MY01 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: 2022

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

NORTH CAROLINA
Department of Environmental Quality

Monitoring and Design Firm

Prepared by:

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KCI ASSOCIATES OF NORTH CAROLINA, PA

ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS
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MEMORANDUM

Date: February 10, 2023
To: Matthew Reid, DMS Project Manager
From: Adam Spiller, Project Manager
KCI Associates of North Carolina, PA
Subject: MY-01 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-01 Monitoring Report comments from NCDMS received on January 30, 2023 for the Round Hill Branch Restoration Site.

1. In an effort to identify and resolve property issues, please verify the conservation easement has been inspected, marking is up to date, fencing is intact, and no encroachments have been identified.
   KCI Response: Besides the fence encroachment issue noted in the MY00 report, no other issues with the easement have been identified. The easement was inspected as part of the visual inspection of the site completed on December 19, 2022.

2. Thank you for providing a comment response letter to the IRT MY0 comments in Appendix F of the MY1 report. Please provide updates to the following items discussed in MY0:
   - The report indicates that KCI is actively working to resolve the fence encroachment issues at the site. When does KCI expect to resolve the issues? The IRT requested this be completed before the 2023 Credit Release Meetings in the MY0 comments.
   - DMS identified picnic tables and logs/gravel within the conservation easement during the MY0 site visit. Have these items been removed from the conservation easement?

   KCI Response: KCI is still working towards resolving the fence encroachment issue. This is expected to be resolved in 2023. The logs and picnic tables that were being stored in the easement were removed in the spring of 2022 and KCI had a conversation with the landowner regarding these items.

3. CCPV: Recommend adding location of additional photo for ford crossing on RHB.
   KCI Response: This change has been made.

4. CCPV: Recommend adding a line to represent the constructed swale on RHB.
   KCI Response: This change has been made.

5. Table of Contents and Page 5: Section is labeled Baseline Conditions. Please update to Monitoring Year 1.
   KCI Response: This has been corrected.

6. Table 4: Please review and revise the assessment date for all Tables. Currently shows 1/19/2022. This is likely a remnant from the MY0 report.
   KCI Response: The correct date is 12/19/2022. This error has been corrected.

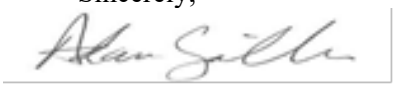
7. Table 5: Please add assessment date to this table.
   KCI Response: This change has been made.

8. Thank you for including the IRT requested additional photos. Recommend including these photos in future reports.
   KCI Response: The additional photo of the ford crossing will be included in future monitoring reports.

9. Stream Gauge Graphs: Please add consecutive day callouts for Camera line like it is shown for the Stream Stage Elevation line.
   KCI Response: This change has been made.

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

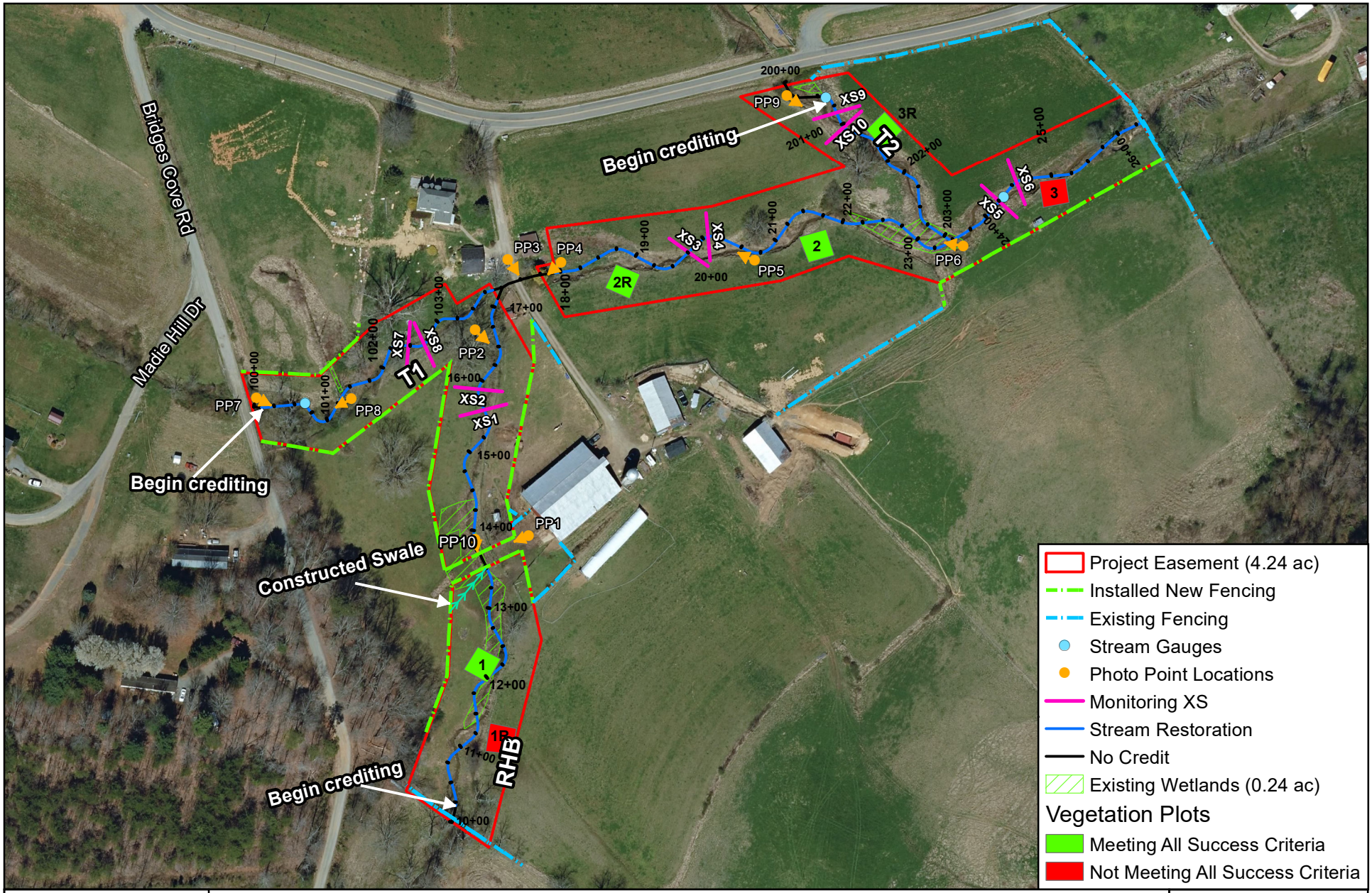
The Round Hill Branch Restoration Site (RHBRS) was completed in December 2021 and restored a total of 2,142 linear feet of stream. The RHBRS is a riparian system in the French Broad River Basin (06010105 8-digit cataloging unit) in Buncombe County, North Carolina. The site's natural hydrologic regime 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)
					Total:	**2,142.000**		

Project Credits

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						
Total		**2142.000**				



0 75 150 Feet

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

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Image Source: NC OneMap 2019 Orthoimagery.

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

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
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	10 bankfull events and both reaches recorded >30 consecutive days of flow in 2022
	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	Geomorpholgy 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	4 out of 6 plots meeting all success criteria

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		
Project Watershed Summary Information			
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%).		
Reach Summary Information			
Parameters			
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		
Wetland Summary Information			
Parameters	**W1 & W3**	**W2**	**W4**
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
Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
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 MY01 vegetation monitoring was conducted October 10, 2022. Four of the six vegetation monitoring plots achieved all of the success criteria. Plots 3 and 1R both had only 3 native hardwood species. KCI believes that over time, native volunteers will supplement the lower level of species diversity that was seen in these areas. Overall the site is well vegetated with a thick and diverse herbaceous layer.

The MY01 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 pool cross-sections showed signs of aggradation. This is a result of the large sediment source from the unbuffered reach just upstream of the project. The system is also continuing to process the sediment that was deposited during the August 2021 storm. 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, especially after such a large scale event as the project streams experienced just after construction.

During 2022, the gauge on RHB recorded 10 bankfull events. The stream gauge on T1 malfunctioned and did not start recording properly until October 31, missing the majority of the time that the stream flowed in 2022. Because of this malfunction, the gauge on T1 recorded a maximum of 21 consecutive days of flow, while the flow camera on T1 recorded a maximum of 181 consecutive days of flow. The gauge on T2 recorded a maximum of 209 consecutive days of flow, while the camera on this reach recorded 83 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.

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 is continuing to address these issues with the landowners and is actively working towards getting the fence moved to the appropriate location.

