MONITORING YEAR 1 ANNUAL REPORT

FINAL

LAUREL VALLEY MITIGATION SITE

Burke County, NC
Catawba River Basin
HUC 03050101

DMS Project No. 100140
NCDEQ Contract No. 7875-02
DMS RFP No. 16-007875 (*Issued: May 6, 2019)*
USACE Action ID No. SAW-2020-00053
DWR Project No. 20200018
Data Collection Dates: June 2023 – December 2023
Submittal Date: January 4, 2024

PREPARED FOR:

Environmental Quality

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LAUREL VALLEY MITIGATION SITE

Monitoring Year 1 Annual Report

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Section 1: PROJECT OVERVIEW

The Laurel Valley Mitigation Site (Site) is in Burke County, approximately 3.5 miles southeast of Morganton. The Site is within the NC Division of Mitigation Services (DMS) Hunting Creek targeted local watershed Hydrologic Unit Code (HUC) 03050101060050 and the NC Division of Water Resources (DWR) Subbasin 03-08-31. The Site will provide stream mitigation units (SMUs) in the Catawba River Basin HUC 03050101 (Catawba 01). Table 3 presents information related to the project attributes.

1.1 Project Quantities and Credits

Mitigation work within the Site included the restoration and preservation of approximately 5,175 linear feet (LF) of perennial stream channel and enhanced and preserved up to an additional 120 LF of riparian buffer in areas across the Site. As outlined in the Laurel Valley Mitigation Plan Addendum (Wildlands, 2023), this will generate 4,864.197 SMUs for the Catawba 01. Table 1 below shows stream credits by reach and the total amount of stream credits expected at closeout.

Table 1: Project Quantities and Credits

PROJECT MITIGATION QUANTITIES									
Project Component	**Existing Footage /Acreage**	**Approved Mitigation Plan Footage /Acreage***	**As-built Footage / Acreage***	**Mitigation Category**	**Restoration Level**	**Priority Level**	**Mitigation Ratio (X:1)**	**Approved Mitigation Plan Crediting**	**Addendum / MY0 Mitigation Plan Crediting**
Stream									
East Prong Hunting Creek R1	416.000	498.000	498.000	Warm	R	P1, P2	1.0	498.000	498.000
East Prong Hunting Creek R2	912.000	686.000	686.000	Warm	R	P1, P2	1.0	686.000	686.000
UT1 R1	457.000	457.000	457.000	Warm	P	N/A	15.0	30.467	30.467
UT1 R2	1,633.000	1,975.000	1,987.360	Warm	R	P1, P2	1.0	1,975.000	1,975.000
UT2	1,470.000	1,542.000	1,546.450	Warm	R	P1, P2	1.0	1,542.000	1,542.000
Total Stream LF	**4,888.000**	**5,158.000**	**5,174.810**						

Table 1: Project Quantities and Credits

PROJECT CREDITS						
Restoration Level	**Stream**			**Riparian Wetland**		**Non-Rip**
	Warm	**Cool**	**Cold**	**Riverine**	**Non-Riverine**	**Wetland**
Restoration	4,701.000					
Re-establishment						
Rehabilitation (1:1 & 1.5:1)						
Enhancement						

Table 1: Project Quantities and Credits

PROJECT CREDITS						
Restoration Level	**Stream**			**Riparian Wetland**		**Non-Rip**
	Warm	**Cool**	**Cold**	**Riverine**	**Non-Riverine**	**Wetland**
Enhancement I						
Enhancement II						
Creation						
Preservation	30.467					
Total	**4,731.467**					

Table 1: Project Quantities and Credits

PROJECT CREDIT ADJUSTMENTS**	
Type	**SMUs**
Total Base SMU	4,731.467
Credit Loss in Required Buffer	-234.350
Credit gain in Required Buffer	367.080
Net Change in Credit Buffers	132.730
Total Adjusted SMUs	**4,864.197**

* Crossing lengths and utility easement have been removed from restoration and preservation footage.
** Credit adjustment for Non-standard Buffer Width calculation using the Wilmington District Stream Buffer Credit Calculator issued by the USACE in January 2018.

1.2 Project Goals and Objectives

The project is intended to provide numerous ecological benefits. Table 2 below describes expected outcomes to water quality and ecological processes and provides project goals and objectives.

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Exclude livestock from stream channels.	Install livestock fencing as needed to exclude livestock from stream channels, wetlands, and riparian areas, or remove livestock from adjacent fields.	Reduce direct fecal coliform and nutrient inputs to the Site streams. Eliminate hoof shear on the stream bed and banks, which will reduce stream bank erosion and fine sediments in the stream channel. Eliminate cattle trampling of wetlands.	Prevent easement encroachments.	Semi-annual visual inspections.	No evidence of livestock with conservation easements.

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Restore and enhance native floodplain vegetation.	Convert active cattle pasture to forested riparian buffers along all Site streams, which will slow and treat sediment laden runoff from adjacent pastures before entering streams. Protect and enhance existing forested riparian buffers. Treat invasive species.	Reduce sediment inputs from pasture runoff. Reduce floodplain velocities and increase retention of flood flows on the floodplain, decrease direct runoff, and increase storage and nutrient cycling. Increase shading of stream channels, which will increase dissolved oxygen. Provide a source of LWD and organic material to Site streams for continued habitat. Support all stream functions.	320 stems per acre at MY3; 260 planted stems per acre at MY5 and a height of 7 ft within riparian zones or 4 ft in wetland planting zones; 210 stems per acre at MY7 with a height of 10 ft in riparian zones or 7 ft in height in wetland planting zones.[1,2] Woody shrub species are not subject to height requirements.	Ten (10) permanent and two (2) mobile one hundred square meter vegetation plots are placed on 2% of the planted area of the Site and monitored during MY1, MY2, MY3, MY5, and MY7.	In MY1, eleven (11) of twelve (12) vegetation plots met interim MY3 density requirements. No invasive species were observed within project area.
Improve the stability of stream channels.	Reconstruct stream channels slated for restoration with stable dimensions and appropriate depth relative to the existing floodplain and riparian wetland areas. Add bank revetments and instream structures to protect restored streams	Reduce sediment inputs from bank erosion. Increase floodplain engagement, decreasing runoff and increasing infiltration. Decrease instream shear stresses. Diversify available habitats.	ER over 1.4 for B-type and 2.2 for C-type channels and BHR below 1.2 with visual assessments showing progression towards stability.[3]	Eleven (11) Cross-sections will be assessed during MY1, MY2, MY3, MY5, and MY7 and visual inspections will be assessed annually.	All eleven (11) cross-sections show streams are stable and functioning as designed. In riffle cross-sections, ERs are over 2.2 and BHRs are below 1.2.

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Improve instream habitat.	Install habitat features such as constructed steps, cover logs, and brush toes on restored reaches. Added woody material/ LWD to channel beds. Construct pools of varying depth.	Increase and diversify available habitats for macroinvertebrates, fish, and amphibians. Promote aquatic species migration and recolonization from refugia, leading to colonization and increase in biodiversity over time. Add complexity including LWD to the streams.[3]	There is no required performance standard for this metric.	Semi-annual visual inspections.	N/A
Increase stream, floodplain, and riparian wetland hydrologic interaction.	Reconstruct stream channels with designed bankfull dimensions and appropriate depth relative to the existing floodplain; thereby, restoring the hydrologic connectivity of the streams with the riparian floodplain and wetland areas.	Reduce shear stress on channel; Hydrate adjacent wetland areas; Filter pollutants out of overbank flows.	Four bankfull events in separate years within the 7-year monitoring period for UT1, UT2, and East Prong Hunting Creek. There are no required performance criteria for the crest gage located downstream of the project Site's boundary or for the trail camera that will be installed in Wetland F (in MY1). Wetlands will be re-verified at MY7.	Four pressure transducers to record flow elevations and durations were installed. Only the three transducers located within the project Site are subject to performance criteria (CG1, CG2, CG3). The measurement of CG4 is only to show that flow is continuing within the off-site resource. A trail camera will also be installed within Wetland F to monitor wetland hydrologic connectivity.	No crest gages subject to performance criteria recorded bankfull events during MY1.
Permanently protect the project Site from harmful uses.	Establish a conservation easement on the Site. Exclude livestock from Site streams and remove pasture from the riparian buffer.	Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands. Support all stream functions.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.	No unapproved easement encroachments were observed.

