MY01 MONITORING REPORT

Dales Creek Restoration Site
Buncombe County, North Carolina
French Broad River Basin - 06010105

DMS Project #100128
DMS Contract #7910
DMS RFP #16-007724 (Issue Date: November 13, 2018)
USACE AID #: SAW 2019-00834 DWR #: 20190864
Monitoring Data Collected: 2022

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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ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS

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MEMORANDUM

Date: January 20, 2023
To: Harry Tsomides, DMS Project Manager
From: Adam Spiller, Project Manager
KCI Associates of North Carolina, PA
Subject: MY-01 Monitoring Report Comments
Dales Creek DMS #7910, Contract 100128
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 August 15, 2022 for the Dales Creek Restoration Site.

1. Please include assessment dates on stream and vegetation visual assessment tables
   KCI Response: This change has been made.

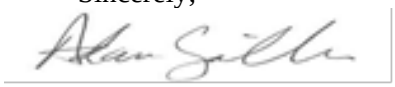
2. Thank you for providing the side by side comparison photos of MY1 vs. MY0. This will be a helpful visual in future years as site conditions progress away from baseline. If possible, in future years please include photos from both sides (upstream and downstream) of the culverts to show both debris jamming/infilling and/or perching (potentially).
   KCI Response: Photos from both sides of the culverts will be included starting in MY02.

3. Table 11 indicates 3 overbank events while the text section indicates these as 3 bankfull events. Please correct the terminology for internal consistency and with the approved mitigation plan standard. Also, each bankfull event needs to be listed as a separate line item with reach, date of occurrence (month/day/year), and measurement device/method.
   KCI Response: Table 11 has been updated to reflect the correct terminology and to list each event as a separate line item.

4. Planting tables show no deviations from the Mitigation Plan. Please verify that plant species and quantities did not deviate from the approved list. If there is a deviation from the approved planting plan, this should be noted as redline changes to these tables.
   KCI Response: There were no deviations from the approved planting plan from the Mitigation Plan.

5. As the project progresses, please consider splitting the CCPV into two sheets to adequately capture project details.
   KCI Response: The CCPV will be split into two sheets starting in MY02.

Sincerely,



Adam Spiller
Project Manager

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PROJECT SUMMARY

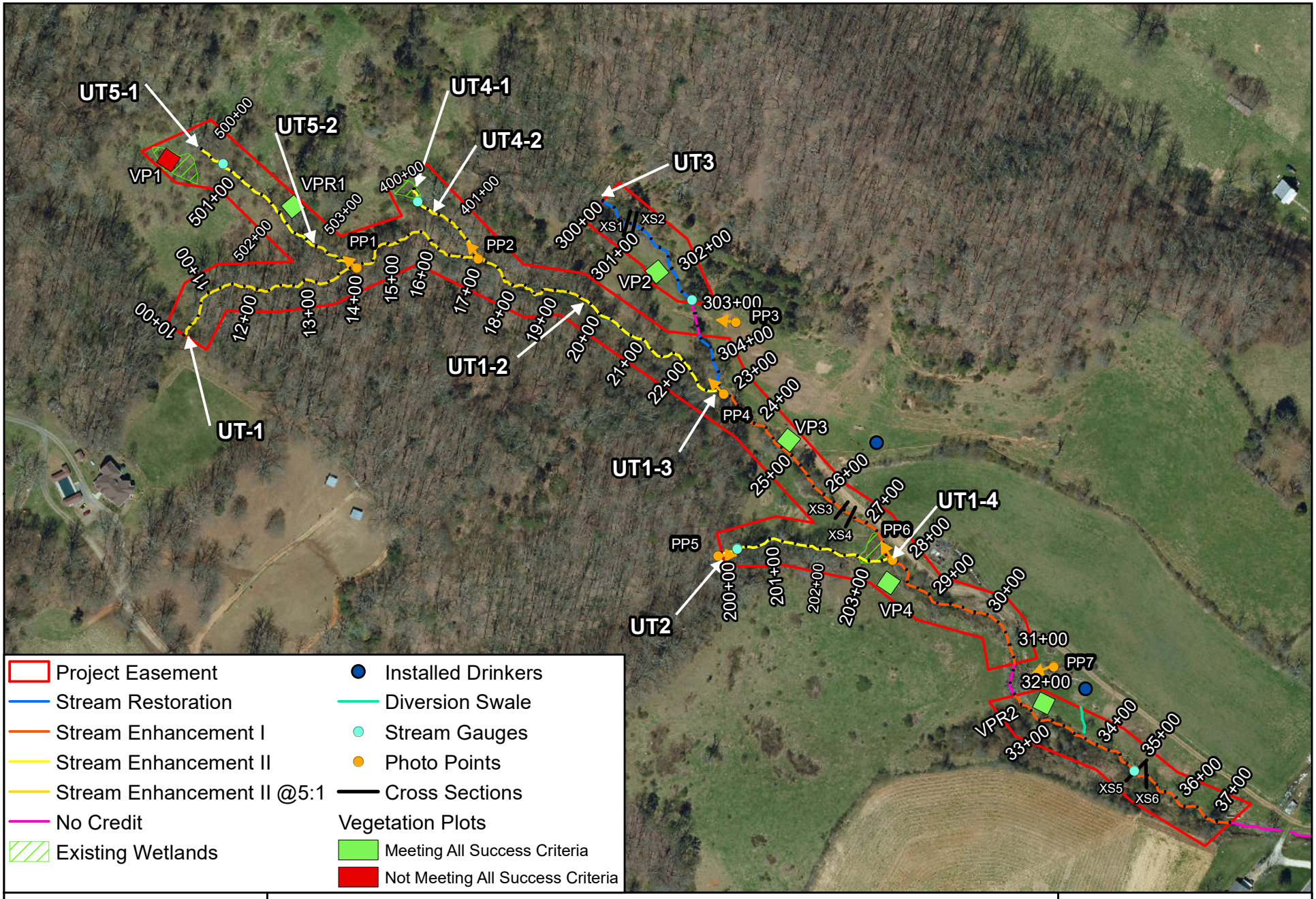
The Dales Creek Restoration Site (DCRS) was completed in April 2022 and restored and enhanced a total of 3,978 linear feet of stream. The DCRS is a riparian system in the French Broad River Basin (06010105 8-digit cataloging unit) in Buncombe County, North Carolina. This riparian stream system had been substantially modified through livestock impacts and removal of the riparian buffer. This site offers the chance to restore streams impacted by agriculture to a stable headwater ecosystem with a functional riparian buffer and floodplain access, while also reducing incoming nutrients from livestock. Project planting and construction were completed in April 2022 and the monitoring components were installed in April 2022.