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

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

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: 12/19/2022

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
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.	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)	7	7		100%

Table 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment — Assessment Date: 12/19/2022

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
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.	2	2		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 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment — Assessment Date: 12/19/2022

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
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.	N/A	N/A		N/A
	Bank Protection	Bank erosion within the structures extent of influence does not 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: 12/19/2022

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
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.	4	4		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)	4	4		100%

Table 4. Round Hill Branch Resotration Site (ID-100066) Visual Stream Stability Assessment — Assessment Date: 12/19/2022

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
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.	5	5		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)	5	5		100%

Table 5. Round Hill Branch Restoration Site (ID-100066) Visual Vegetation Assessment Assessment Date: 12/19/2022

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	0.00	0.0%
	Total		0.00	0.0%
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10 acres	0.00	0.0%
	Cumulative Total		0.00	0.0%

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	# Encroachments noted	

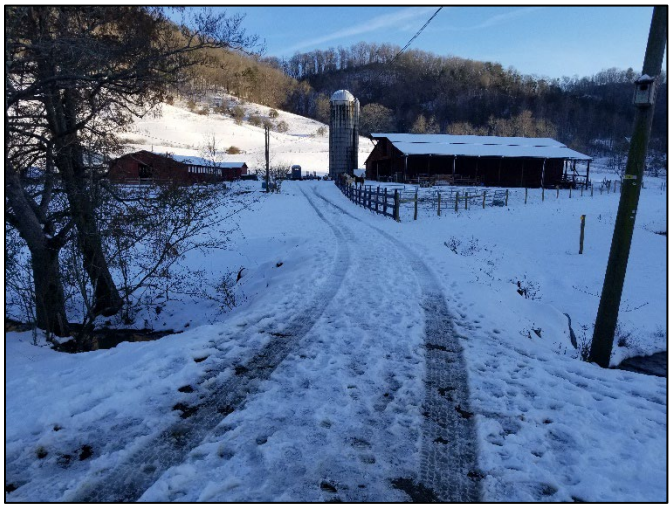
Photo Reference Photos

PP1 – MY-00 – 1/18/22

PP1 – MY-01 – 12/20/22

PP2 – MY-00 – 1/18/22

PP2 – MY-01 – 12/20/22



PP3 – MY-00 – 1/18/22

PP3 – MY-01 – 12/20/22

PP4 – MY-00 – 1/18/22

PP4 – MY-01 – 12/20/22

PP5 – MY-00 – 1/18/22

PP5 – MY-01 – 12/20/22

PP6 – MY-00 – 1/18/22

PP6 – MY-01 – 12/20/22

PP7 – MY-00 – 1/18/22

PP7 – MY-01 – 12/20/22

PP8 – MY-00 – 1/18/22

PP8 – MY-01 – 12/20/22

PP9 – MY-00 – 1/18/22

PP9 – MY-01 – 12/20/22

Vegetation Monitoring Plot Photos

Vegetation Plot 1 – MY-01 – 10/10/22

Vegetation Plot 2 – MY-01 – 10/10/22

Vegetation Plot 3 – MY-01 – 10/10/22

Vegetation Plot 1R – MY-01 – 10/10/22

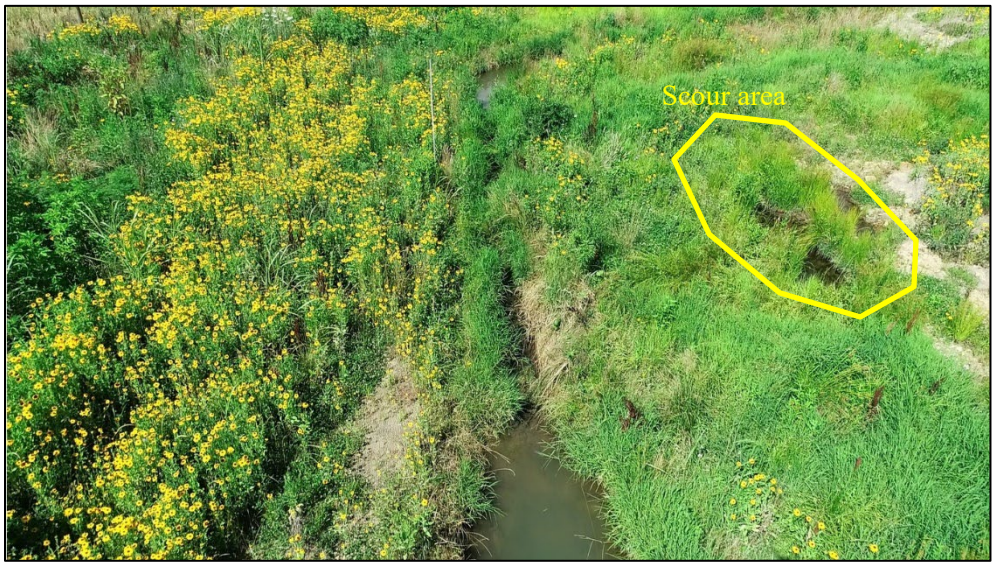
Vegetation Plot 2R – MY-01 – 10/10/22

Vegetation Plot 3R – MY-01 – 10/10/22

Additional Photos

Ford Crossing on RHB – MY-01 – 10/10/22

Diversion swale on RHB – MY-01 – 10/10/22



Scour area near RHB/T3 confluence – MY-01 – 10/10/22

APPENDIX B

Vegetation Plot Data

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

	Scientific Name	Common Name	Tree/Shrub	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	Aesculus flava	yellow buckeye	Tree	FACU			2	2				1	
	Alnus serrulata	hazel alder	Tree	OBL	1	1	1	1				1	
	Carya glabra	pignut hickory	Tree	FACU			1	1	2	2			
	Carya ovata	shagbark hickory	Tree	FACU								1	
	Cornus amomum	silky dogwood	Shrub	FACW									2
	Liriodendron tulipifera	tuliptree	Tree	FACU							3		2
	Nyssa sylvatica	blackgum	Tree	FAC	3	3			1	1			1
	Platanus occidentalis	American sycamore	Tree	FACW	6	6			4	4	4		5
	Quercus alba	white oak	Tree	FACU			2	2				2	
	Quercus montana	chestnut oak	Tree	UPL							2		2
	Quercus rubra	northern red oak	Tree	FACU	1	1	3	3				2	
	Salix nigra	black willow	Tree	OBL	6	9		2					
Sum	Performance Standard				17	20	9	11	7	7	9	7	12
Post Mitigation Plan Species	*Juglans nigra*	*black walnut*	*Tree*	*FACU*		*1*					*1*	*1*	
	Prunus serotina	*black cherry*	*Tree*	*FACU*				*2*					
	Robinia pseudoacacia	*black locust*	*Tree*	*FACU*									*1*
Sum	Proposed Standard				17	20	9	11	7	7	9	7	12
Mitigation Plan Performance Standard	Current Year Stem Count					20		11		7	9	7	12
	Stems/Acre					810		445		243	364	283	486
	Species Count					5		6		3	3	5	5
	Dominant Species Composition (%)					43		23		57	40	25	38
	Average Plot Height (ft.)					2		2		2	1	1	1
	% 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)	
Date(s) Mowing	
Date of Current Survey	2022-10-10
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												
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												
Monitoring Year 1	364	1	3	0	283	1	5	0	486	1	5	0
Monitoring Year 0												

APPENDIX C

Stream Geomorphology Data

Table 8. Baseline Stream Data Summary Round Hill Branch, RHB-1										
Parameter	**Pre-Existing Condition (applicaple)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
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^2)	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 (applicaple)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
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^2)	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 (applicaple)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
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^2)	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 (applicaple)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
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^2)	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 (applicaple)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
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^2)	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										

Table 9. Cross-section Morphology Monitoring Summary
Round Hill Branch Restoration Site (ID-100066)

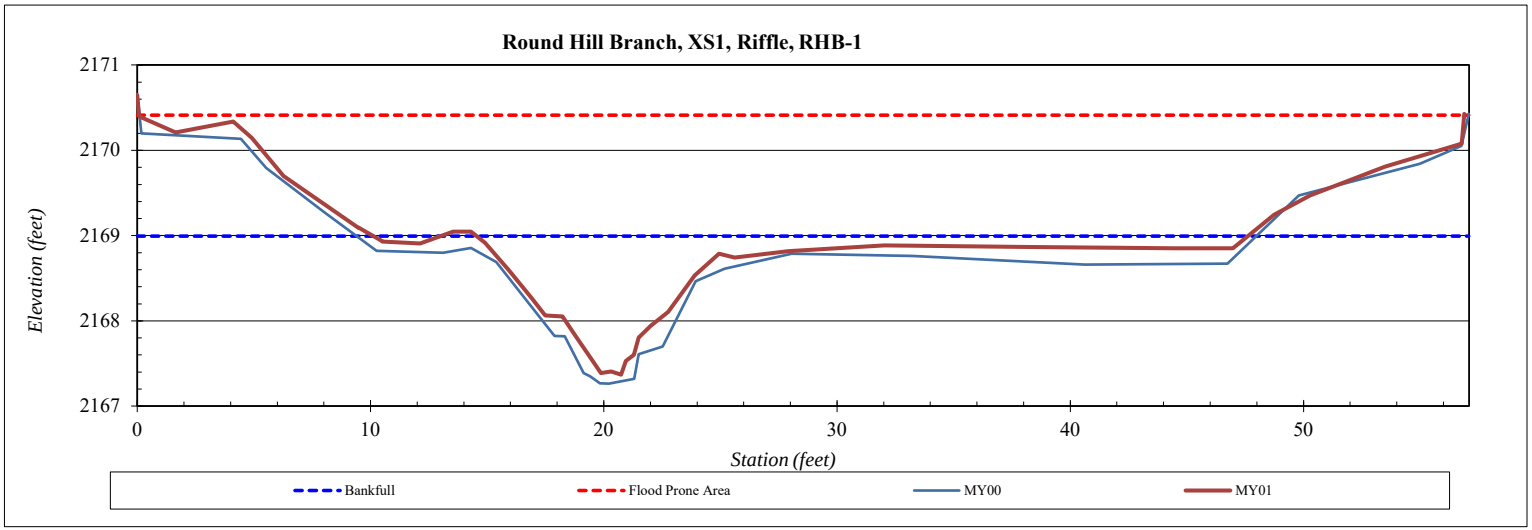
	Cross Section 1 (Riffle - RHB-1)							Cross Section 2 (Pool - RHB-1)							Cross Section 3 (Riffle - RHB-2)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2168.8	2169.0						2168.0	2168.0						2161.1	2161.2					
Bank Height Ratio - Based on AB Bankfull Area	1.0	0.9						---	---						1.0	1.1					
Thalweg Elevation	2167.3	2167.4						2165.8	2165.8						2160.1	2159.9					
LTOB Elevation	2168.8	2168.8						2168.0	2168.1						2161.1	2161.3					
LTOB Max Depth (ft)	1.5	1.4						2.1	2.3						1.1	1.4					
LTOB Cross Sectional Area (ft^2)	8.9	6.9						15.5	17.0						6.1	7.2					
	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						2154.4	2154.5						2153.8	2154.1					
Bank Height Ratio - Based on AB Bankfull Area	---	---						1.0	1.0						---	---					
Thalweg Elevation	2157.5	2157.5						2152.9	2152.9						2150.6	2151.3					
LTOB Elevation	2160.7	2160.7						2154.4	2154.4						2153.8	2153.8					
LTOB Max Depth (ft)	3.2	3.2						1.5	1.5						3.2	2.6					
LTOB Cross Sectional Area (ft^2)	29.7	18.6						8.6	7.9						26.4	21.9					
	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						2167.2	2167.7						2162.5	2162.6					
Bank Height Ratio - Based on AB Bankfull Area	1.0	0.9						---	---						1.0	1.0					
Thalweg Elevation	2166.8	2166.8						2165.4	2166.0						2161.7	2161.9					
LTOB Elevation	2167.7	2167.8						2167.2	2167.5						2162.5	2162.6					
LTOB Max Depth (ft)	0.9	1.0						1.8	1.5						0.8	0.7					
LTOB Cross Sectional Area (ft^2)	3.5	2.9						10.2	9.0						3.1	3.2					
	Cross Section 10 (Pool - T2)																				
	MY0	MY1	MY2	MY3	MY5	MY7	MY+														
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2161.4	2161.6																			
Bank Height Ratio - Based on AB Bankfull Area	---	---																			
Thalweg Elevation	2159.8	2159.8																			
LTOB Elevation	2161.4	2161.4																			
LTOB Max Depth (ft)	1.6	1.6																			
LTOB Cross Sectional Area (ft^2)	6.8	5.8																			

Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS1
Drainage Area (sq mi):	0.46
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation	Station	Elevation
0.0	2170.65	53.5	2169.81
0.1	2170.40	56.8	2170.08
1.6	2170.21	56.9	2170.43
4.1	2170.34		
4.9	2170.15		
6.3	2169.70		
9.5	2169.09		
10.5	2168.93		
12.1	2168.91		
13.5	2169.05		
14.3	2169.05		
14.9	2168.92		
15.9	2168.60		
16.9	2168.27		
17.5	2168.06		
18.2	2168.05		
18.8	2167.84		
19.4	2167.58		
19.9	2167.39		
20.3	2167.41		
20.7	2167.37		
20.9	2167.53		
21.3	2167.60		
21.5	2167.80		
22.0	2167.94		
22.8	2168.11		
23.9	2168.53		
24.9	2168.79		
25.6	2168.74		
27.9	2168.82		
32.0	2168.88		
38.3	2168.87		
44.5	2168.85		
47.0	2168.85		
48.7	2169.25		
50.3	2169.47		

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2168.99
Bankfull Cross-Sectional Area:	8.9
LTOB Cross-Sectional Area:	6.9
Bankfull Width:	10.4
Flood Prone Area Elevation:	2170.41
Flood Prone Width:	56.8
LTOB Max Depth	1.4
LTOB Mean Depth	0.7
W / D Ratio:	15.5
Entrenchment Ratio:	5.5
Bank Height Ratio:	0.9
Thalweg Elevation:	2167.37

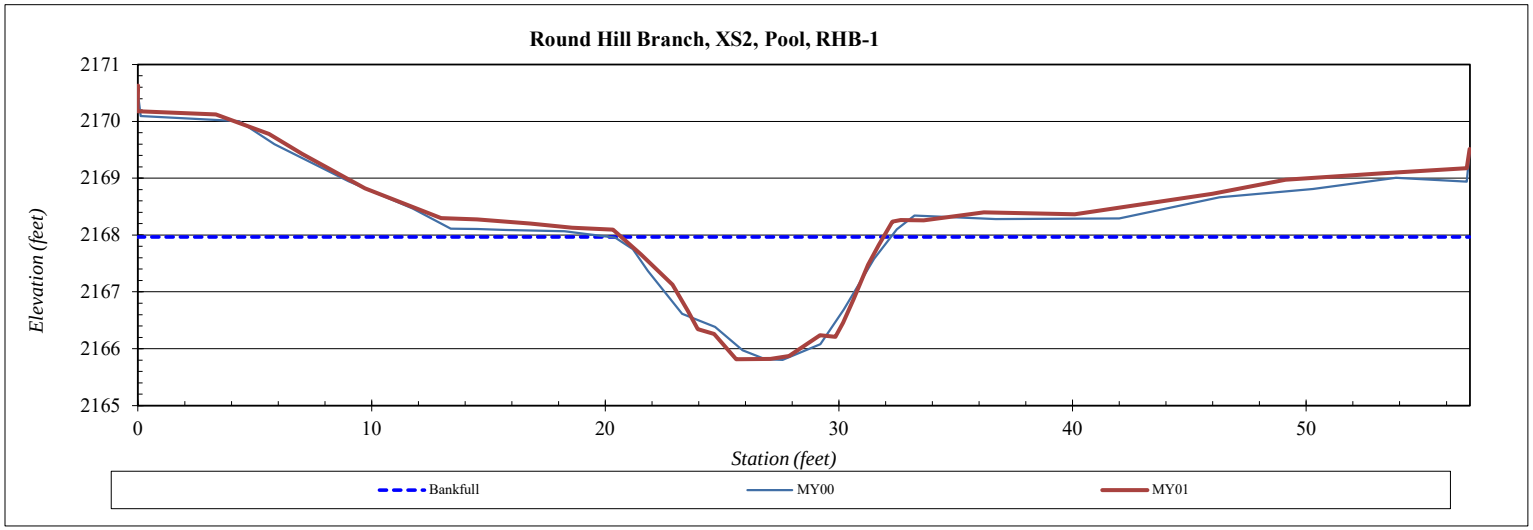


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS2
Drainage Area (sq mi):	0.46
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation
0.0	2170.63
0.0	2170.18
3.3	2170.12
5.6	2169.78
7.0	2169.43
9.7	2168.82
13.0	2168.30
14.5	2168.28
16.8	2168.20
18.6	2168.13
20.3	2168.10
21.5	2167.66
22.9	2167.13
23.5	2166.67
24.0	2166.35
24.7	2166.26
25.6	2165.81
27.1	2165.82
27.9	2165.87
29.2	2166.24
29.8	2166.21
30.2	2166.46
30.6	2166.87
31.3	2167.48
31.7	2167.82
32.3	2168.24
32.6	2168.27
33.6	2168.26
36.2	2168.40
40.1	2168.37
46.0	2168.73
49.1	2168.97
53.2	2169.08
56.9	2169.18
57.0	2169.51

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2167.96
Bankfull Cross-Sectional Area:	15.5
LTOB Cross-Sectional Area:	17.0
Bankfull Width:	11.2
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	2.3
LTOB Mean Depth	1.5
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2165.81

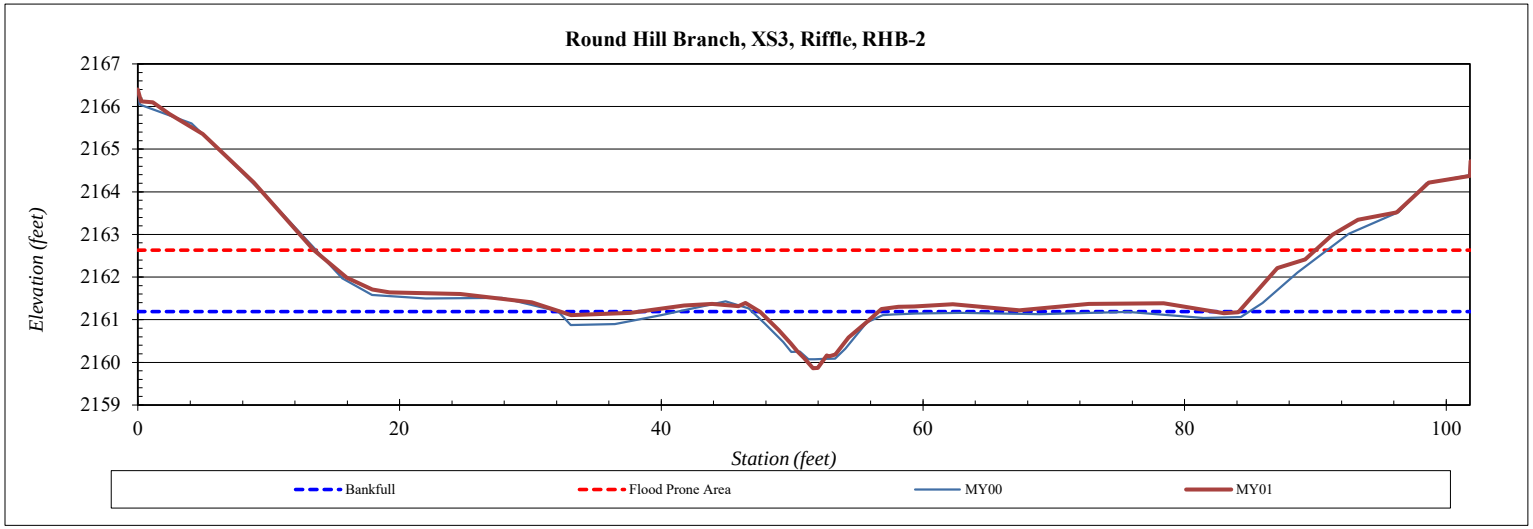


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS3
Drainage Area (sq mi):	0.59
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation	Station	Elevation
0.0	2166.40	72.7	2161.37
0.2	2166.13	78.4	2161.39
1.1	2166.10	83.0	2161.15
2.4	2165.83	84.1	2161.17
5.0	2165.36	87.1	2162.21
8.8	2164.22	89.2	2162.41
13.4	2162.64	91.3	2162.99
16.0	2161.99	93.3	2163.34
17.9	2161.71	96.2	2163.52
19.2	2161.64	98.7	2164.21
24.6	2161.60	101.8	2164.37
30.1	2161.41	101.9	2164.72
33.1	2161.10		
37.6	2161.16		
41.7	2161.33		
43.9	2161.37		
45.9	2161.32		
46.4	2161.39		
47.6	2161.18		
49.0	2160.76		
49.9	2160.44		
50.4	2160.26		
50.9	2160.10		
51.6	2159.86		
52.0	2159.87		
52.6	2160.16		
52.8	2160.14		
53.3	2160.18		
53.6	2160.28		
54.3	2160.58		
55.8	2160.96		
56.8	2161.25		
58.1	2161.30		
59.3	2161.31		
62.3	2161.36		
67.4	2161.22		