[1] Increased inundation will inhibit some woody species growth and some of these areas may have increased herbaceous and scrub/shrub vegetation; therefore, a reduced vegetation height performance standard has been applied.

[2] All volunteer stems and/or supplemental plantings must be present in the plot for 2 years before being counted towards vegetation performance criteria.

[3] BHR = bank height ratio, ER = entrenchment ratio, and LWD = large woody debris

1.3 Project Attributes

The project Site is bordered by an active farm comprised of cattle pastures, barns, and a residence. Based on historic aerials from 1947 to 2016, East Prong Hunting Creek and UT2 have existed in their same approximate location and with the same pattern for over 72 years. Aerials show that UT1 historically flowed into East Prong Hunting Creek within the project Site and was rerouted sometime between 1976 and 1984. Agricultural management of open pastures remained consistent between 1947 and 2016, with a brief period between 1976 and 1984 when pastures were fallow. Table 3 below and Tables 8a – 8b in Appendix C present additional information on pre-restoration conditions.

Table 3: Project Attributes

PROJECT INFORMATION			
Project Name	Laurel Valley Mitigation Site	County	Burke County
Project Area (acres)	14	Project Coordinates	35.702772, -81.642614
PROJECT WATERSHED SUMMARY INFORMATION			
Physiographic Province	Piedmont	River Basin	Catawba River
USGS HUC 8-digit	03050101	USGS HUC 14-digit	03050101060050
DWR Sub-basin	03-08-31	Land Use Classification	Forested (62%), agriculture (17%), developed (16%)
Project Drainage Area (acres)	1,274	Percentage of Impervious Area	2%

RESTORATION TRIBUTARY SUMMARY INFORMATION			
Parameters	**East Prong Hunting Creek**	**UT1**	**UT2**
Pre-project length (feet)	1,328	2,090	1,470
Post-project (feet)	1,184	2,444	1,546
Valley confinement (Confined, moderately confined, unconfined)	Unconfined	Moderately confined	Moderately confined
Drainage area (acres)	1,274	136	155
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial
DWR Water Quality Classification	WS-IV	WS-IV	WS-IV
Dominant Stream Classification (existing)	C5, B5c	B5c, G5c	B4, B4c
Dominant Stream Classification (proposed)	C4	C4	C4
Dominant Evolutionary class (Simon) if applicable	V. Aggradation and widening	IV. Degradation and widening	IV. Degradation and widening

Table 3: Project Attributes

REGULATORY CONSIDERATIONS			
Parameters	**Applicable?**	**Resolved?**	**Supporting Documentation**
Water of the United States - Section 404	Yes	Yes	USACE Action ID No. SAW-2020-00053
Water of the United States - Section 401	Yes	Yes	DWR # 2020-0018
Endangered Species Act	Yes	Yes	Categorical Exclusion in Mitigation Plan (Wildlands, 2022)
Historic Preservation Act	Yes	Yes	
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A
Coastal Zone Management Act	No	N/A	N/A

Wetland Summary Information				
Parameters	**Wetland A**	**Wetland B**	**Wetland C**	**Wetland D**
Pre-project area (acres)	0.020	2.784	0.003	0.069
Wetland Type	Riverine	Riverine	Riverine	Riverine
Mapped Soil Series	Arkaqua Loam	Arkaqua Loam	Fairview Sandy Clam Loam	Fairview Sandy Clay Loam
Drainage Class	Poorly drained	Poorly drained	Well drained	Well drained
Soil Hydric Status	No	No	No	No
Source of Hydrology	Groundwater/Overbank	Groundwater/Overbank	Groundwater	Groundwater
Restoration or enhancement method	None	None	None	None

Parameters	**Wetland E**	**Wetland F**	**Wetland G**
Pre-project area (acres)	0.948	0.701	0.095
Wetland Type	Riverine	Riverine	Riverine
Mapped Soil Series	Arkaqua Loam, Fairview Sandy Clay Loam	Colvard Sandy Loam, Fairview Sandy Clay Loam	Colvard Sandy Loam
Drainage Class	Poorly drained, Well drained	Well drained, Well drained	Well drained
Soil Hydric Status	No	No	No
Source of Hydrology	Groundwater/Overbank	Groundwater/Overbank	Groundwater
Restoration or enhancement method	None	None	None

Section 2: Monitoring Year 1 Data Assessment

Annual monitoring and site visits were conducted during monitoring year (MY) 1 to assess the condition of the project. The vegetation and stream success criteria for the Site follow the approved success criteria presented in the Mitigation Plan (Wildlands, 2022). Performance criteria for vegetation, stream, and hydrologic assessments are located in Section 1.2 Table 2. Methodology for annual monitoring is presented in the As-Built Baseline Monitoring Reports (Wildlands, 2022).

2.1 Vegetative Assessment

The MY1 vegetative survey was completed in August 2023. Vegetation monitoring resulted in a stem density range from 283 to 729 planted stems per acre. Average stem density was 553 planted stems per acre. All 10 permanent and 1 of the 2 mobile vegetation plots are meeting the MY3 interim success criteria of 320 stems per acre and all plots are on track to meet MY7 success criteria of 210 stems per acre. Mobile vegetation plot (MVP) 2 did not meet the MY3 interim stem density requirement due to the plot containing 62% sycamore (*Platanus occidentalis*). Mature trees within the Site that were saved during construction are continuing to survive. Herbaceous vegetation is establishing itself across the site. Refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table and Appendix B for Vegetation Plot Data.

2.2 Vegetation Areas of Concern and Management Activity

Vegetation management including herbicide applications were implemented during MY1 to prevent the spread of invasive species that could compete with planted native species. In July and August 2023, approximately 50 linear feet of UT2 and 50 linear feet of East Prong Hunting Creek were chemically treated for marsh dewflower (*Murdannia keisak*). It is expected as riparian vegetation continues to become established and shade the channel, in-stream vegetation densities will decrease. Invasive species will continue to be monitored, mapped, and controlled across the Site as necessary throughout the monitoring period.

Additional signage was installed within the utility easement marking the conservation easement to prevent vegetation management from occurring within the Site. All other items from the DMS boundary inspection have been resolved. In September 2023, the entire conservation easement was inspected to verify proper markings and intact fencing. A small portion of the boundary near East Prong Hunting Creek Reach 1 was subject to potential encroachment by mowing beyond the easement boundary. Well-marked t-posts and horse tape were installed to prevent future encroachments and establish a mow line.

2.3 Stream Assessment

Morphological surveys for MY1 were conducted in June 2023. All streams within the Site are stable and functioning as designed. All 11 cross-sections at the Site show little to no change from design in the bankfull area and width-to-depth ratio, and bank height ratios are less than 1.2. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table and Stream Photographs. Refer to Appendix C for Stream Geomorphology Data.

2.4 Stream Areas of Concern and Management Activity

Inspection of stream structures and banks did not identify any stream areas of concern, indicating that the stream is performing as designed. The mid-channel bar on East Prong Hunting Creek Sta.101+00 is still present (see photo point 19 in Appendix A). It is still anticipated that the restored portion of the stream will process the upstream sediment with multiple out of bank events. Some sediment is present

within the culvert on the upstream portion of UT1 Reach 1 near Photo Point #1. The sediment load is minimal and is not impeding flow or animal passage. This is expected to flush through the system during rain events. The Site will continue to be monitored and any issues will be mapped and reported throughout the monitoring period.

2.5 Hydrology Assessment

Crest gages (CG) were installed on East Prong Hunting Creek, UT1, and UT2 to monitor bankfull events. An off-site automated transducer (CG4) was also installed on an adjacent parcel to monitor baseflow hydrology and large flow events of an off-site hydrologic resource. No bankfull events were recorded on East Prong Hunting Creek, UT1, or UT2 during MY1. From February to August of 2023, the off-site crest gage (CG4) recorded 16 bankfull events and 240 days of consecutive flow. No performance criteria are associated with CG4; however, the on-site gages (CG1 – CG3) are required to meet the performance standards outlined in Table 2. Precipitation data was collected from the Morganton weather station located approximately 2.5 miles from the Site. The trail camera located on UT1 Sta. 219+75 was not able to detect any hydrological connectivity between the stream and adjacent wetland; however, the wetland continues to be wet. The camera will continue to be used and will be adjusted as needed.

