site Hydrograph Stream Gauge RHB

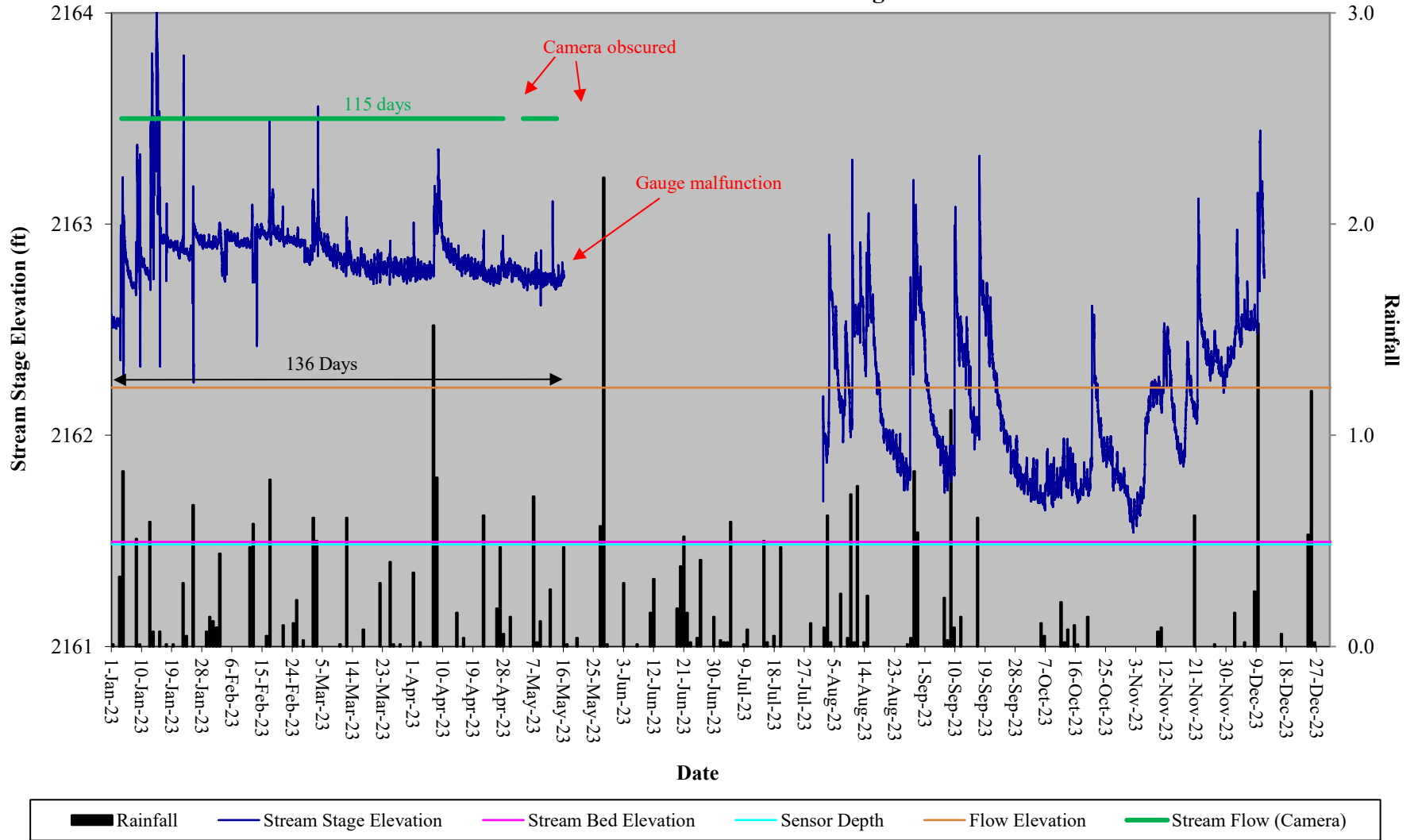


# Round Hill Branch Creek Restoration Site Hydrograph Stream Gauge T1





### Round Hill Branch Creek Restoration Site Hydrograph T2 Stream Flow Gauge



# **APPENDIX E**

## **Project Timeline and Contact Info**

<b>Table 13. Project Activity &amp; Reporting History Round Hill Branch Restoration Site, DMS Project #100066</b>		
<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Actual Completion or Delivery</b>
Site Instituted		April 25, 2018
Mitigation Plan		Nov. 13, 2020
Final Design - Construction Plans		Feb. 12, 2021
Construction Grading Completed		June 18, 2021
As-built Survey		August 11, 2021
Repairs from Storm Damage Completed		Sept. 26, 2021
Planting Completed		Dec. 20, 2021
Baseline Monitoring/Report		February 2022
Vegetation Monitoring	January 18, 2022	
Stream Survey	January 19, 2022	
Year 1 Monitoring		January 2023
Vegetation Monitoring	October 10, 2022	
Stream Survey	December 20, 2022	
Year 2 Monitoring		January 2024
Vegetation Monitoring	August 1, 2023	
Stream Survey	August 1, 2023	

<b>Table 14. Project Contacts Round Hill Branch Restoration Site, DMS Project #100066</b>	
<b>Design Firm</b>	KCI Associates of North Carolina, PA 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2512 Fax: (919) 783-9266
<b>Construction Contractor</b>	KCI Environmental Technologies and Construction 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller
<b>Planting Contractor</b>	Shenandoah Habitats 1983 Jefferson Highway Waynesboro, VA 22980 Contact: Mr. David Coleman Phone: (540) 941-0067
<b>Monitoring Performers</b>	
	KCI Associates of North Carolina, PA 4505 Falls of Neuse Road Suite 400 Raleigh, NC 27609 Contact: Mr. Adam Spiller