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2161.19
Bankfull Cross-Sectional Area:	6.1
LTOB Cross-Sectional Area:	7.2
Bankfull Width:	9.1
Flood Prone Area Elevation:	2162.63
Flood Prone Width:	76.6
LTOB Max Depth	1.4
LTOB Mean Depth	0.8
W / D Ratio:	11.6
Entrenchment Ratio:	8.4
Bank Height Ratio:	1.1
Thalweg Elevation:	2159.86

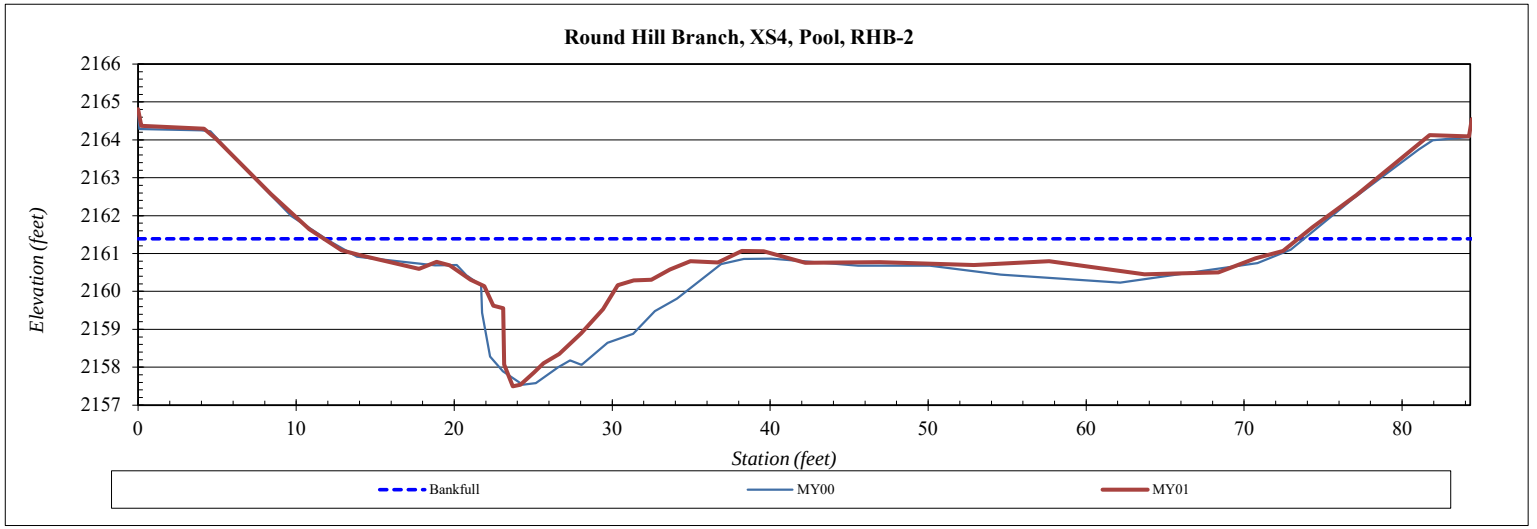


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS4
Drainage Area (sq mi):	0.59
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation	Station	Elevation
0.0	2164.81	68.4	2160.50
0.2	2164.37	70.7	2160.88
4.2	2164.29	72.5	2161.07
4.9	2164.03	74.3	2161.69
8.4	2162.57	77.1	2162.55
10.8	2161.64	81.7	2164.13
12.9	2161.09	84.2	2164.09
14.1	2160.95	84.4	2164.54
17.8	2160.60		
18.9	2160.79		
19.7	2160.69		
21.0	2160.31		
21.9	2160.14		
22.5	2159.63		
23.1	2159.56		
23.2	2158.07		
23.7	2157.50		
24.2	2157.54		
25.0	2157.86		
25.6	2158.10		
26.6	2158.35		
28.0	2158.90		
29.4	2159.53		
30.4	2160.17		
31.4	2160.29		
32.5	2160.30		
33.7	2160.58		
34.9	2160.80		
36.7	2160.76		
38.2	2161.07		
39.6	2161.06		
42.2	2160.75		
46.9	2160.77		
52.9	2160.69		
57.7	2160.80		
63.7	2160.45		

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2161.38
Bankfull Cross-Sectional Area:	29.7
LTOB Cross-Sectional Area:	18.6
Bankfull Width:	16.0
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	3.2
LTOB Mean Depth	1.2
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2157.50

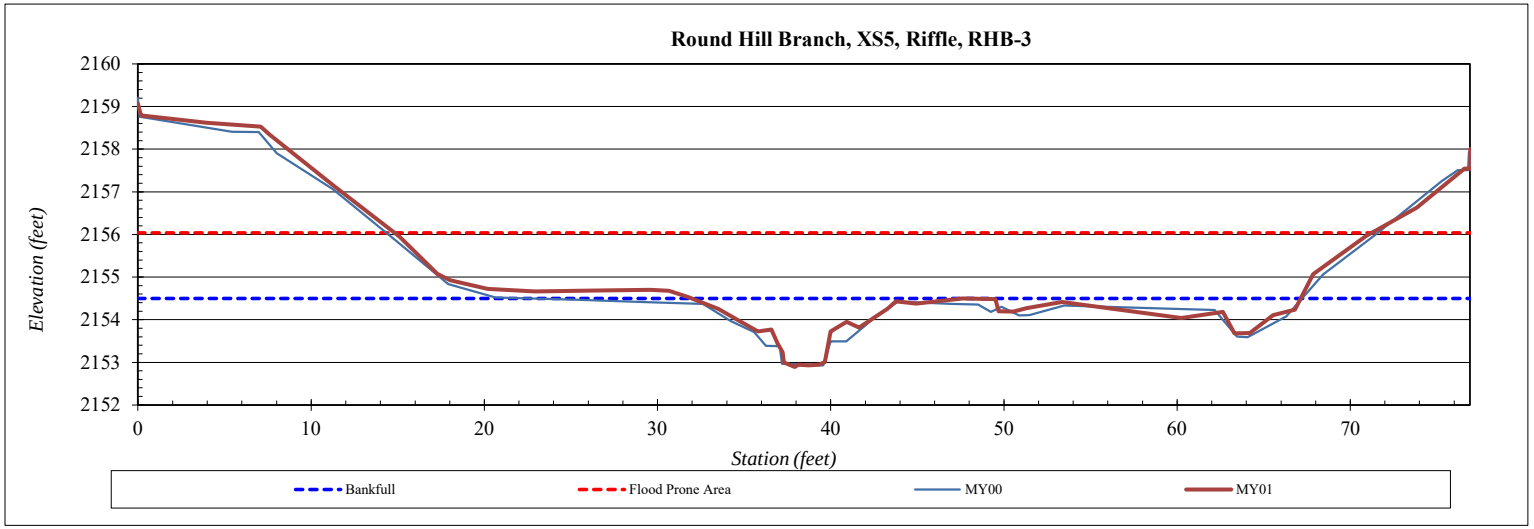


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS5
Drainage Area (sq mi):	0.74
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation	Station	Elevation
0.0	2159.07	50.5	2154.19
0.2	2158.79	51.3	2154.27
4.0	2158.62	53.3	2154.42
7.1	2158.53	60.2	2154.04
7.6	2158.34	62.6	2154.19
11.3	2157.12	63.3	2153.68
15.1	2155.95	64.2	2153.69
17.3	2155.08	65.5	2154.11
18.0	2154.93	66.8	2154.23
20.2	2154.72	67.9	2155.07
22.9	2154.66	70.9	2155.96
26.6	2154.68	73.8	2156.63
29.6	2154.70		
30.7	2154.68		
31.8	2154.53		
33.5	2154.25		
34.7	2153.99		
35.8	2153.73		
36.6	2153.77		
36.9	2153.45		
37.2	2153.23		
37.3	2153.00		
37.9	2152.89		
38.1	2152.95		
38.7	2152.93		
39.3	2152.94		
39.7	2153.01		
40.0	2153.73		
40.9	2153.95		
41.6	2153.81		
43.3	2154.26		
43.8	2154.43		
44.9	2154.38		
47.6	2154.50		
49.5	2154.48		
49.7	2154.20		

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2154.49
Bankfull Cross-Sectional Area:	8.6
LTOB Cross-Sectional Area:	7.9
Bankfull Width:	11.8
Flood Prone Area Elevation:	2156.04
Flood Prone Width:	56.4
LTOB Max Depth	1.5
LTOB Mean Depth	0.7
W / D Ratio:	17.6
Entrenchment Ratio:	4.8
Bank Height Ratio:	1.0
Thalweg Elevation:	2152.89