2.6 Adaptive Management Plan

Site maintenance and adaptive measurement implementation will follow those outlined in the project's Final Mitigation Plan (Wildlands, 2022). No adaptive management implementation is needed at this time.

2.7 Monitoring Year 1 Summary

Overall, the Site is performing as intended and is on track to meet success criteria. Except for mobile vegetation plot 2, all vegetation plots exceed the MY3 interim requirement of 320 planted stems per acre. All streams within the Site are stable and meeting project goals. Herbaceous vegetation is establishing itself across the site. Small areas of in-stream vegetation were treated. All vegetative species of concern will continue to be assessed and treated, as needed, throughout the seven-year post-construction monitoring period. T-posts and horse tape were installed in an area along the easement boundary near East Prong Hunting Creek Reach 1 where mow lines were not established to prevent encroachments.

Summary information and data related to the performance of various projects and monitoring elements can be found in the tables and figures in the report appendices. All raw data supporting the tables and figures are included in the digital submittal.

Section 3: METHODOLOGY

Annual monitoring will consist of collecting morphologic, vegetative, and hydrologic data to assess project success based on the goals outlined in the Site's Mitigation Plan (Wildlands, 2022). Monitoring requirements will follow guidelines outlined in the NC IRT Stream and Wetland Mitigation Guidance Update (2016). Installed monitoring devices and plot locations closely mimic the locations of those proposed in the Site's Mitigation Plan. Deviations from these locations were made when professional judgement deemed them necessary to better represent as-built field conditions or when installation of the device in the proposed location was not physically feasible.

Geomorphic data was collected following the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Mapping was collected by either a professional licensed surveyor or an Arrow 100® Submeter GNSS Receiver and processed using ArcPro. Crest gages, using automated pressure transducers, were installed in riffle cross-sections to monitor stream hydrology throughout the year. Stream hydrology and vegetation monitoring protocols followed the Wilmington District Stream and Wetland Compensatory Mitigation Update (NCIRT, 2016). Vegetation installation data collection follow the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008); however, vegetation data processing follows the NC DMS Vegetation Data Entry Tool and Vegetation Plot Data Table (NCDMS, 2020).

Section 4: REFERENCES

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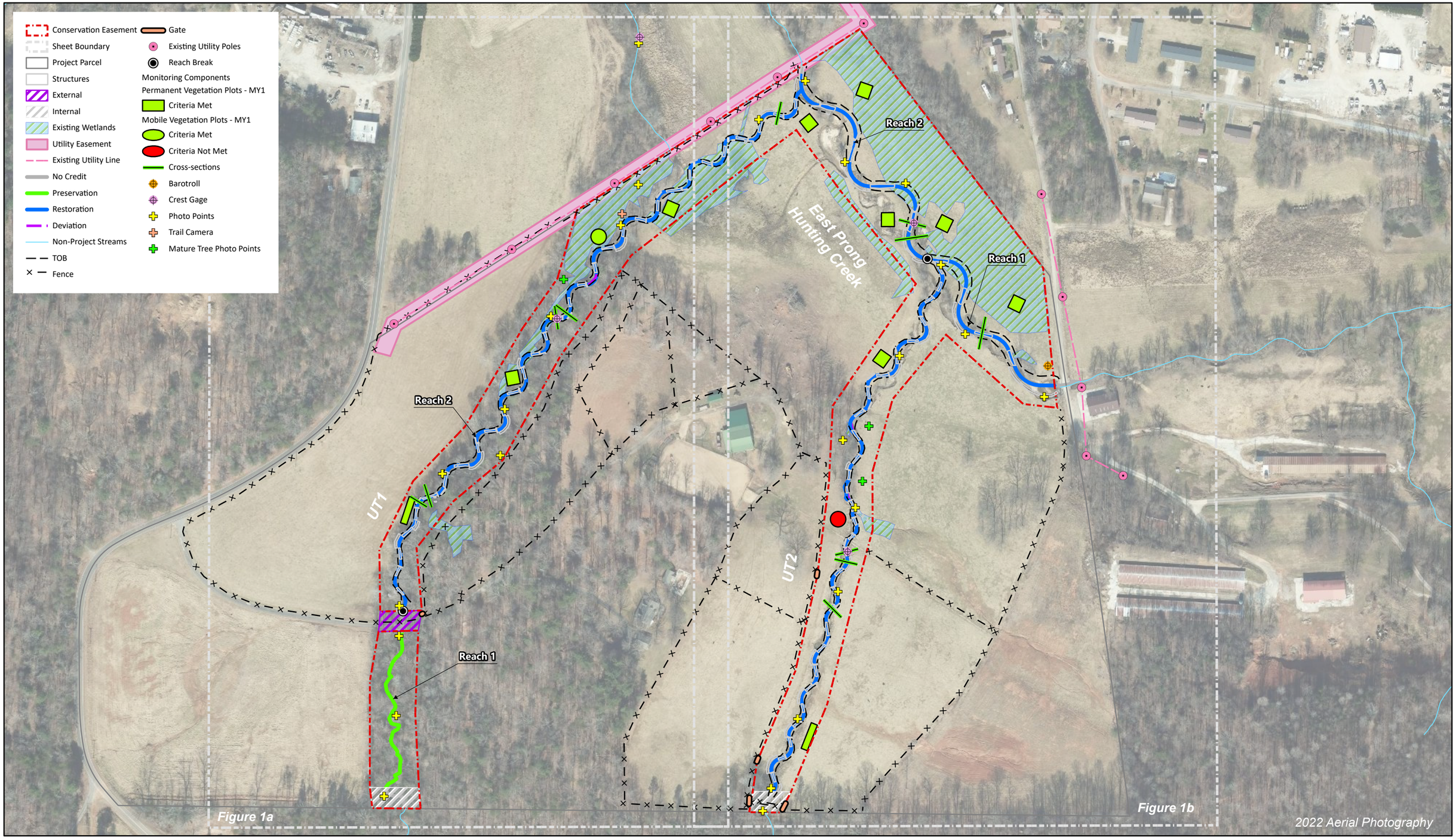
Figures 1a-b

Current Condition Plan View Maps



WILDLANDS ENGINEERING

0 110 220 Feet

N

Figure 1. Current Condition Plan View (Key)
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Burke County, NC

Conservation Easement
Project Parcel
Structures
External
Internal
Existing Wetlands
Utility Easement
Existing Utility Line
No Credit
Preservation
Restoration
Deviation
Non-Project Streams
TOB
Fence
Gate
Existing Utility Poles
Reach Break
Monitoring Components
Permanent Vegetation Plots - MY1
Criteria Met
Mobile Vegetation Plots - MY1
Criteria Met
Cross-sections
Crest Gage
Photo Points
Trail Camera
Mature Tree Photo Points

CG4
PP11
PP10
PP9
TC
MP1
MT1
PP8
CG1
XS4
XS3
VP3
VP2
VP1
XS2
XS1
PP7
PP6
PP5
PP4
PP3
PP2
PP1
Reach 2
Reach 1
UT1
216+00
215+00
214+00
213+00
212+00
211+00
210+00
209+00
208+00
207+00
206+00
217+00
218+00
219+00
220+00
221+00
222+00
223+00

2022 Aerial Photography

WILDLANDS ENGINEERING

0 60 120 Feet

N

Figure 1a Current Condition Plan View
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023
Burke County, NC

Conservation Easement
Project Parcel
Structures
Internal
Existing Wetlands
Utility Easement
Existing Utility Line
No Credit
Restoration
Deviation
Non-Project Streams
TOB
Fence
Gate
Existing Utility Poles
Reach Break
Monitoring Components
Permanent Vegetation Plots - MY1
Criteria Met
Mobile Vegetation Plots - MY1
Criteria Not Met
Cross-sections
Barotroll
Crest Gage
Photo Points
Mature Tree Photo Points

PP24 PP12 PP23 PP22 PP21 PP20 PP19 PP18 PP17 PP16 PP15 PP14 PP13 PP13A
VP10 VP9 VP8 VP7 VP6 VP5 VP4
MT3 MT2
CG3 CG2
XS11 XS10 XS9 XS8 XS7 XS6 XS5
MP2
Reach 1 Reach 2
Barotroll
UT2
113+40 113+00 226+27 226+00 225+00 112+00 224+00 111+00 223+00 110+00 109+00 108+00 107+00 316+10 316+00 106+00 105+00 115+00 104+00 314+00 103+00 102+00 101+00 100+00 312+00 311+00 310+00 309+00 308+00 307+00 306+00 305+00 304+00 303+00 302+00 301+00 300+00