Table 1. Dales Creek Restoration Site (ID-100128) 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								
UT1 Reach 1	967	967	Cool	EII	5.00000	193.400		
UT1 Reach 2	332	332	Cool	EII	2.50000	132.800		
UT1 Reach 3	488	478	Cool	EI	1.50000	325.333		
UT1 Reach 4	873	869	Cool	EI	1.50000	582.000		Crossing exception at STA 31+37 to 32+03
UT2	343	343	Cool	EII	2.50000	137.200		
UT3	396	388	Cool	R	1.00000	396.000		Crossing exception at STA 302+79 to 303+43
UT4 Reach 1	56	58	Cool	EII	2.50000	22.400		
UT4 Reach 2	134	134	Cool	EII	5.00000	26.800		
UT5 Reach 1	290	290	Cool	EII	2.50000	166.000		
UT5 Reach 2	99	99	Cool	EII	5.00000	19.800		
					Total:	**1,951.733**		

Project Credits

Restoration Level	Stream			Riparian Wetland	Non-Riparian Wetland	Coastal Marsh
	Warm	Cool	Cold			
Restoration		396.000				
Re-establishment						
Rehabilitation						
Enhancement						
Enhancement I		907.333				
Enhancement II		648.400				
Creation						
Preservation						
Total		1951.733				



CURRENT CONDITIONS PLAN VIEW
DALES CREEK RESTORATION SITE
BUNCOMBE COUNTY, NC

Image Source: NC Statewide Orthoimagery, 2019

Table 2. Dales Creek Restoration Site (ID-100128) Goals, Performance and Results

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Restore channelized and livestock impacted streams to stable B-type channels	-Relocate or stabilize channelized and/or incised streams to connect to a floodplain or floodprone area -Install a bankfull-sized channel cross-section - Create bedform diversity with pools, riffles, and habitat structures	Dispersion of high flows on the floodplain, increase in biogeochemical cycling within the system, and recharging of riparian wetlands.	BHR<1.2, ER>2.2, and no change >10% in BHR or ER between monitoring events; 4 bankfull events; continuous flow for at least 30 days each year	6 cross-section surveys, 5 pressure transducer stream gauges (measuring bankfull events on UT1-4 and stream flow on UT2, UT3, UT4, and UT5), annual visual inspection of stream banks and bed	All XS with a BHR<1.2; 5/6 XS with an ER>2.2, 3 bankfull events in 2022
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. -Plant the site with native trees and shrubs and a herbaceous seed mix	Reduction in floodplain sediment inputs from runoff, increased bank stability, increased LWD and organic material in streams.	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre at MY5, and 210 stems per acre at MY7.	6 vegetation monitoring plots, annual visual inspection of fencing and vegetation condition (including vigor and presence of invasive species)	5/6 plots meeting all success criteria

Table 3. Dales Creek Restoration Site (ID-100128) Project Attribute Table

Project Name	Dales Creek Restoration Site		
County	Buncombe County		
Project Area (acres)	7.692		
Project Coordinates (latitude and longitude decimal degrees)	35.5991°N, -82.7466°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)	139		
Project Drainage Area Percentage of Impervious Area	<1%		
Land Use Classification	Forest (73%), Pasture/Farmland (26%), and Low-density Residential Development (1%).		
Reach Summary Information			
Parameters	**All Reaches Combined**		
Pre-project length (feet)	4,114		
Post-project (feet)	4,088		
Valley confinement (Confined, moderately confined, unconfined)	Partially confined to confined		
Drainage area (acres)	139		
Perennial, Intermittent, Ephemeral	Intermittent – Perennial		
NCDWR Water Quality Classification	C		
Dominant Stream Classification (existing)	F4		
Dominant Stream Classification (proposed)	B4a		
Dominant Evolutionary class (Simon) if applicable	Stage IV		
Parameters	**W1**	**W2**	**W3**
Pre-project (acres)	0.07	0.03	0.04
Post-project (acres)	0.07	0.03	0.04
Wetland Type (non-riparian, riparian)	Riparian	Riparian	Riparian
Mapped Soil Series	Toecan-Tusquitee Complex	Toecan-Tusquitee Complex	Tate
Soil Hydric Status	Non-hydric	Non-hydric	Non-hydric
Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Yes	SAW-2019-00834
Water of the United States - Section 401	Yes	Yes	DWR# 19-0864
Endangered Species Act	Yes	Yes	USFWS
Historic Preservation Act	No	N/A	NCSHPO
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

MONITORING RESULTS

The site was planted in April 2022. The MY01 vegetation monitoring was conducted on November 2, 2022. Five out of the six vegetation monitoring plots have met all of the success criteria. The plot that did not meet all of the success critieria, was Plot 1, which only had 2 native hardwood species. This plot is located in an area with many mature trees in close proximity to it and KCI expects that native volunteer species will colonize the plot in future monitoring years to correct this low level of diversity. Several invasive species were present on site during 2022. These species were treated on August 23, 2022 with herbicide. KCI will continue to monitor the invasives on site and treat as necessary.

The MY01 cross-section survey was completed on December 20, 2022. The survey found the stream functioning as designed. Small amounts of aggradation (approximately 0.3') were seen in XS2 and XS3. This has led to an entrenchment ratio of 2.1 in XS3. These slight changes are part of the stream settling after construction and do not represent a threat to project success. KCI expects that as the stream continues to settle and this sediment moves through the system, that all of the cross-section measurements will be within the desired ranges.