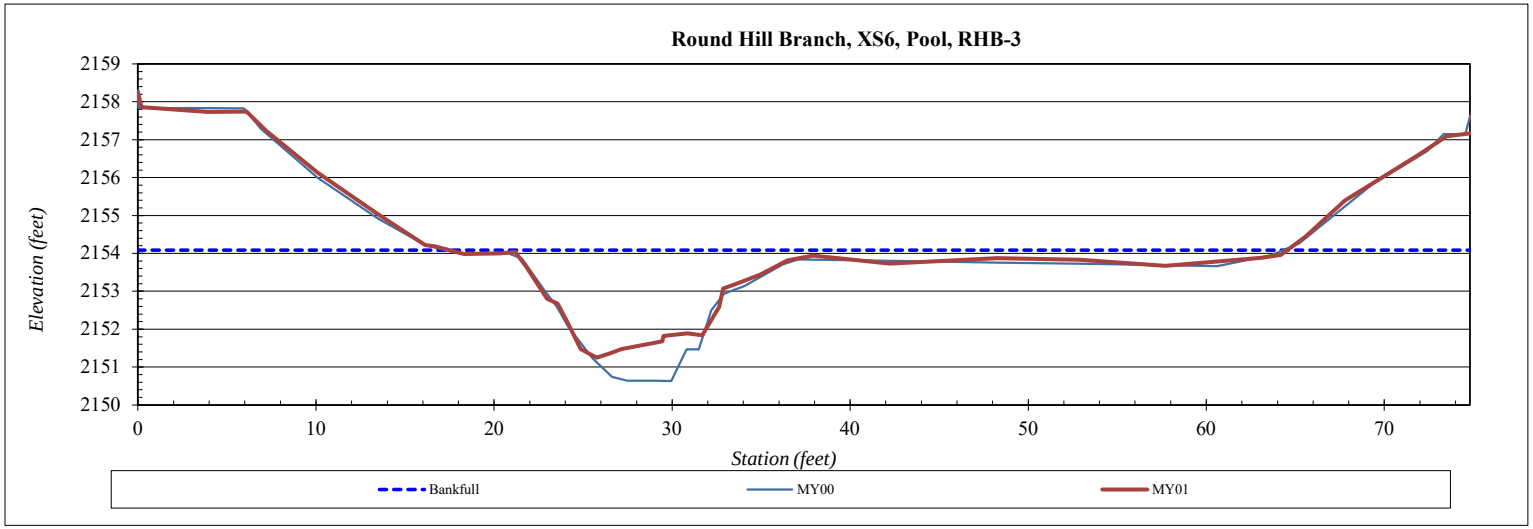


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS6
Drainage Area (sq mi):	0.74
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation	Station	Elevation
0.0	2158.27	65.6	2154.45
0.2	2157.86	67.8	2155.40
3.9	2157.74	71.8	2156.57
6.1	2157.74	73.5	2157.09
7.2	2157.25	75.0	2157.18
10.1	2156.14	75.0	2157.73
13.5	2155.03		
16.1	2154.22		
16.7	2154.19		
18.3	2153.98		
20.4	2154.00		
21.2	2154.04		
21.8	2153.65		
23.0	2152.80		
23.6	2152.67		
24.1	2152.19		
24.9	2151.48		
25.8	2151.25		
26.5	2151.37		
27.2	2151.47		
29.4	2151.68		
29.5	2151.82		
30.9	2151.89		
31.7	2151.84		
32.7	2152.59		
32.9	2153.07		
33.6	2153.19		
34.9	2153.44		
36.5	2153.82		
37.9	2153.94		
42.2	2153.73		
48.2	2153.88		
52.9	2153.83		
57.7	2153.67		
63.1	2153.88		
64.2	2153.96		

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2154.09
Bankfull Cross-Sectional Area:	26.4
LTOB Cross-Sectional Area:	21.9
Bankfull Width:	16.7
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	2.6
LTOB Mean Depth	1.3
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2151.25

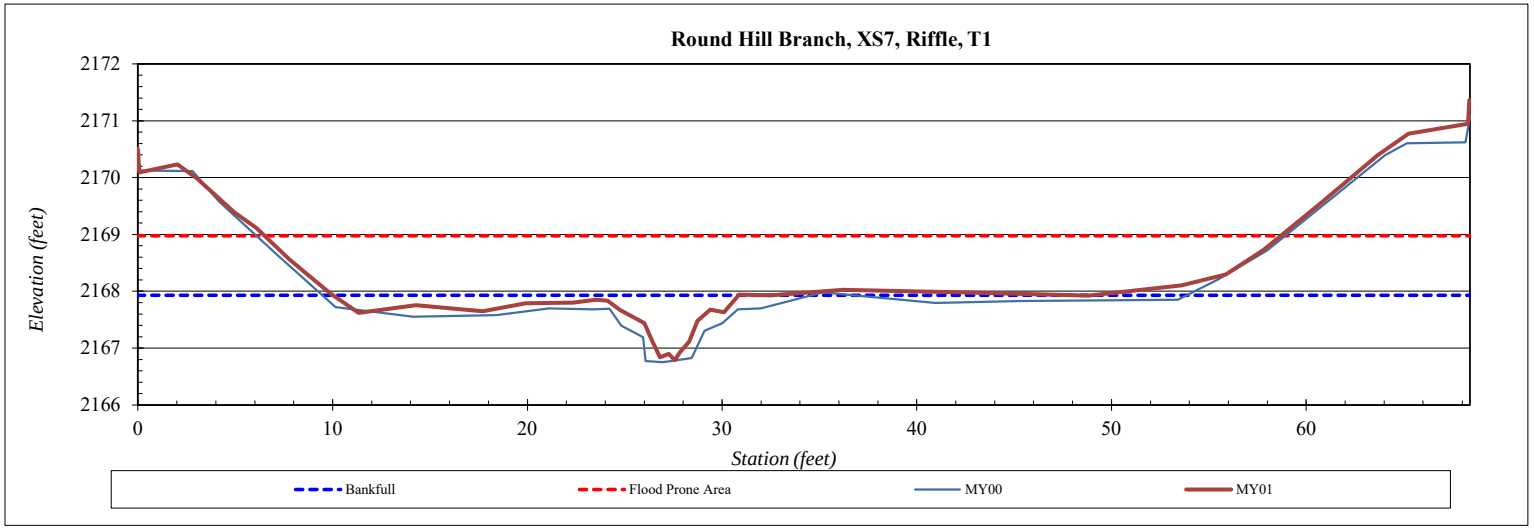


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS7
Drainage Area (sq mi):	0.11
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation	Station	Elevation
0.0	2170.51	65.3	2170.78
0.1	2170.09	66.2	2170.83
2.0	2170.23	68.3	2170.95
3.0	2169.98	68.4	2171.36
5.0	2169.39		
6.1	2169.11		
7.8	2168.56		
9.8	2167.97		
11.3	2167.62		
14.3	2167.76		
17.7	2167.65		
19.9	2167.79		
22.3	2167.80		
23.5	2167.85		
24.1	2167.83		
24.8	2167.67		
26.0	2167.44		
26.4	2167.11		
26.8	2166.84		
27.3	2166.90		
27.6	2166.79		
27.8	2166.93		
28.3	2167.11		
28.7	2167.48		
29.4	2167.68		
30.1	2167.63		
30.9	2167.94		
32.5	2167.93		
36.2	2168.03		
42.3	2167.98		
48.8	2167.92		
53.6	2168.11		
55.9	2168.30		
57.8	2168.73		
60.7	2169.55		
63.7	2170.39		

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2167.93
Bankfull Cross-Sectional Area:	3.5
LTOB Cross-Sectional Area:	2.9
Bankfull Width:	6.7
Flood Prone Area Elevation:	2168.98
Flood Prone Width:	52.2
LTOB Max Depth	1.0
LTOB Mean Depth	0.4
W / D Ratio:	15.5
Entrenchment Ratio:	7.8
Bank Height Ratio:	0.9
Thalweg Elevation:	2166.79

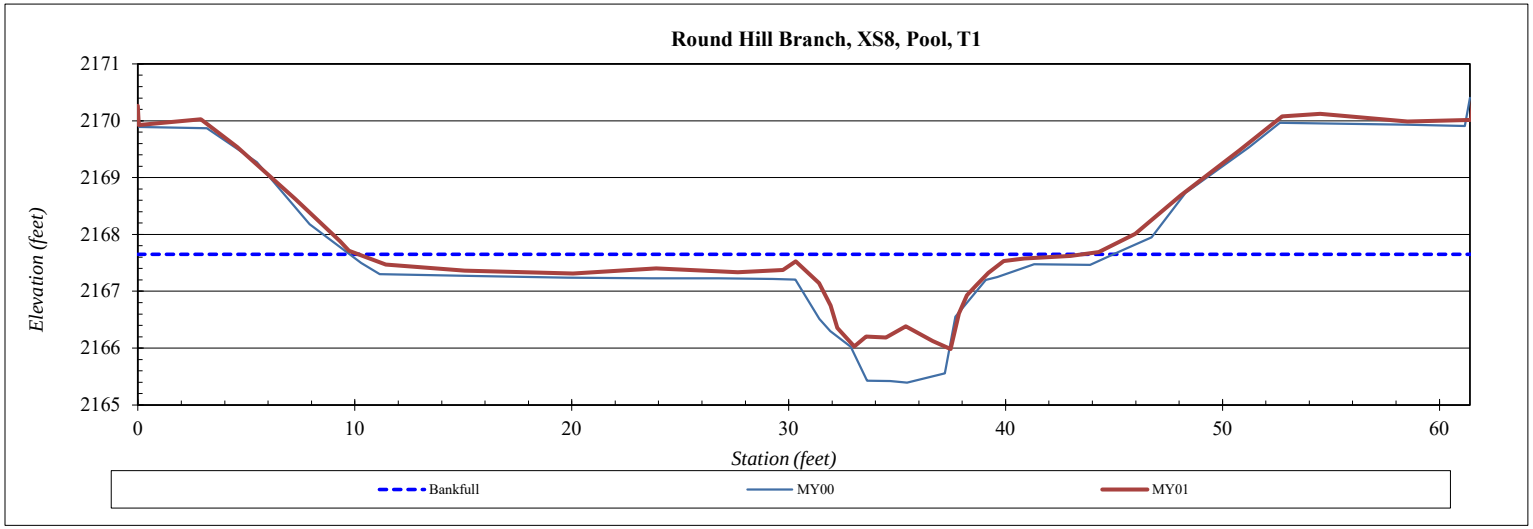


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS8
Drainage Area (sq mi):	0.11
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation	Station	Elevation
0.0	2170.26	58.5	2169.99
0.0	2169.92	61.5	2170.01
2.9	2170.03	61.5	2170.40
4.6	2169.54		
7.3	2168.63		
9.3	2167.88		
9.7	2167.71		
11.4	2167.47		
15.1	2167.36		
20.1	2167.32		
23.9	2167.40		
27.7	2167.34		
29.7	2167.37		
30.3	2167.53		
31.4	2167.14		
31.9	2166.75		
32.2	2166.35		
33.0	2166.03		
33.6	2166.20		
34.5	2166.19		
35.4	2166.38		
36.6	2166.13		
37.5	2165.98		
37.8	2166.61		
38.2	2166.93		
38.7	2167.11		
39.2	2167.32		
39.9	2167.53		
40.9	2167.58		
43.0	2167.62		
44.3	2167.69		
46.0	2168.01		
48.1	2168.69		
50.8	2169.48		
52.8	2170.08		
54.5	2170.12		