2022 Aerial Photography

WILDLANDS ENGINEERING

0 60 120 Feet

N

Figure 1b Current Condition Plan View
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023
Burke County, NC

APPENDICES

Appendix A

Visual Assessment Data

Table 4a. Visual Stream Morphology Stability Assessment Table

Laurel Valley Mitigation Site

DMS Project No. 100140

Monitoring Year 1 - 2023

East Prong Hunting Creek Reach 1 Date Last Assessed: 9/22/2023

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	498
					Assessed Bank Length	996
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.	0	0		NA
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	3	3		100%

East Prong Hunting Creek Reach 2 Date Last Assessed: 9/22/2023

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	686
					Assessed Bank Length	1,372
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%.	5	5		100%

Table 4b. Visual Stream Morphology Stability Assessment Table

Laurel Valley Mitigation Site

DMS Project No. 100140

Monitoring Year 1 - 2023

UT1 Reach 2 Date Last Assessed: 9/22/2023

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	1,975
					Assessed Bank Length	3,950
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.	21	21		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	13	13		100%

UT2 Date Last Assessed: 9/22/2023

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	1,542
					Assessed Bank Length	3,084
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.	21	21		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	13	13		100%

Table 5. Vegetation Condition Assessment Table
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Planted Acreage **13.09**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10	0	0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10	0	0%
		Total	**0**	**0%**
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10	0	0%
		Cumulative Total	**0.0**	**0%**

Visual assessment was completed September 22 , 2023.

Easement Acreage **14.16**

Vegetation Category	Definitions	Mapping Threshold (ac)	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. Invasive species included in summation above should be identified in report summary.	0.10	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 Encroachments Noted / 0 ac	

Visual assessment was completed September 22 , 2023.

Stream Photographs
Monitoring Year 1

	
PP1 – view upstream—UT1 Reach 1 (8/29/2023)	**PP1** – view downstream—UT1 Reach 1 (8/29/2023)
	
PP2 – view upstream—UT1 Reach 1 (8/29/2023)	**PP2** – view downstream—UT1 Reach 1 (8/29/2023)
	
PP3 – view upstream—UT1 Reach 1 (8/29/2023)	**PP3** – view downstream—UT1 Reach 1 (8/29/2023)

	
PP4 – view upstream—UT1 Reach 2 (8/29/2023)	**PP4** – view downstream—UT1 Reach 2 (8/29/2023)
	
PP5 – view upstream—UT1 Reach 2 (8/29/2023)	**PP5** – view downstream—UT1 Reach 2 (8/29/2023)
	
PP6 – view North—UT1 Reach 2 (8/29/2023)	**PP6** – view South—UT1 Reach 2 (8/29/2023)

PP6 – view East—UT1 Reach 2 (8/29/2023)

PP6 – view West—UT1 Reach 2 (8/29/2023)

PP7 – view upstream—UT1 Reach 2 (8/29/2023)

PP7 – view downstream—UT1 Reach 2 (8/29/2023)

PP8 – view upstream—UT1 Reach 2 (8/29/2023)

PP8 – view downstream—UT1 Reach 2 (8/29/2023)

	
PP9 – view upstream—UT1 Reach 2 (8/29/2023)	**PP9** – view downstream—UT1 Reach 2 (8/29/2023)
	
PP10 – view North—UT1 Reach 2 (8/29/2023)	**PP10** – view South—UT1 Reach 2 (8/29/2023)
	
PP10 – view East—UT1 Reach 2 (8/29/2023)	**PP10** – view West—UT1 Reach 2 (8/29/2023)

PP11 – view upstream—Downstream of project (8/29/2023)

PP11 – view downstream—Downstream of project (8/29/2023)

PP12 – view upstream—UT1 Reach 2 (8/29/2023)

PP12 – view downstream—UT1 Reach 2 (8/29/2023)

PP13A – view downstream—UT2 (8/29/2023)

	
PP13 – view upstream—UT2 (8/29/2023)	**PP13** – view downstream—UT2 (8/29/2023)
	
PP14 – view upstream—UT2 (8/29/2023)	**PP14** – view downstream—UT2 (8/29/2023)
	
PP15 – view upstream—UT2 (8/29/2023)	**PP15** – view downstream—UT2 (8/29/2023)

PP16 – view upstream—UT2 (8/29/2023)

PP16 – view upstream of wetland—UT2 (8/29/2023)

PP16 – view downstream—UT2 (8/29/2023)

PP17 – view North—UT2 (8/29/2023)

PP17 – view South— UT2 (8/29/2023)

	
PP17 – view East—UT2 (8/29/2023)	**PP17** – view West— UT2 (8/29/2023)
	
PP18 – view upstream—UT2 (8/29/2023)	**PP18** – view downstream—UT2 (8/29/2023)
	
PP19 – view upstream—E. Prong Hunting CRK R1 (8/29/2023)	**PP19** – view downstream— E. Prong Hunting CRK R1 (8/29/2023)

PP20 – view upstream—E. Prong Hunting CRK R1 (8/29/2023)

PP20 – view downstream—E. Prong Hunting CRK R1 (8/29/2023)

PP21 – view upstream—E. Prong Hunting CRK R1 (8/29/2023)

PP21 – view downstream—E. Prong Hunting CRK R2 (8/29/2023)

PP21 – view upstream—UT2 (8/29/2023)

	
PP22 – view upstream—E. Prong Hunting CRK R2 (8/29/2023)	**PP22** – view downstream—E. Prong Hunting CRK R2 (8/29/2023)
	
PP23 – view upstream—E. Prong Hunting CRK R2 (8/29/2023)	**PP23** – view downstream—E. Prong Hunting CRK R2 (8/29/2023)
	
PP24 – view upstream—E. Prong Hunting CRK R2 (8/29/2023)	**PP24** – view downstream—E. Prong Hunting CRK R2 (8/29/2023)

UT1 STA 219+75 – Trail camera (6/16/2023)

IRT Requested Photographs
Monitoring Year 1

UT1 STA 206+96 – rock stabilization (9/22/2023)

UT1 STA 224+05 – rock stabilization (9/22/2023)

UT1 206+00 – French drain (8/29/2023)

East Prong Hunting Creek R1 – Established mow line (9/22/2023)

UT1 – Fence repair (8/29/2023)

Utility Easement– Conservation Easement signage (9/22/2023)

Vegetation Plot Photographs
Monitoring Year 1

Permanent Vegetation Plot 1 *(8/30/2023)*

Permanent Vegetation Plot 2 *(8/30/2023)*

Permanent Vegetation Plot 3 *(8/30/2023)*

Permanent Vegetation Plot 4 *(8/30/2023)*

Permanent Vegetation Plot 5 *(8/30/2023)*

Permanent Vegetation Plot 6 *(8/30/2023)*

Permanent Vegetation Plot 7 *(8/30/2023)*

Permanent Vegetation Plot 8 *(8/30/2023)*

Permanent Vegetation Plot 9 *(8/30/2023)*

Permanent Vegetation Plot 10 *(8/30/2023)*

Mobile Vegetation Plot 1 *(8/30/2023)*

Mobile Vegetation Plot 2 *(8/30/2023)*

Tree Survival Photographs

Monitoring Year 1

MT1 – UT1 STA 217+75 (8/29/2023)

MT2 – UT2 STA 309+00 (8/29/2023)

MT3 – UT2 STA 310+50 (8/29/2023)

Appendix B

Vegetation Plot Data

Table 6. Vegetation Plot Data
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Planted Acreage	13
Date of Initial Plant	2023-01-10
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	NA
Date of Current Survey	2023-08-30
Plot size (ACRES)	0.0247