During 2022, the stream gauge on T1 recorded 3 bankfull events. None of the flow gauges recorded any days of flow in 2022. Based on on-site assessment and observations, KCI does not believe that this data is accurate. Due to the size of the streams and their relative steepness, it would appear that, although the streams were flowing, it was at a level too low for the gauges to record. Before the beginning of the 2023 growing season, KCI will reinstall the gauges as needed and install cameras in their vicinity to provide supplemental data.

REFERENCES

NCDENR, Ecosystem Enhancement Program. 2009. French Broad River Basin Restoration Priorities 2009. Raleigh, NC. https://deq.nc.gov/media/8060/download

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. Dales Creek Resotration Site (ID-100128) Visual Stream Stability Assessment

Reach UT1 Reach 3

Assessed Stream Length 488

Assessed Bank Length 976 Assessment Date: 12/20/2022

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. Dales Creek Resotration Site (ID-100128) Visual Stream Stability Assessment

Reach	UT1 Reach 4
Assessed Stream Length	873
Assessed Bank Length	1746

Assessment Date: 12/20/2022

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. Dales Creek Resotration Site (ID-100128) Visual Stream Stability Assessment

Reach UT3

Assessed Stream Length 396

Assessed Bank Length 792 Assessment Date: 12/20/2022

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.	1	1		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)	1	1		100%

Table 5. Dales Creek Restoration Site (ID-100128) Visual Vegetation Assessment

Planted acreage **4.11** Assessment Date: 12/20/2022

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 **7.69**

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.	0.10 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 – 4/27/22

PP1 – MY-01 – 12/20/22

PP2 – MY-00 – 4/27/22

PP2 – MY-01 – 12/20/22

PP3 – MY-00 – 4/27/22

PP3 – MY-01 – 12/20/22

PP4 – MY-00 – 4/27/22

PP4 – MY-01 – 12/20/22

PP5 – MY-00 – 4/27/22

PP5 – MY-01 – 12/20/22

PP6 – MY-00 – 4/27/22

PP6 – MY-01 – 12/20/22

PP7 – MY-00 – 4/27/22

PP7 – MY-01 – 12/20/22

Culvert on T1 – 12/20/22

Culvert on T3 – 12/20/22

Vegetation Monitoring Plot Photos

Vegetation Plot 1 – MY-00 – 7/14/22

Vegetation Plot 1 – MY-01 – 10/31/22

Vegetation Plot 2 – MY-00 – 4/27/22

Vegetation Plot 2 – MY-01 – 10/31/22

Vegetation Plot 3 – MY-00 – 4/27/22

Vegetation Plot 3 – MY-01 - 10/31/22

Vegetation Plot 4 – MY-00 – 4/27/22

Vegetation Plot 4 – MY-01 – 10/31/22

Vegetation Plot R1 – MY-01 – 10/31/22

Vegetation Plot R2 – MY-01 – 10/31/22

APPENDIX B

Vegetation Plot Data

Table 6. Vegetation Plot Data
Dales Creek Restoration Site (ID-100128)

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 1 R	Veg Plot 2 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	Aesculus flava	yellow buckeye	Tree	FACU					1	1	2	2		2
	Alnus serrulata	hazel alder	Tree	OBL	3	3						2		
	Asimina triloba	pawpaw	Tree	FAC									1	
	Betula lenta	sweet birch	Tree	FACU			2	2	5	9	2	2		
	Cornus amomum	silky dogwood	Shrub	FACW	6	6			1	1			1	
	Liriodendron tulipifera	tuliptree	Tree	FACU			2	2			2	2	2	2
	Platanus occidentalis	American sycamore	Tree	FACW			5	5	5	5			2	3
	Quercus alba	white oak	Tree	FACU			1	1			2	2		1
	Quercus falcata	southern red oak	Tree	FACU			2	2			2	2	1	1
	Quercus rubra	northern red oak	Tree	FACU									1	1
	Quercus sp.						2	2	1	1	1	1		
	Salix nigra	black willow	Tree	OBL						1				
Sum	Performance Standard				9	9	14	14	13	18	11	13	8	10
Post Mitigation Plan Species	*Gleditsia triacanthos*	*honeylocust*	*Shrub*	*FAC*									*1*	
Sum	Proposed Standard				9	9	14	14	13	18	11	13	8	10
Mitigation Plan Performance Standard	Current Year Stem Count					9		14		18		13	8	10
	Stems/Acre					283		567		729		526	324	405
	Species Count					2		6		6		7	6	6
	Dominant Species Composition (%)					67		36		50		15	22	30
	Average Plot Height (ft.)					3		1		1		1	3	2
	% Invasives					0		0		0		0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					9		14		18		13	8	10
	Stems/Acre					283		567		729		526	324	405
	Species Count					2		6		6		7	6	6
	Dominant Species Composition (%)					67		36		50		15	22	30
	Average Plot Height (ft.)					3		1		1		1	3	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	4.11
Date of Initial Plant	4/11/2022
Date(s) of Supplemental Plant(s)	
Date(s) Mowing	
Date of Current Survey	12/20/2022
Plot size (ACRES)	0.0247

Table 7. Vegetation Performance Standards Summary Table
Dales Creek Restoration Site (ID-100128)

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	283	3	2	0	567	1	6	0	729	1	6	0
Monitoring Year 0	729	2	4	0	850	1	5	0	931	1	5	0
	Veg Plot Group 4 F				Veg Plot Group 1 R				Veg Plot Group 2 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	526	1	7	0	324	3	6	0	405	2	6	0
Monitoring Year 0	891	1	8	0								

APPENDIX C

Stream Geomorphology Data

Table 8. Baseline Stream Data Summary Dales Creek, UT1 Reach 3										
Parameter	**Pre-Existing Condition (if applicable)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	4.6			22.2	2	6.8		4.9		1
Floodprone Width (ft)	8.9			26.0	2	18.3		11.7		1
Bankfull Mean Depth (ft)	0.3			0.8	2	0.5		0.3		1
Bankfull Max Depth (ft)	0.4			1.2	2	0.8		0.6		1
Bankfull Cross Sectional Area (ft^2)	3.5			6.3	2	3.4		1.7		1
Width/Depth Ratio	6.0			77.7	2	13.5		14.7		1
Entrenchment Ratio	1.2			2.0	2	2.7		2.4		1
Bank Height Ratio	1.7			3.8	2	1.0		1.0		1
Max part size (mm) mobilized at bankfull	151					111		74		
Rosgen Classification	G4/B4a					B4a		B4a		
Bankfull Discharge (cfs)	24.5					24.7		24.7		
Sinuosity (ft)	1.1					1.1		1.1		
Water Surface Slope (Channel) (ft/ft)	0.074					0.074		0.075		
Other										