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2167.65
Bankfull Cross-Sectional Area:	10.2
LTOB Cross-Sectional Area:	9.0
Bankfull Width:	9.6
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	1.5
LTOB Mean Depth	0.9
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2165.98

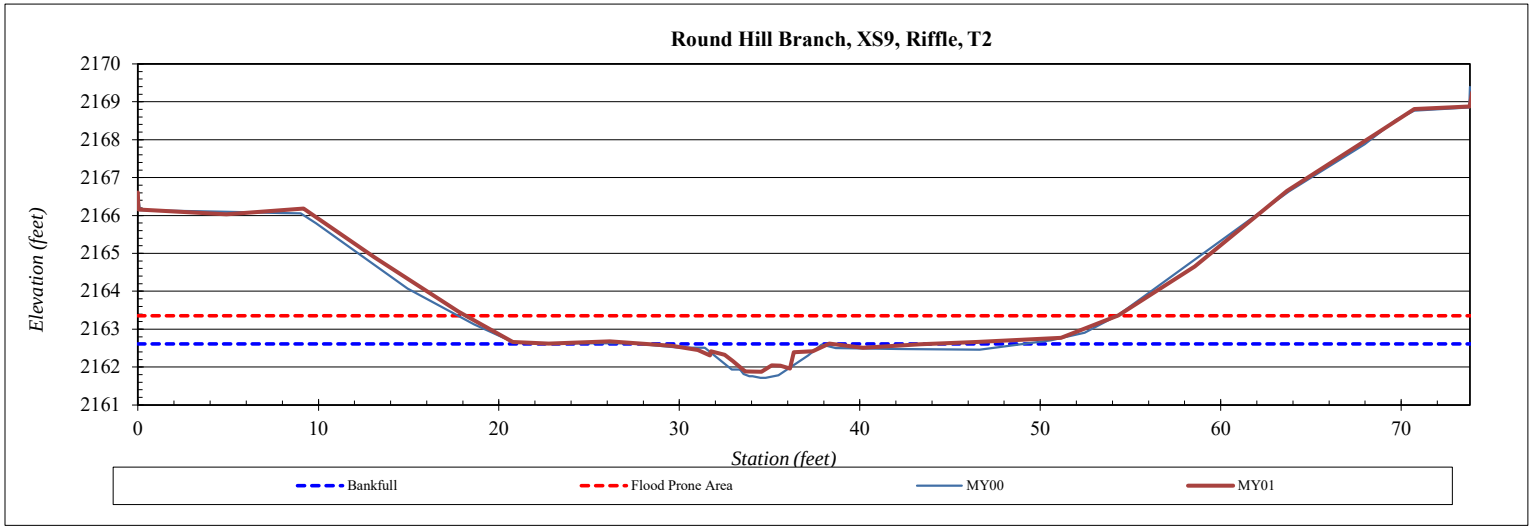


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS9
Drainage Area (sq mi):	0.11
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation
0.0	2166.60
0.0	2166.16
4.9	2166.03
9.2	2166.18
13.1	2164.90
17.8	2163.46
20.8	2162.66
22.8	2162.62
26.1	2162.68
29.6	2162.56
31.0	2162.45
31.7	2162.31
31.8	2162.42
32.5	2162.33
33.0	2162.15
33.6	2161.88
34.6	2161.87
35.1	2162.05
35.6	2162.04
36.1	2161.96
36.3	2162.39
37.4	2162.42
38.3	2162.62
40.2	2162.51
43.4	2162.60
46.4	2162.66
51.2	2162.77
54.3	2163.36
58.6	2164.65
63.7	2166.65
68.8	2168.20
70.7	2168.81
73.8	2168.88
73.9	2169.24

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2162.61
Bankfull Cross-Sectional Area:	3.1
LTOB Cross-Sectional Area:	3.2
Bankfull Width:	10.0
Flood Prone Area Elevation:	2163.35
Flood Prone Width:	36.1
LTOB Max Depth	0.7
LTOB Mean Depth	0.3
W / D Ratio:	31.2
Entrenchment Ratio:	3.6
Bank Height Ratio:	1.0
Thalweg Elevation:	2161.87

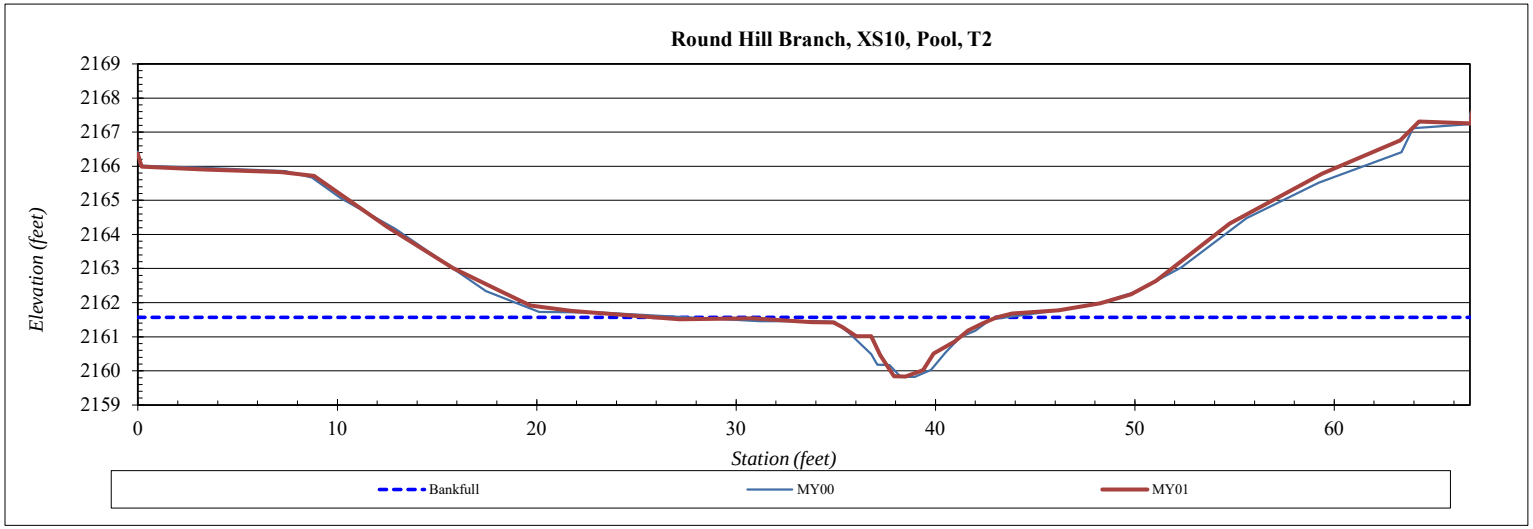


Cross-Section Plots

River Basin:	French Broad
Site:	Round Hill Branch
XS ID	XS10
Drainage Area (sq mi):	0.11
Date:	1/19/2022
Field Crew:	TS, KB

Station	Elevation
0.0	2166.36
0.2	2165.99
3.3	2165.91
7.2	2165.83
8.8	2165.72
12.5	2164.22
15.8	2163.01
18.1	2162.35
19.7	2161.92
21.8	2161.76
27.2	2161.51
30.8	2161.54
33.8	2161.43
34.9	2161.42
35.3	2161.28
36.0	2161.02
36.8	2161.01
37.2	2160.46
37.9	2159.84
38.5	2159.84
39.4	2160.02
39.9	2160.50
41.0	2160.86
41.6	2161.19
42.4	2161.40
43.1	2161.57
43.8	2161.68
46.2	2161.78
48.3	2161.98
49.8	2162.25
51.1	2162.64
54.8	2164.32
59.4	2165.79
63.3	2166.76
64.3	2167.31
66.9	2167.25

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2161.56
Bankfull Cross-Sectional Area:	6.8
LTOB Cross-Sectional Area:	5.8
Bankfull Width:	8.1
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	1.6
LTOB Mean Depth	0.7
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2159.84