	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 5 F		Veg Plot 6 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	FACW					1	1					1	1
	Betula nigra	river birch	Tree	FACW	2	2	2	2	1	1	1	1			1	1
	Calycanthus floridus	eastern sweetshrub	Shrub	FACU							1	1				
	Carya cordiformis	bitternut hickory	Tree	FAC	1	1					2	2	2	2		
	Celtis laevigata	sugarberry	Tree	FACW			2	2	1	1					1	1
	Cephalanthus occidentalis	common buttonbush	Shrub	OBL					1	1					1	1
	Cornus amomum	silky dogwood	Shrub	FACW												
	Cornus florida	flowering dogwood	Tree	FACU							1	1				
	Euonymus americanus	bursting-heart	Shrub	FAC	1	1							1	1		
	Fagus grandifolia	American beech	Tree	FACU							1	1	2	2		
	Hamamelis virginiana	American witchhazel	Tree	FACU	1	1					1	1				
	Lindera benzoin	northern spicebush	Tree	FACW			1	1	1	1	1	1	1	1		
	Morus rubra	red mulberry	Tree	FACU							1	1	2	2		
	Oxydendrum arboreum	sourwood	Shrub	FACU							2	2				
	Platanus occidentalis	American sycamore	Tree	FACW	3	3	3	3	1	1	3	3	3	3	3	3
	Quercus alba	white oak	Tree	FACU	1	1					1	1	2	2		
	Quercus rubra	northern red oak	Tree	FACU							1	1	1	1		
	Salix nigra	black willow	Tree	OBL			3	3	2	2					3	3
	Salix sericea	silky willow	Shrub	OBL			1	1	1	1					1	1
	Sambucus canadensis	American black elderberry	Tree						1	1					1	1
	Ulmus americana	American elm	Tree	FAC			2	2	4	4					3	3
	Ulmus rubra	slippery elm	Tree	FAC	1	1					2	2	2	2		
Sum	Performance Standard				10	10	14	14	14	14	18	18	16	16	15	15
Mitigation Plan Performance Standard	Current Year Stem Count					10		14		14		18		16		15
	Stems/Acre					405		567		567		729		648		607
	Species Count					7		7		10		13		9		9
	Dominant Species Composition (%)					30		21		29		17		19		20
	Average Plot Height (ft.)					2		3		3		2		2		2
	% Invasives					0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					10		14		14		18		16		15
	Stems/Acre					405		567		567		729		648		607
	Species Count					7		7		10		13		9		9
	Dominant Species Composition (%)					30		21		29		17		19		20
	Average Plot Height (ft.)					2		3		3		2		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.

Table 6. Vegetation Plot Data

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Planted Acreage	13
Date of Initial Plant	2023-01-10
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	NA
Date of Current Survey	2023-08-30
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 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	Alnus serrulata	hazel alder	Tree	FACW			1	1					1	
	Betula nigra	river birch	Tree	FACW	2	2	1	1					1	
	Calycanthus floridus	eastern sweetshrub	Shrub	FACU										
	Carya cordiformis	bitternut hickory	Tree	FAC										1
	Celtis laevigata	sugarberry	Tree	FACW	2	2	2	2	3	3	3	3		
	Cephalanthus occidentalis	common buttonbush	Shrub	OBL	1	1	1	1	1	1	1	1	1	
	Cornus amomum	silky dogwood	Shrub	FACW	2	2	1	1	1	1	2	2		
	Cornus florida	flowering dogwood	Tree	FACU										
	Euonymus americanus	bursting-heart	Shrub	FAC										
	Fagus grandifolia	American beech	Tree	FACU										
	Hamamelis virginiana	American witchhazel	Tree	FACU										
	Lindera benzoin	northern spicebush	Tree	FACW	1	1								1
	Morus rubra	red mulberry	Tree	FACU										
	Oxydendrum arboreum	sourwood	Shrub	FACU										1
	Platanus occidentalis	American sycamore	Tree	FACW	1	1	4	4	3	3	3	3	4	5
	Quercus alba	white oak	Tree	FACU										
	Quercus rubra	northern red oak	Tree	FACU										
	Salix nigra	black willow	Tree	OBL	3	3	3	3	3	3	2	2	1	
	Salix sericea	silky willow	Shrub	OBL	1	1								
	Sambucus canadensis	American black elderberry	Tree		1	1								
	Ulmus americana	American elm	Tree	FAC	1	1	4	4	4	4	4	4		
	Ulmus rubra	slippery elm	Tree	FAC										
Sum	Performance Standard				15	15	17	17	15	15	15	15	8	8
Mitigation Plan Performance Standard	Current Year Stem Count					15		17		15		15	8	8
	Stems/Acre					607		688		607		607	324	283
	Species Count					10		8		6		6	5	4
	Dominant Species Composition (%)					20		24		27		27	50	62
	Average Plot Height (ft.)					2		3		2		3	3	3
	% Invasives					0		0		0		0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					15		17		15		15	8	8
	Stems/Acre					607		688		607		607	324	283
	Species Count					10		8		6		6	5	4
	Dominant Species Composition (%)					20		24		27		27	50	62
	Average Plot Height (ft.)					2		3		2		3	3	3
	% 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.

Table 7. Vegetation Performance Standards Summary Table

Laurel Valley Mitigation Site

DMS Project No. 100140

Monitoring Year 1 - 2023

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	405	2	7	0	567	3	7	0	567	3	10	0
Monitoring Year 0	729	2	13	0	688	2	9	0	607	2	10	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 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	729	2	13	0	648	2	9	0	607	2	9	0
Monitoring Year 0	729	2	13	0	648	2	9	0	607	2	9	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot 9 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	607	2	10	0	688	3	8	0	607	2	6	0
Monitoring Year 0	648	2	11	0	688	2	8	0	607	2	6	0
	Veg Plot 10 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	607	3	6	0	324	3	5	0	283	3	4	0
Monitoring Year 0	648	2	6	0	526	2	6	0	607	2	7	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.

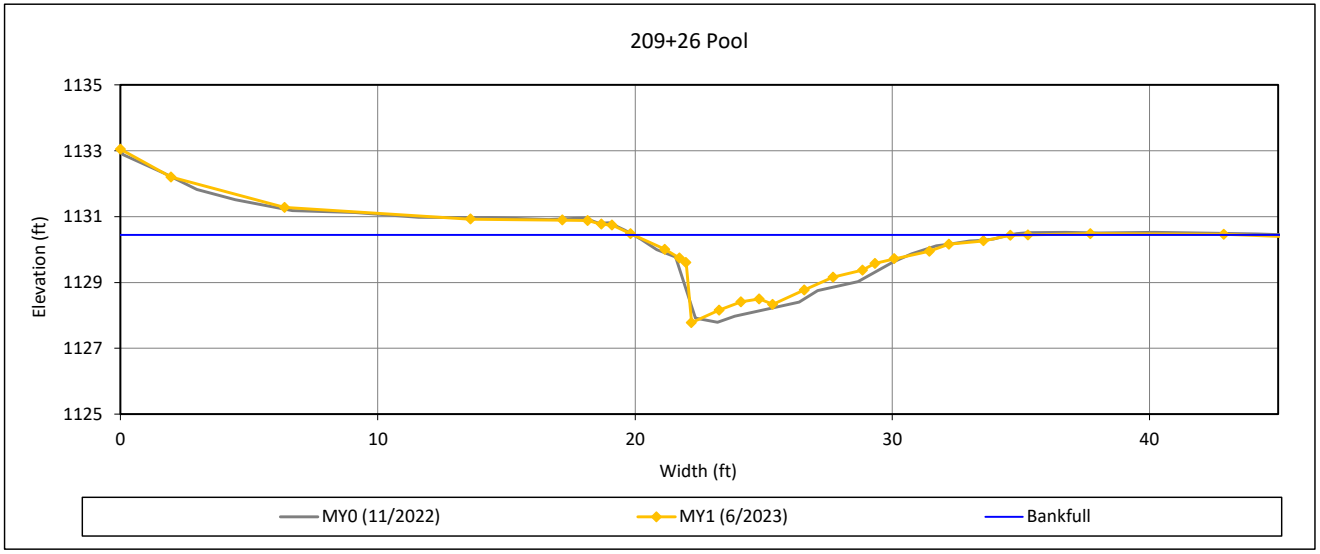
Appendix C

Stream Geomorphology Data

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 1-UT1 Reach 2



Bankfull Dimensions	
16.0	x-section area (ft.sq.)
15.3	width (ft)
1.0	mean depth (ft)
2.7	max depth (ft)
17.6	wetted perimeter (ft)
0.9	hydraulic radius (ft)
14.7	width-depth ratio