Table 8. Baseline Stream Data Summary Dales Creek, UT1 Reach 4										
Parameter	**Pre-Existing Condition (if applicable)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	5.1	6.9	7.3	7.8	4	8.0		8.6		1
Floodprone Width (ft)	10.1	13.3	12.8	17.4	4	20		27.9		1
Bankfull Mean Depth (ft)	0.5	0.7	0.7	0.8	4	0.6		0.9		1
Bankfull Max Depth (ft)	1.0	1.1	1.1	1.1	4	0.9		1.4		1
Bankfull Cross Sectional Area (ft^2)	3.8	3.4	4.2	5.3	4	4.8		7.8		1
Width/Depth Ratio	6.3	11.2	11.2	16.1	4	13.2		9.5		1
Entrenchment Ratio	1.4	2.0	1.9	2.6	4	2.5		3.2		1
Bank Height Ratio	1.0	2.4	1.4	6.0	4	1.0		1.0		1
Max part size (mm) mobilized at bankfull	79					84		121		
Rosgen Classification	G4/B4a					B4a		B4a		
Bankfull Discharge (cfs)	27.7					31.2		31.2		
Sinuosity (ft)	1.1					1.1		1.1		
Water Surface Slope (Channel) (ft/ft)	0.048					0.048		0.047		
Other										

Table 8. Baseline Stream Data Summary Dales Creek, UT3										
Parameter	**Pre-Existing Condition (if applicable)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	2.0	3.4	2.9	6.3	5	5.0		4.7		1
Floodprone Width (ft)	3.0	6.2	5.5	12.6	5	15.5		18.7		1
Bankfull Mean Depth (ft)	0.3	0.4	0.4	0.5	5	0.4		0.5		1
Bankfull Max Depth (ft)	0.4	0.6	0.6	0.8	5	0.6		0.9		1
Bankfull Cross Sectional Area (ft^2)	1.0	1.2	1.2	1.6	5	1.9		2.3		1
Width/Depth Ratio	3.8	10.0	7.1	24.6	5	13.5		9.5		1
Entrenchment Ratio	1.2	1.9	1.6	3.3	5	3.1		4.0		1
Bank Height Ratio	1.0	2.4	1.9	4.9	5	1.0		1.0		1
Max part size (mm) mobilized at bankfull	100					115		147		
Rosgen Classification	G4					B4a		B4a		
Bankfull Discharge (cfs)	6.6					12.9		12.9		
Sinuosity (ft)	1.1					1.1		1.1		
Water Surface Slope (Channel) (ft/ft)	0.104					0.105		0.108		
Other										

Table 9. Cross-section Morphology Monitoring Summary
Dales Creek Restoration Site (ID-100128)

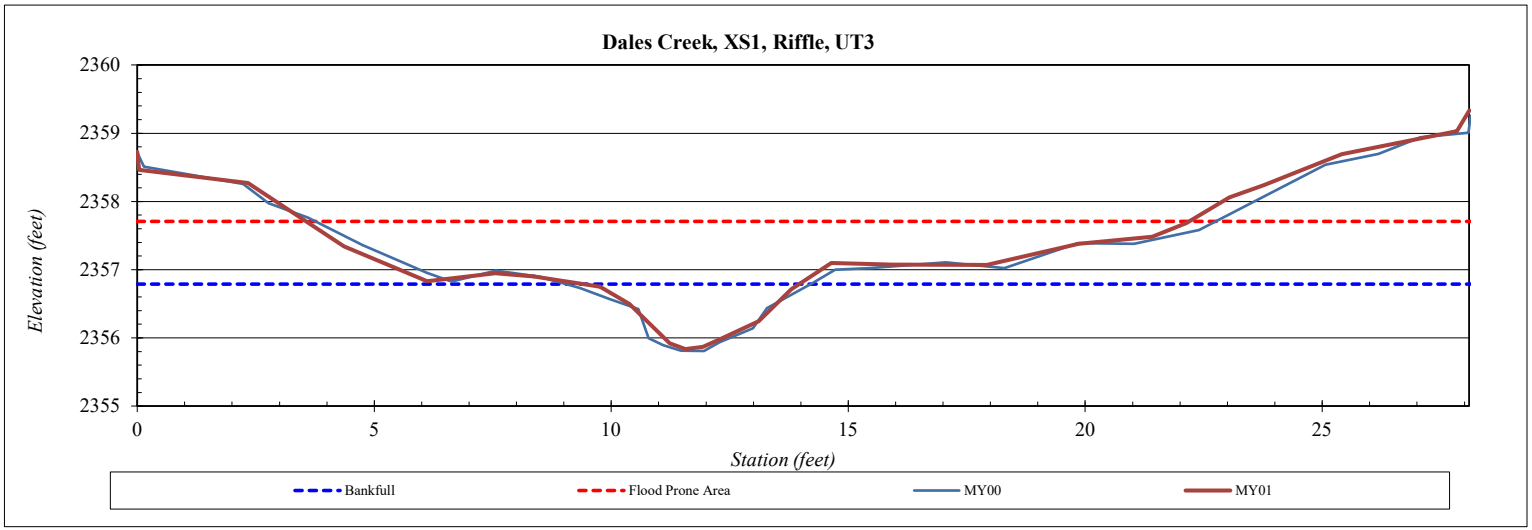
	Cross Section 1 (Riffle - UT3)							Cross Section 2 (Pool - UT3)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2356.7	2356.8						2355.3	2355.6					
Bank Height Ratio - Based on AB Bankfull Area	1.0	1.0						---	---					
Thalweg Elevation	2355.8	2355.8						2354.5	2355.0					
LTOB Elevation	2356.7	2356.8						2355.3	2355.7					
LTOB Max Depth (ft)	0.9	0.9						0.9	0.8					
LTOB Cross Sectional Area (ft^2)	2.3	2.2						2.8	3.7					
	Cross Section 3 (Riffle - UT1-3)							Cross Section 4 (Pool - UT1-3)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2286.9	2287.0						2285.8	2285.8					
Bank Height Ratio - Based on AB Bankfull Area	1.0	0.6						---	---					
Thalweg Elevation	2286.3	2286.5						2284.8	2284.8					
LTOB Elevation	2286.9	2286.9						2285.8	2286.0					
LTOB Max Depth (ft)	0.6	0.3						1.1	1.2					
LTOB Cross Sectional Area (ft^2)	1.7	0.9						3.0	3.9					
	Cross Section 5 (Riffle - UT1-4)							Cross Section 6 (Pool - UT1-4)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2242.6	2242.7						2241.4	2241.4					
Bank Height Ratio - Based on AB Bankfull Area	1.0	0.9						---	---					
Thalweg Elevation	2241.2	2241.2						2240.6	2240.6					
LTOB Elevation	2242.6	2242.6						2241.4	2241.5					
LTOB Max Depth (ft)	1.4	1.4						0.7	0.9					
LTOB Cross Sectional Area (ft^2)	7.8	6.4						2.8	3.2					