APPENDIX D

Hydrologic Data

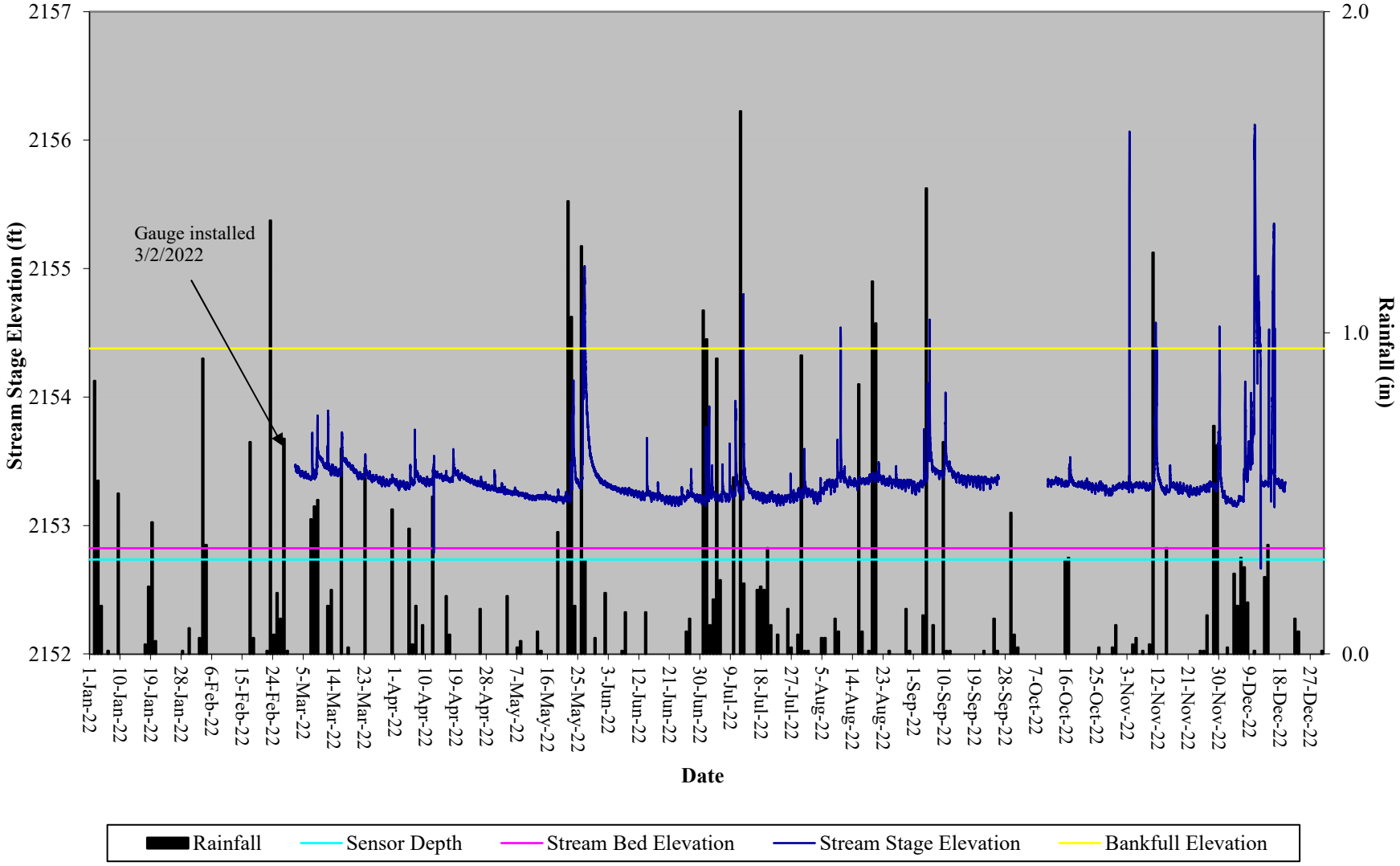
Table 10. Rainfall Summary, Round Hill Branch Restoration Site (ID-100066)							
	MY1 2022	MY2 2023	MY3 2024	MY4 2025	MY5 2026	MY6 2027	MY7 2028
Annual Precip Total	40.27						
WETS 30th Percentile	29.73						
WETS 70th Percentile	53.88						
Normal	Yes						

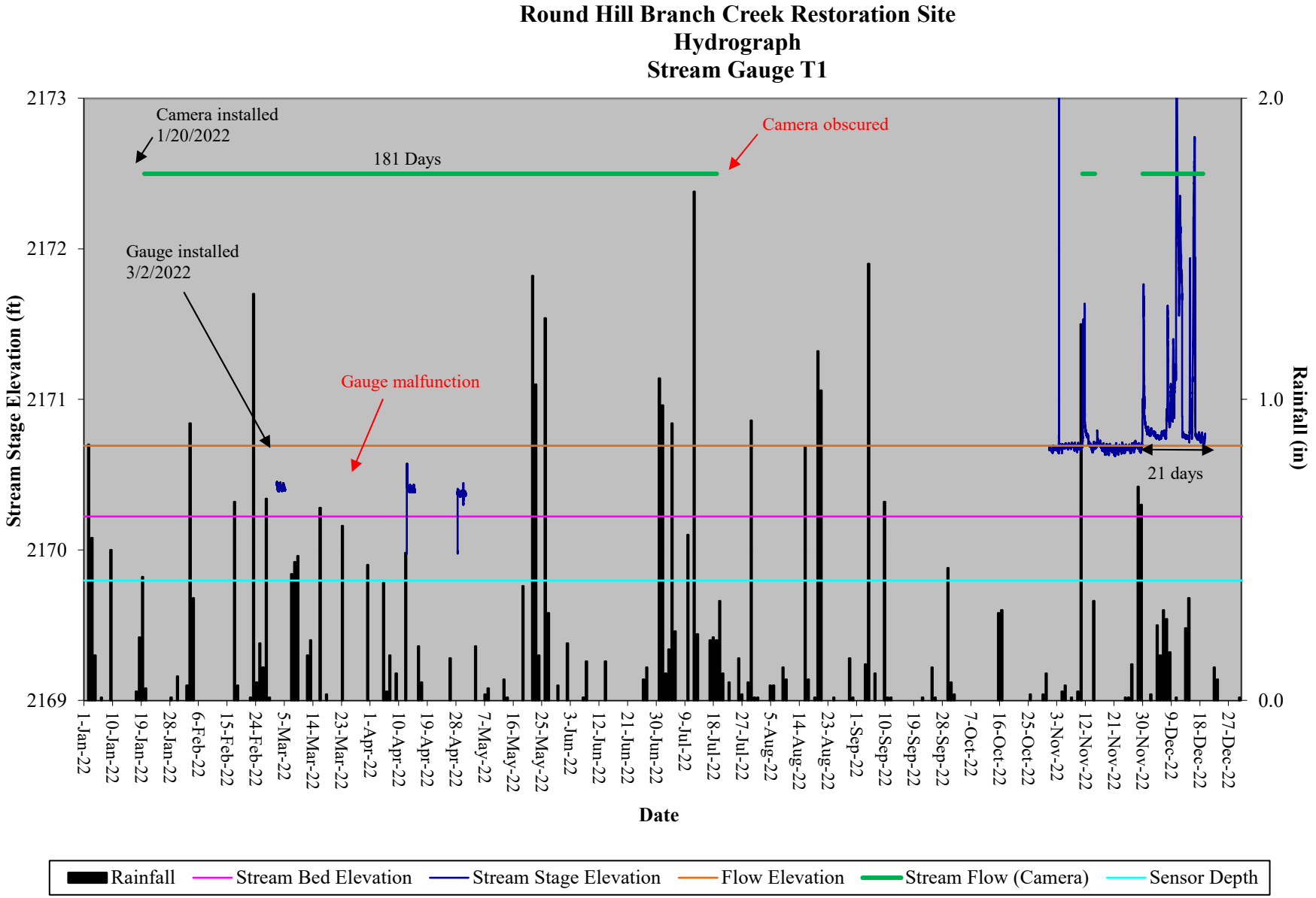
Table 11. Overbank Events, Round Hill Branch Restoration Site (ID-100066)							
Gage ID	MY1 2022	MY2 2023	MY3 2024	MY4 2025	MY5 2026	MY6 2027	MY7 2028
RHB	10						