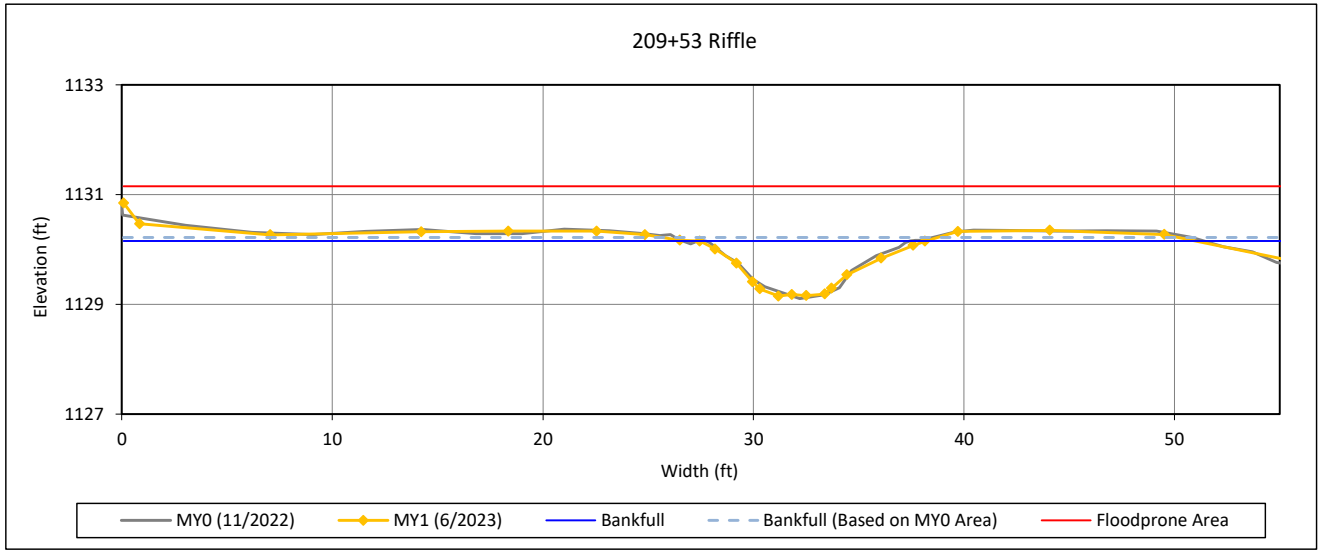
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 2-UT1 Reach 2



Bankfull Dimensions	
5.9	x-section area (ft.sq.)
10.7	width (ft)
0.6	mean depth (ft)
1.0	max depth (ft)
10.9	wetted perimeter (ft)
0.5	hydraulic radius (ft)
19.2	width-depth ratio
57.5	W flood prone area (ft)
5.4	entrenchment ratio
< 1.0	low bank height ratio

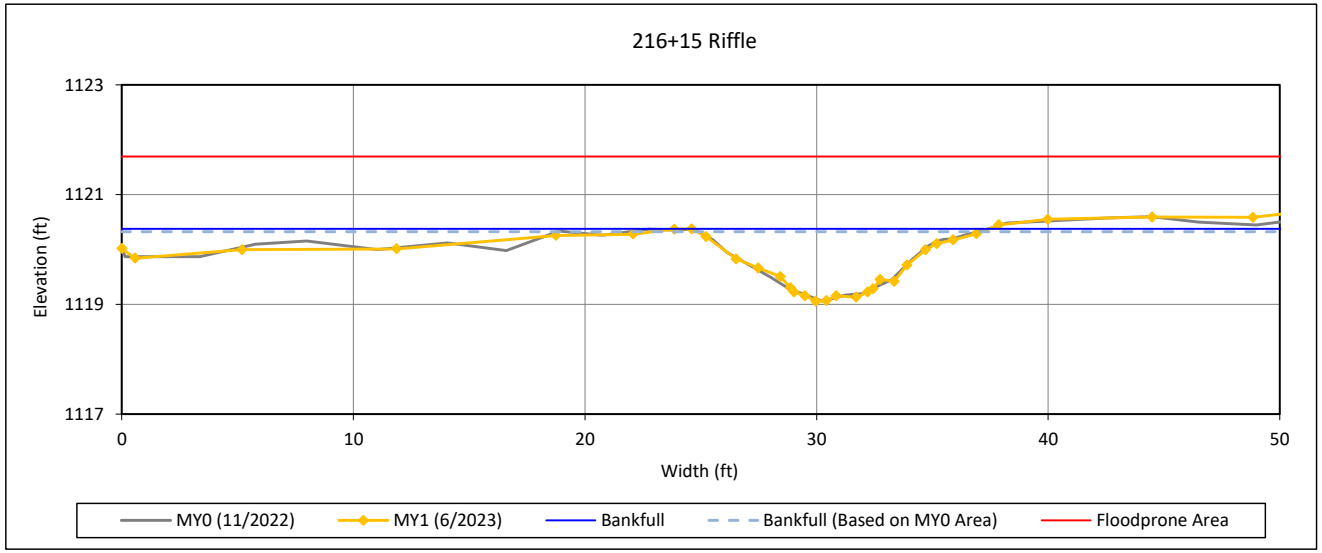
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 3-UT1 Reach 2



Bankfull Dimensions	
8.9	x-section area (ft.sq.)
12.8	width (ft)
0.7	mean depth (ft)
1.3	max depth (ft)
13.2	wetted perimeter (ft)
0.7	hydraulic radius (ft)
18.5	width-depth ratio
56.4	W flood prone area (ft)
4.4	entrenchment ratio
1.0	low bank height ratio

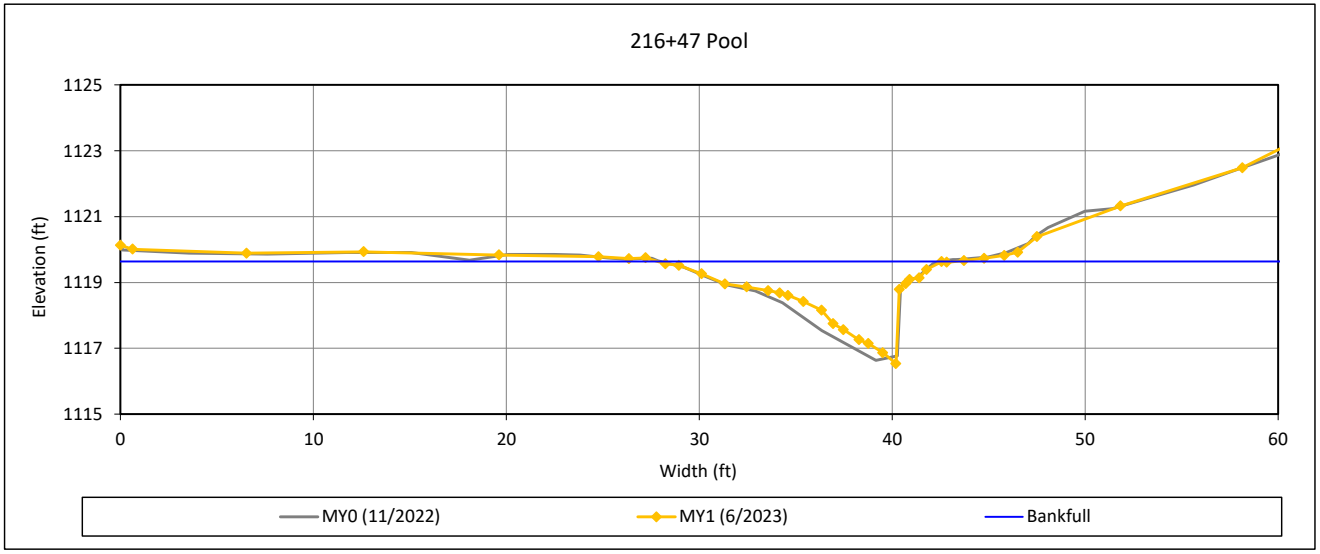
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 4-UT1 Reach 2



Bankfull Dimensions	
16.1	x-section area (ft.sq.)
14.7	width (ft)
1.1	mean depth (ft)
3.1	max depth (ft)
17.5	wetted perimeter (ft)
0.9	hydraulic radius (ft)
13.4	width-depth ratio