Cross-Section Plots

River Basin:	French Broad
Site:	Dales Creek
XS ID	XS1
Drainage Area (sq mi):	0.02
Date:	4/28/2022
Field Crew:	TS, KB

Station	Elevation

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2356.79
Bankfull Cross-Sectional Area:	2.3
LTOB Cross-Sectional Area:	2.2
Bankfull Width:	4.6
Flood Prone Area Elevation:	2357.71
Flood Prone Width:	18.6
LTOB Max Depth	0.9
LTOB Mean Depth	0.5
W / D Ratio:	9.5
Entrenchment Ratio:	4.1
Bank Height Ratio:	1.0
Thalweg Elevation:	2355.84

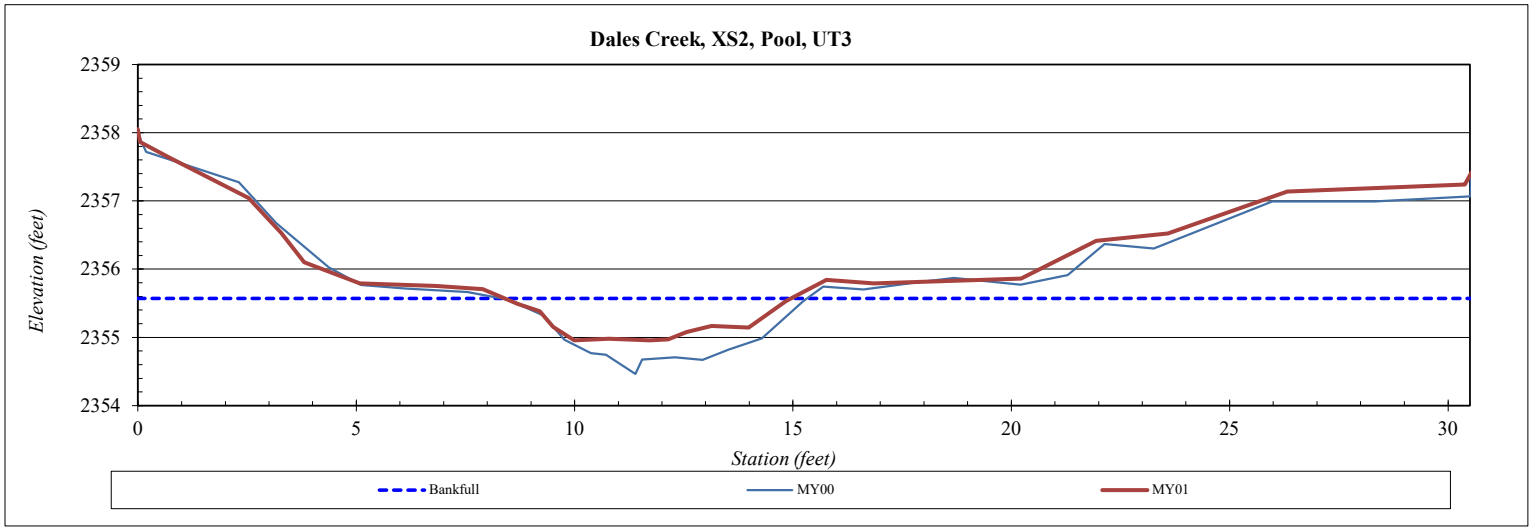


Cross-Section Plots

River Basin:	French Broad
Site:	Dales Creek
XS ID	XS2
Drainage Area (sq mi):	0.02
Date:	4/28/2022
Field Crew:	TS, KB

Station	Elevation

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2355.57
Bankfull Cross-Sectional Area:	2.8
LTOB Cross-Sectional Area:	3.7
Bankfull Width:	6.6
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	0.8
LTOB Mean Depth	0.6
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2354.96