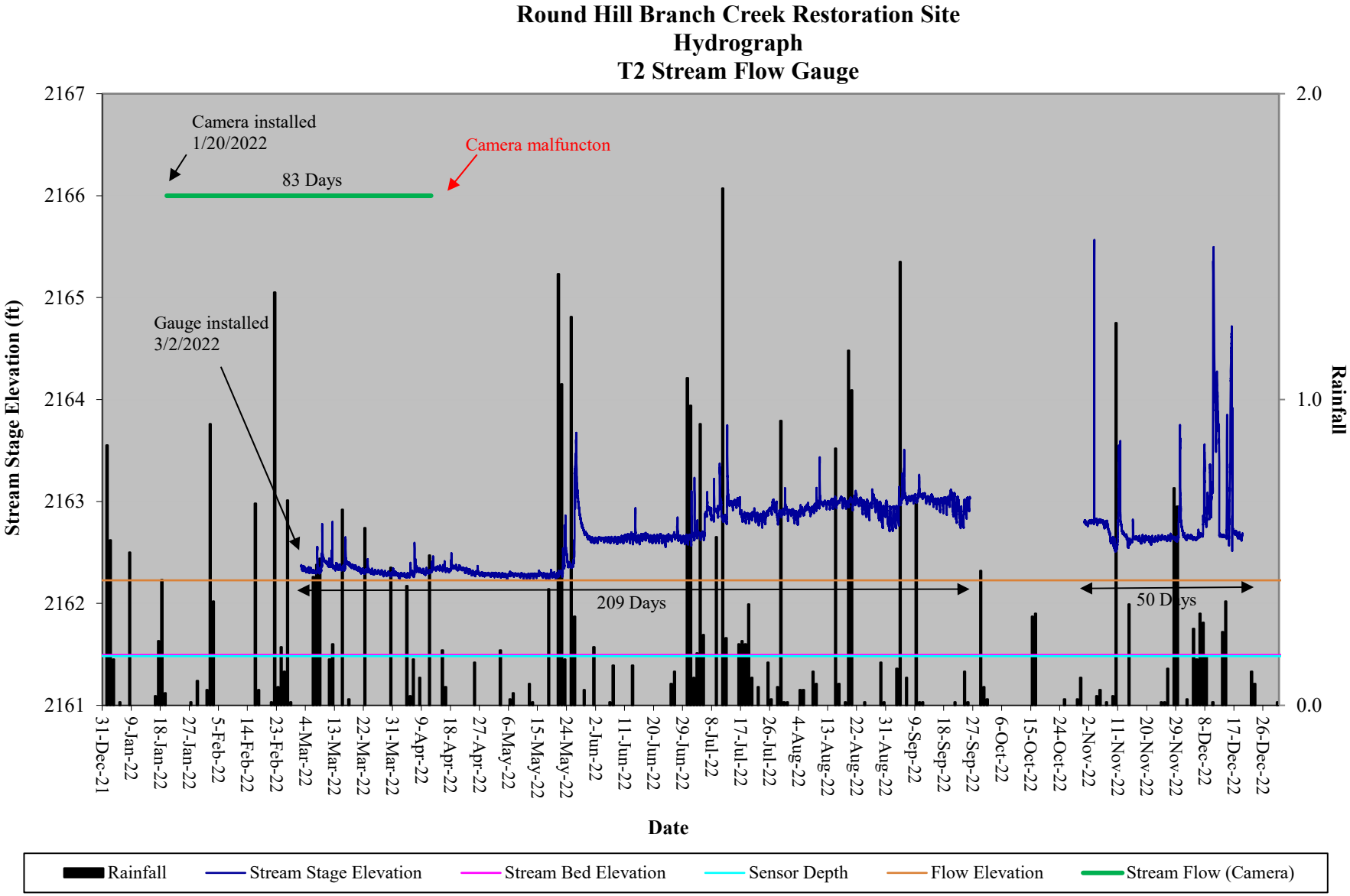
Table 12. Stream Flow Criteria Attainment, Round Hill Branch Restoration Site (ID-100066)							
	Greater than 30 Days of Flow/Max Consecutive Days						
Reach	MY1 2022	MY2 2023	MY3 2024	MY4 2025	MY5 2026	MY6 2027	MY7 2028
UT1 (Gauge)	No/21*						
UT1 (Camera)	Yes/181						
UT2 (Gauge)	Yes/209						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

*Gauge malfunction

Round Hill Branch Creek Restoration Site
Hydrograph
Stream Gauge RHB




Round Hill Branch Creek Restoration Site
Hydrograph
Stream Gauge T1
Camera installed
1/20/2022
181 Days
Camera obscured
Gauge installed
3/2/2022
Gauge malfunction
21 days
Stream Stage Elevation (ft)
Rainfall (in)
Date
2173
2172
2171
2170
2169
2.0
1.0
0.0
1-Jan-22
10-Jan-22
19-Jan-22
28-Jan-22
6-Feb-22
15-Feb-22
24-Feb-22
5-Mar-22
14-Mar-22
23-Mar-22
1-Apr-22
10-Apr-22
19-Apr-22
28-Apr-22
7-May-22
16-May-22
25-May-22
3-Jun-22
12-Jun-22
21-Jun-22
30-Jun-22
9-Jul-22
18-Jul-22
27-Jul-22
5-Aug-22
14-Aug-22
23-Aug-22
1-Sep-22
10-Sep-22
19-Sep-22
28-Sep-22
7-Oct-22
16-Oct-22
25-Oct-22
3-Nov-22
12-Nov-22
21-Nov-22
30-Nov-22
9-Dec-22
18-Dec-22
27-Dec-22
Rainfall
Stream Bed Elevation
Stream Stage Elevation
Flow Elevation
Stream Flow (Camera)
Sensor Depth


Round Hill Branch Creek Restoration Site
Hydrograph
T2 Stream Flow Gauge
Camera installed
1/20/2022
Camera malfuncton
83 Days
Gauge installed
3/2/2022
209 Days
50 Days
Stream Stage Elevation (ft)
Rainfall
Date
2167
2166
2165
2164
2163
2162
2161
2.0
1.0
0.0
31-Dec-21
9-Jan-22
18-Jan-22
27-Jan-22
5-Feb-22
14-Feb-22
23-Feb-22
4-Mar-22
13-Mar-22
22-Mar-22
31-Mar-22
9-Apr-22
18-Apr-22
27-Apr-22
6-May-22
15-May-22
24-May-22
2-Jun-22
11-Jun-22
20-Jun-22
29-Jun-22
8-Jul-22
17-Jul-22
26-Jul-22
4-Aug-22
13-Aug-22
22-Aug-22
31-Aug-22
9-Sep-22
18-Sep-22
27-Sep-22
6-Oct-22
15-Oct-22
24-Oct-22
2-Nov-22
11-Nov-22
20-Nov-22
29-Nov-22
8-Dec-22
17-Dec-22
26-Dec-22
Rainfall
Stream Stage Elevation
Stream Bed Elevation
Sensor Depth
Flow Elevation
Stream Flow (Camera)

APPENDIX E

Project Timeline and Contact Info

Table 13. Project Activity & Reporting History Round Hill Branch Restoration Site, DMS Project #100066		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
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	

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

APPENDIX F

Additional Information

KCI ASSOCIATES OF NC

ISO 9001:2015 CERTIFIED

ENGINEERS • PLANNERS • SCIENTISTS • CONSTRUCTION MANAGERS

4505 Falls of Neuse Rd., Suite 400 • Raleigh, NC 27609 • Phone 919-783-9214 • Fax 919-783-9266

Date: January 4, 2023

To: Kim Browning, USACE

From: Adam Spiller, Project Manager
KCI Associates of North Carolina, P.A.

Subject: Round Hill Branch Restoration Site
Baseline Site Review – Response to IRT Comments
French Broad River Basin - 06010105
Buncombe County, North Carolina
DEQ Contract No. #7534
DMS Project #100066
USACE AID #: SAW-2018-01168

Below are our responses to comments received on July 7, 2022 after the baseline report review for the Round Hill Branch Restoration Site. Please contact me if you have any questions or would like clarification concerning these responses.

Kim Browning, USACE:

1. What is the total area of floodplain scour that you refer to as vernal pools that enhance ecological function to the site? Will these areas be planted with herbaceous cover to prevent further scouring, and will these areas be re-planted with woody species as described in the final mitigation plan?
   KCI Response: The scour area is less than 0.01 acres in size. The site had not been planted at the time of the scour event and so no woody stems were damaged during the event and no re-plant is currently planned. During the first growing season, the area was well colonized by herbaceous species and further scour is not anticipated.

2. Please inform the IRT once the fencing encroachments have been resolved.
   KCI Response: KCI is actively working to resolve the fencing encroachments and will notify the IRT once this issue is resolved.

3. Although the snow-covered photos are aesthetically pleasing, please provide photos that show the condition of the buffer and stream banks in future reports.
   KCI Response: While we typically try to avoid doing fieldwork in the snow, it was unavoidable in this case. We will make an effort to avoid this for future projects. A video of a drone flight of the site, taken in November 2021 can be found here: https://youtu.be/4AINxWWJGXo and another video of a drone flight of the site, taken in June 2022 can be found here: https://youtu.be/P138sm21ea0

4. Please provide an additional photo for the crossing where photo point 1 is located, from the perspective of looking upstream at the crossing (position yourself near STA 14+00). Both photos of this crossing show the gates open, so livestock access to the ford crossing is a concern.
KCI Response: This photo has been provided in the MY01 report. During the first monitoring year there have been no signs of damage or instability in and around this crossing.

Erin Davis, DWR:

1. DWR was glad that the two easement dispute areas were identified early. We encourage making every effort to resolve these issues prior to the 2023 credit release meeting.
KCI Response: See response to USACE comment 2.

2. DWR requests photos of the floodplain scour area and the drainage swale feature be included in the MY1 report.
KCI Response: These photos have been added to the MY01 report.

3. Please show all existing wetland areas within the project easement on future CCPV figures.
KCI Response: Existing wetland areas have been added to the CCPV.

4. Given that the as-built survey was performed in May 2021 and long. profile surveyed in August 2021, it would've been helpful to include supplemental non-snow covered project photos in the MY0 report. Please make a note for future projects.
KCI Response: See response to USACE comment 3.

5. DWR appreciated that DMS' site visit comments (and KCI's responses) were included for this review.

Todd Bower, USEPA:

1. There were a few, relatively minor deviations from the original design plans; primarily these were due to adjustments due to bedrock encountered during construction.

2. Many planted species were not identified during vegetation monitoring due to monitoring during dormancy. This resulted in fewer species than planted noted on some of the veg plots. No comment as this will be corrected in the coming MY survey. Counts/percentages; all appear suitable and maintains a diverse mix of species.
KCI Response: All woody stems were identified to species during the MY01 survey.

3. No adaptive management plan needed at this time.

4. No issues of conservation easement encroachment however there are two areas where fencing and conservation easement boundaries are being actively addressed with the adjoining landowners.

5. I recommend adding the pool adjustments made (due to bedrock) to the longitudinal profile for comparison of design and actual. Noted locations at T1 (sta.10375), and missing pools on RHB (stas. 1080, 1290 and 1340).
KCI Response: All adjustments that were made were added by as red-lines to the as-built plans.

6. I noted a slight discrepancy in the stream credits calculated in Table 1. The As-Built length of streams is 2,242 feet and the length of streams removed for credit due to crossings is 114 feet. This results in a final credit amount of 2,128 cool SMUs. It appears that the stream segments removed from credit are tallied from the Original Mitigation Plan lengths (2,256 – 114 = 2,142). Recommend KCI take another look at these totals and correct if necessary.
   KCI Response: Credit lengths are generally calculated using the approved mitigation plan lengths unless there is significant deviation found during the as-built survey.

Sincerely,

Adam Spiller
Project Manager