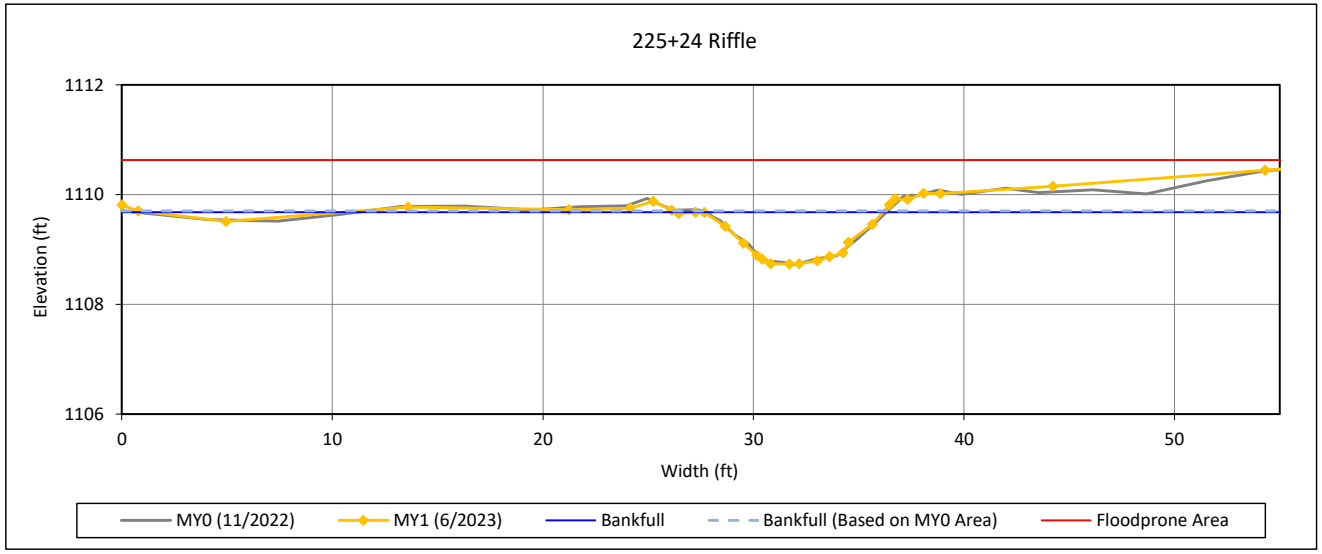
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 5-UT1 Reach 2



Bankfull Dimensions	
5.2	x-section area (ft.sq.)
8.9	width (ft)
0.6	mean depth (ft)
0.9	max depth (ft)
9.2	wetted perimeter (ft)
0.6	hydraulic radius (ft)
15.3	width-depth ratio
56.5	W flood prone area (ft)
6.3	entrenchment ratio
1.0	low bank height ratio

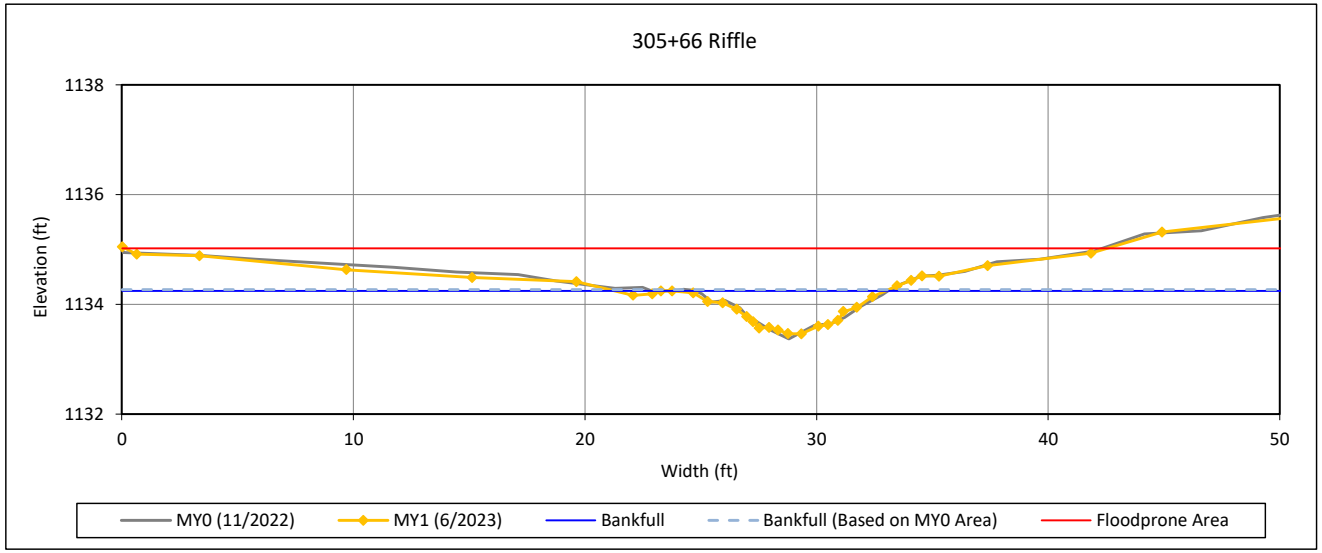
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 6-UT2



Bankfull Dimensions	
3.7	x-section area (ft.sq.)
9.2	width (ft)
0.4	mean depth (ft)
0.8	max depth (ft)
9.4	wetted perimeter (ft)
0.4	hydraulic radius (ft)
23.1	width-depth ratio
42.4	W flood prone area (ft)
4.6	entrenchment ratio
1.0	low bank height ratio

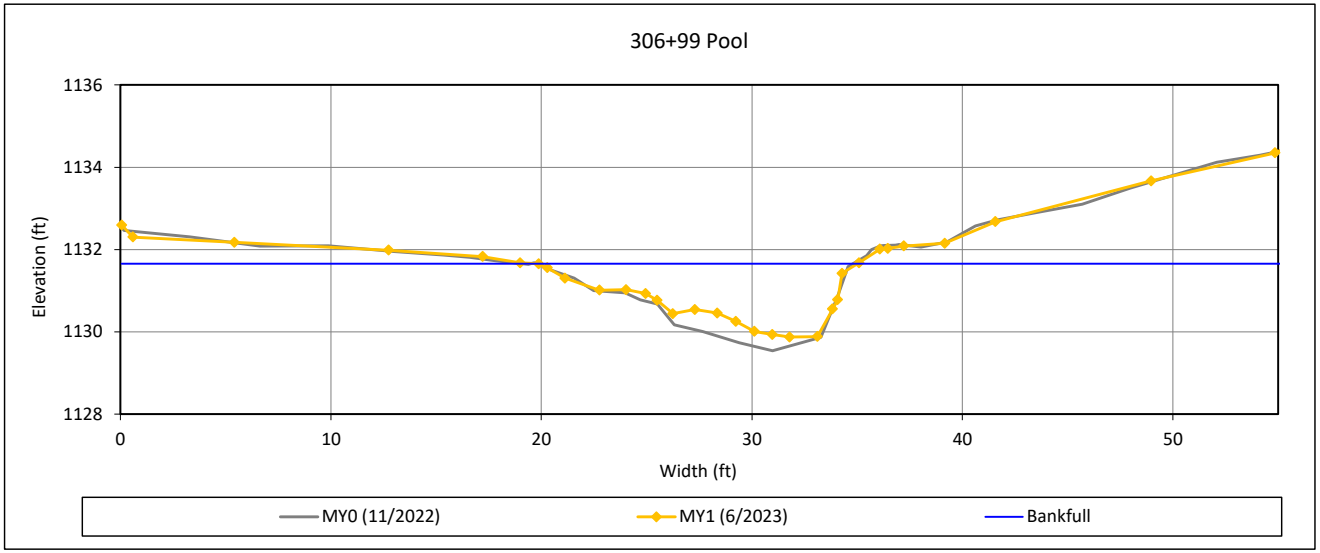
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 7-UT2



Bankfull Dimensions	
15.3	x-section area (ft.sq.)
15.1	width (ft)
1.0	mean depth (ft)
1.8	max depth (ft)
16.2	wetted perimeter (ft)
0.9	hydraulic radius (ft)
15.0	width-depth ratio