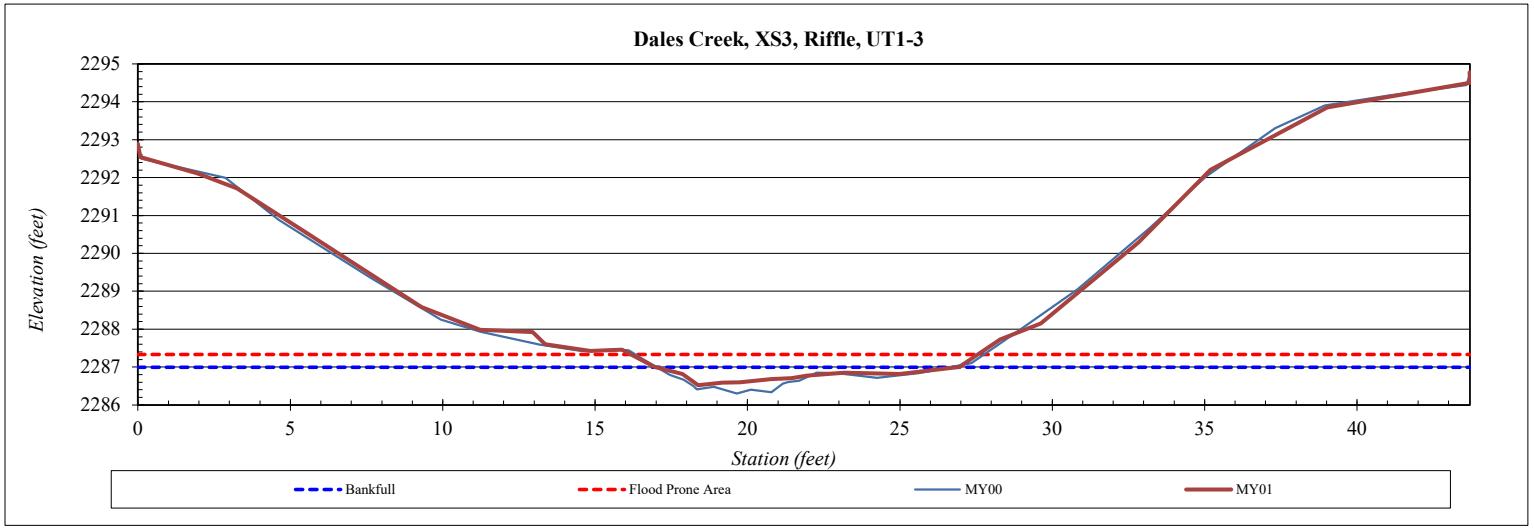


Cross-Section Plots

River Basin:	French Broad
Site:	Dales Creek
XS ID	XS3
Drainage Area (sq mi):	0.15
Date:	4/28/2022
Field Crew:	TS, KB

Station	Elevation

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2286.99
Bankfull Cross-Sectional Area:	1.7
LTOB Cross-Sectional Area:	0.9
Bankfull Width:	5.3
Flood Prone Area Elevation:	2287.33
Flood Prone Width:	11.4
LTOB Max Depth	0.3
LTOB Mean Depth	0.2
W / D Ratio:	30.7
Entrenchment Ratio:	2.1
Bank Height Ratio:	0.6
Thalweg Elevation:	2286.52

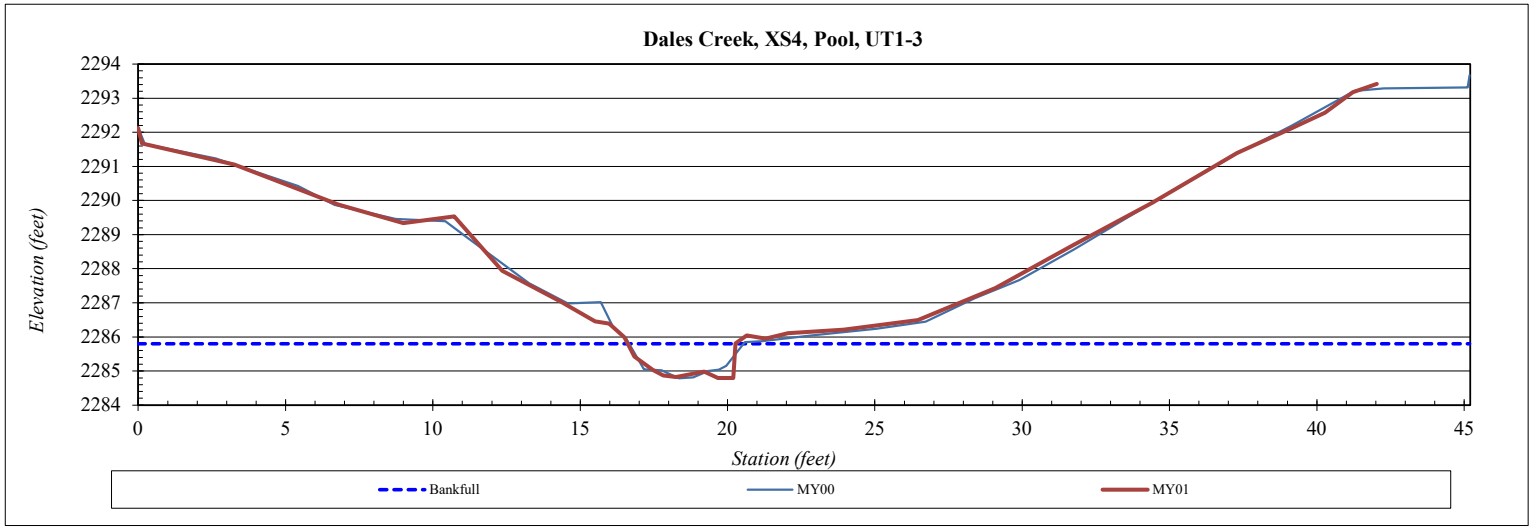


Cross-Section Plots

River Basin:	French Broad
Site:	Dales Creek
XS ID	XS4
Drainage Area (sq mi):	0.15
Date:	4/28/2022
Field Crew:	TS, KB

Station	Elevation

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2285.80
Bankfull Cross-Sectional Area:	3.0
LTOB Cross-Sectional Area:	3.9
Bankfull Width:	3.7
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	1.2
LTOB Mean Depth	1.1
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2284.79

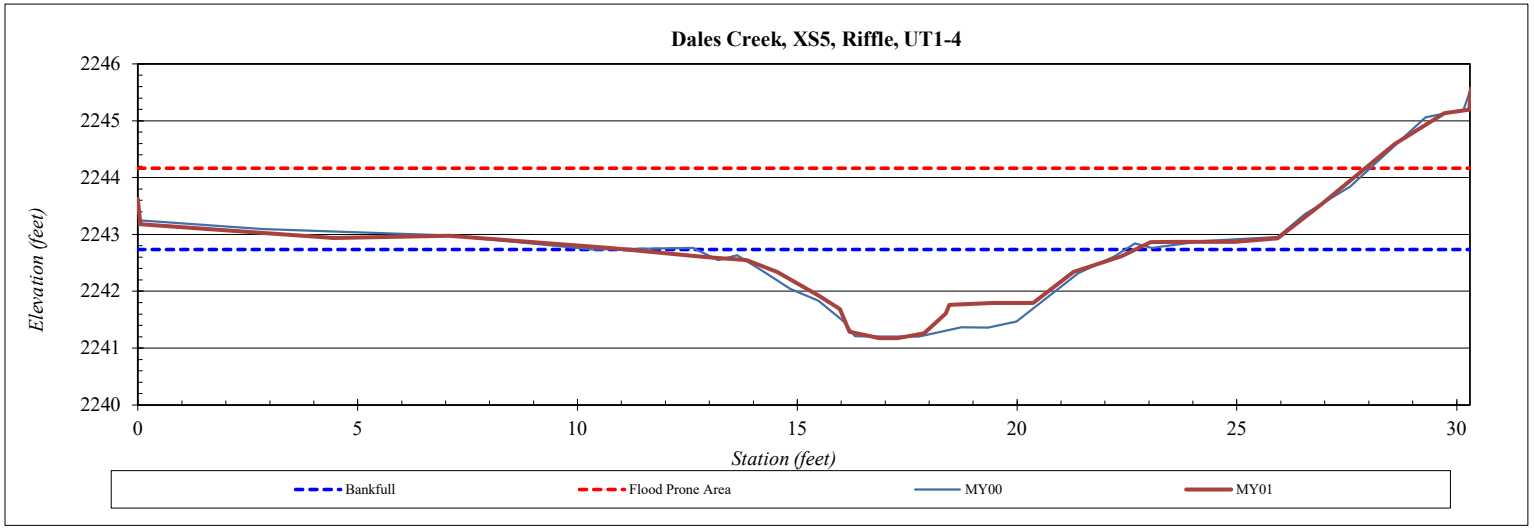


Cross-Section Plots

River Basin:	French Broad
Site:	Dales Creek
XS ID	XS5
Drainage Area (sq mi):	0.22
Date:	4/28/2022
Field Crew:	TS, KB

Station	Elevation

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2242.74
Bankfull Cross-Sectional Area:	7.8
LTOB Cross-Sectional Area:	6.4
Bankfull Width:	11.6
Flood Prone Area Elevation:	2244.16
Flood Prone Width:	27.9
LTOB Max Depth	1.4
LTOB Mean Depth	0.5
W / D Ratio:	21.2
Entrenchment Ratio:	2.4
Bank Height Ratio:	0.9
Thalweg Elevation:	2241.17

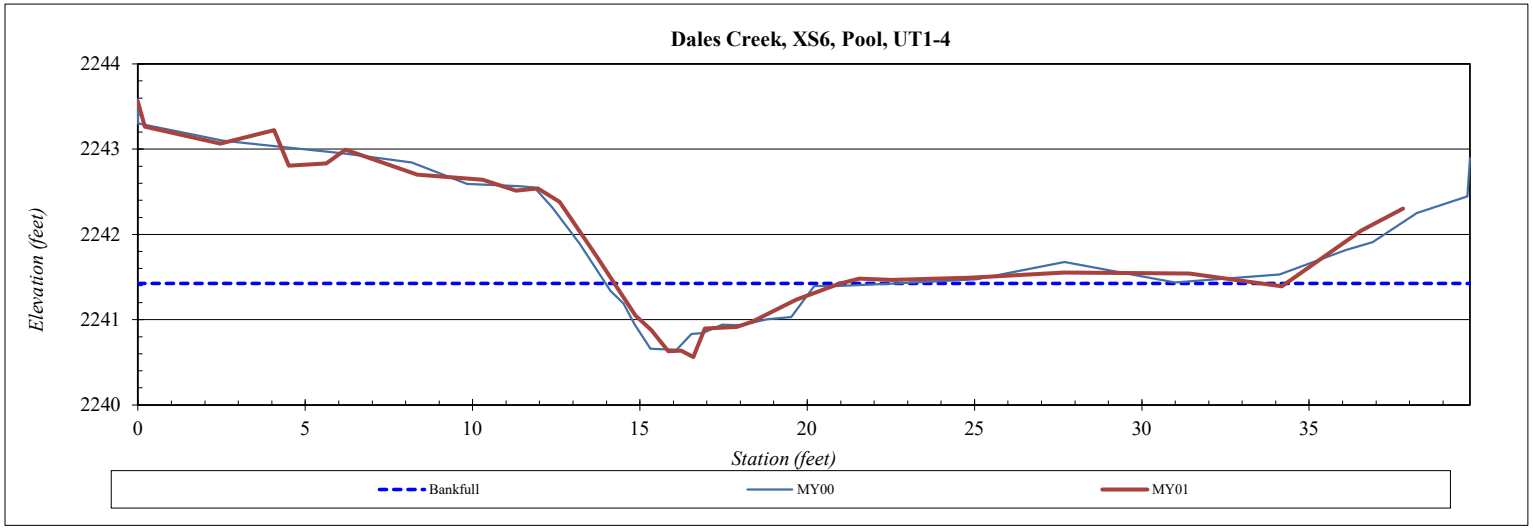


Cross-Section Plots

River Basin:	French Broad
Site:	Dales Creek
XS ID	XS6
Drainage Area (sq mi):	0.22
Date:	4/28/2022
Field Crew:	TS, KB

Station	Elevation

SUMMARY DATA	
Bankfull Elevation (ft) - Based on AB-Bankfull Area	2241.42
Bankfull Cross-Sectional Area:	2.8
LTOB Cross-Sectional Area:	3.2
Bankfull Width:	6.7
Flood Prone Area Elevation:	---
Flood Prone Width:	---
LTOB Max Depth	0.9
LTOB Mean Depth	0.5
W / D Ratio:	---
Entrenchment Ratio:	---
Bank Height Ratio:	---
Thalweg Elevation:	2240.56



APPENDIX D

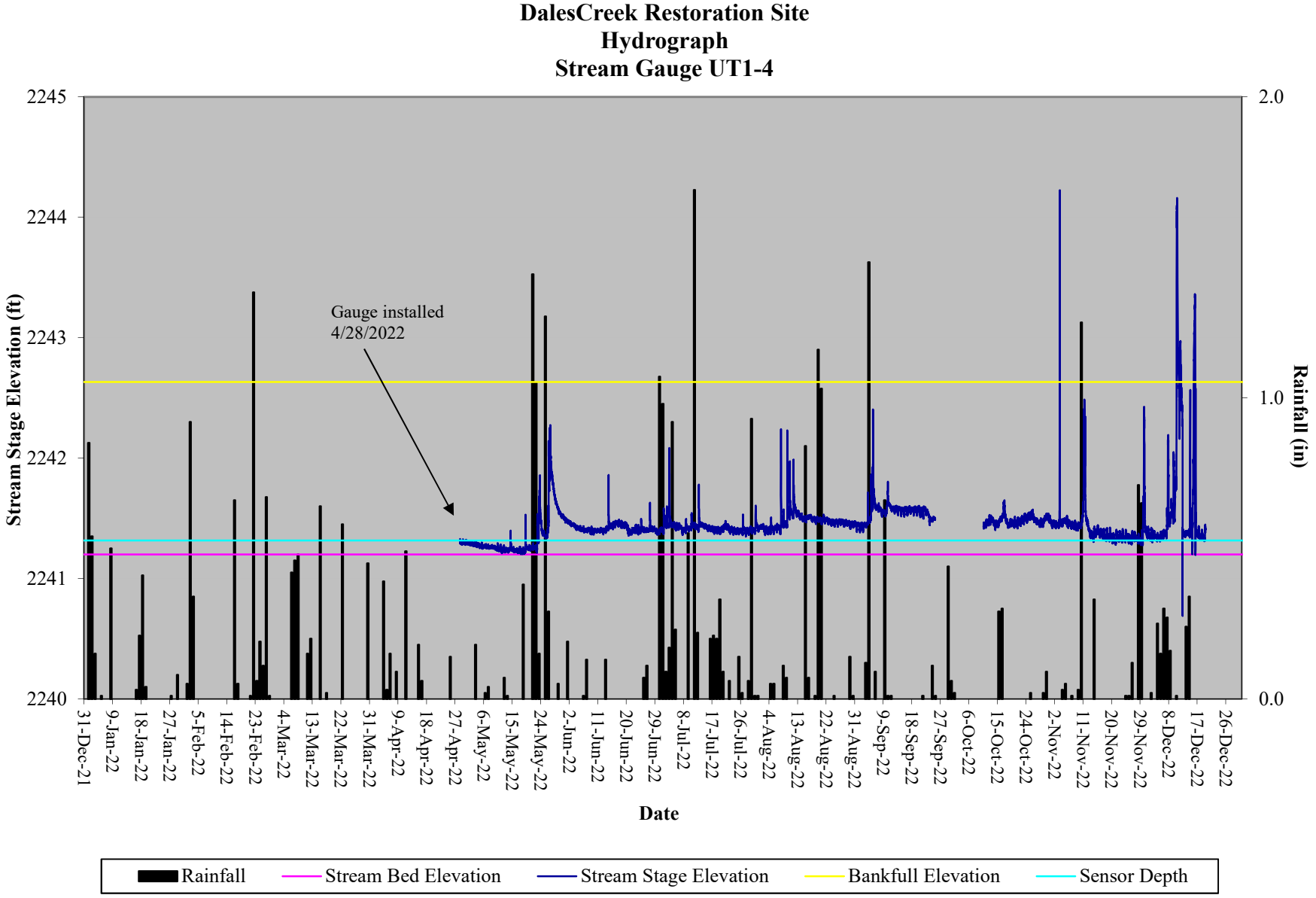
Hydrologic Data

Table 10. Rainfall Summary, Dales Creek Restoration Site (ID-100128)							
	MY1 2022	MY2 2023	MY3 2024	MY4 2025	MY5 2026	MY6 2027	MY7 2028
Annual Precip Total	36.38						
WETS 30th Percentile	27.32						
WETS 70th Percentile	49.98						
Normal	Yes						

Table 11. Bankfull Events, Dales Creek Restoration Site (ID-100128)							
Gage ID	MY1 2022	MY2 2023	MY3 2024	MY4 2025	MY5 2026	MY6 2027	MY7 2028
UT1-4	3						
Year	Date		Reach		Method		
MY01	11/3/2022		UT1-4		On-site stream gauge		
	12/10/2022		UT1-4		On-site stream gauge		
	12/16/2022		UT1-4		On-site stream gauge		

Table 12. Stream Flow Criteria Attainment, Dales Creek Restoration Site (ID-100128)							
	Greater than 30 Days of Flow/Max Consecutive Days						
Reach	MY1 2022	MY2 2023	MY3 2024	MY4 2025	MY5 2026	MY6 2027	MY7 2028
UT2	No/0*						
UT3	No/0*						
UT4-1	No/0*						
UT5-1	No/0*						

*stream flowing below level that gauges can record


DalesCreek Restoration Site
Hydrograph
Stream Gauge UT1-4
Stream Stage Elevation (ft)
Rainfall (in)
Gauge installed
4/28/2022
2245
2244
2243
2242
2241
2240
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
Date
Rainfall
Stream Bed Elevation
Stream Stage Elevation
Bankfull Elevation
Sensor Depth

APPENDIX E

Project Timeline and Contact Info

Table 13. Project Activity & Reporting History Dales Creek Restoration Site, DMS Project #100128		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Site Instituted		May 23, 2019
Mitigation Plan		Feb. 19, 2021
Final Design - Construction Plans		Aug. 25, 2021
Construction Grading Completed		April 1, 2022
Planting Completed		April 11, 2022
As-built Survey		April 29, 2022
Baseline Monitoring/Report		May 2022
Vegetation Monitoring	April 27, 2022	
Stream Survey	April 28, 2022	
Invasive Species Treatment		August 23, 2022
Year 1 Monitoring		December 2022
Vegetation Monitoring	October 31, 2022	
Stream Survey	December 20, 2022	

Table 14. Project Contacts Dales Creek Restoration Site, DMS Project #100128	
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	Chatham Civil Contracting, LLC 811 Archie Johnson Road Siler City, NC 27344 Contact: Mr. Stephen James Phone: (919)704-4442
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