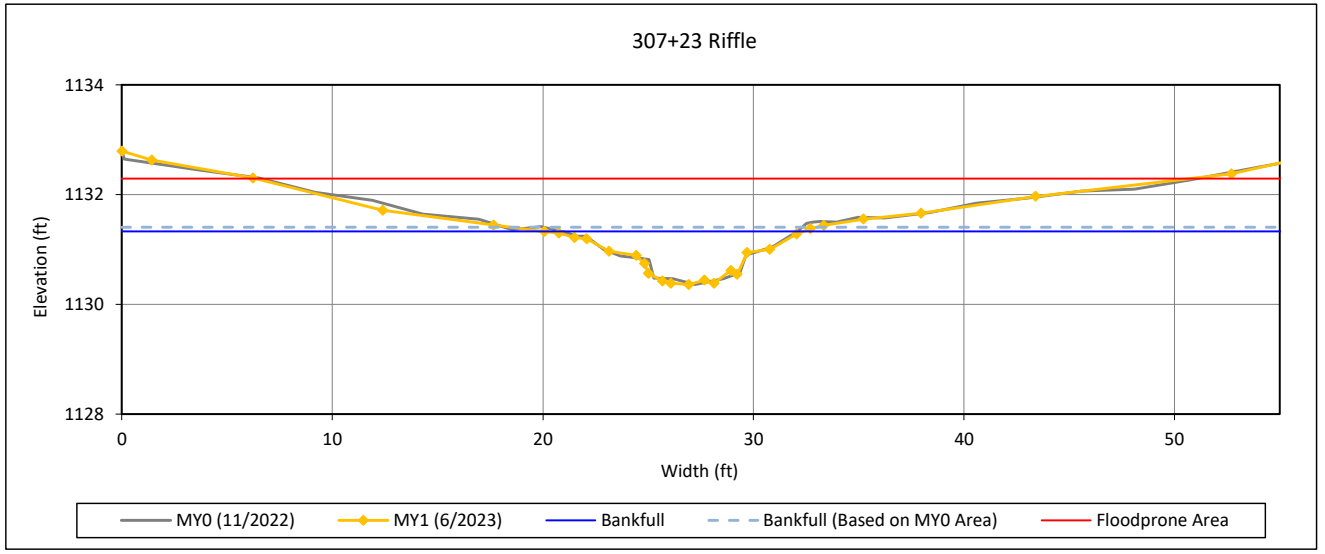
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 8-UT2



Bankfull Dimensions	
5.8	x-section area (ft.sq.)
12.3	width (ft)
0.5	mean depth (ft)
1.0	max depth (ft)
12.6	wetted perimeter (ft)
0.5	hydraulic radius (ft)
25.8	width-depth ratio
44.4	W flood prone area (ft)
3.6	entrenchment ratio
< 1.0	low bank height ratio

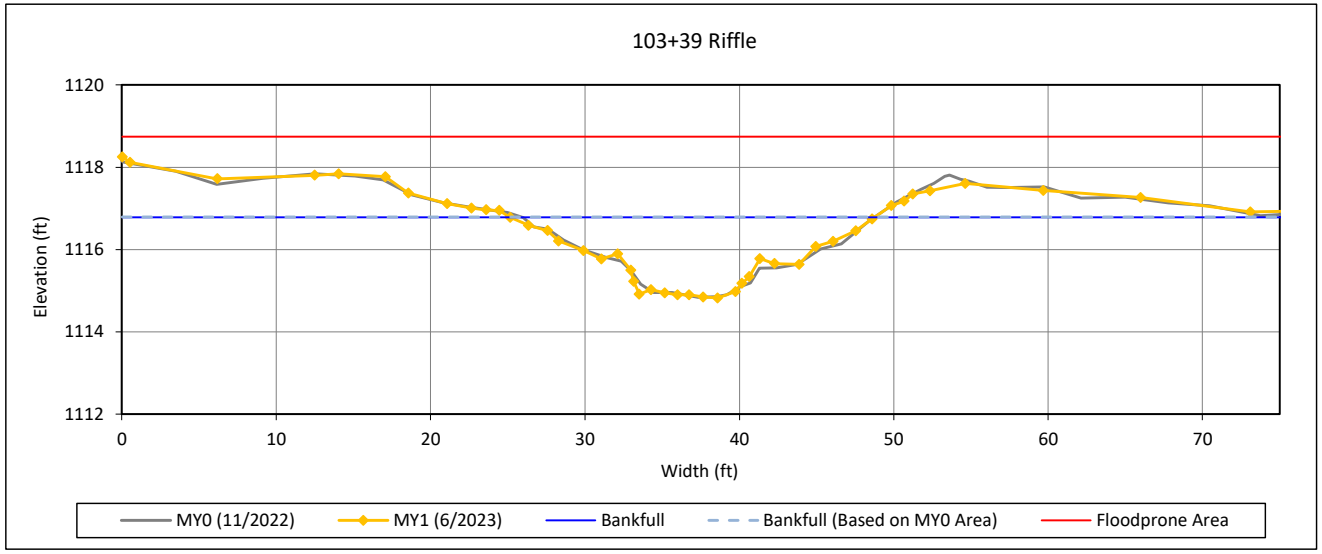
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 9-East Prong Hunting Creek Reach 1



Bankfull Dimensions	
25.0	x-section area (ft.sq.)
23.6	width (ft)
1.1	mean depth (ft)
2.0	max depth (ft)
24.4	wetted perimeter (ft)
1.0	hydraulic radius (ft)
22.2	width-depth ratio
79.1	W flood prone area (ft)
3.4	entrenchment ratio
1.0	low bank height ratio

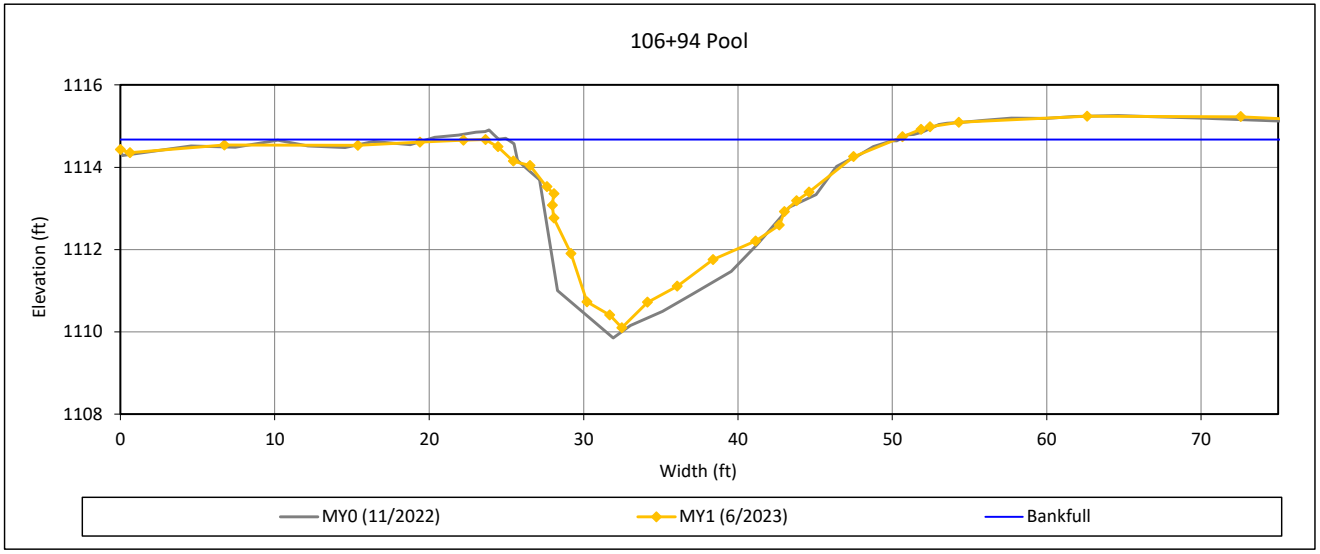
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 10-East Prong Hunting Creek Reach 2



Bankfull Dimensions	
57.0	x-section area (ft.sq.)
26.6	width (ft)
2.1	mean depth (ft)
4.6	max depth (ft)
29.0	wetted perimeter (ft)
2.0	hydraulic radius (ft)
12.4	width-depth ratio

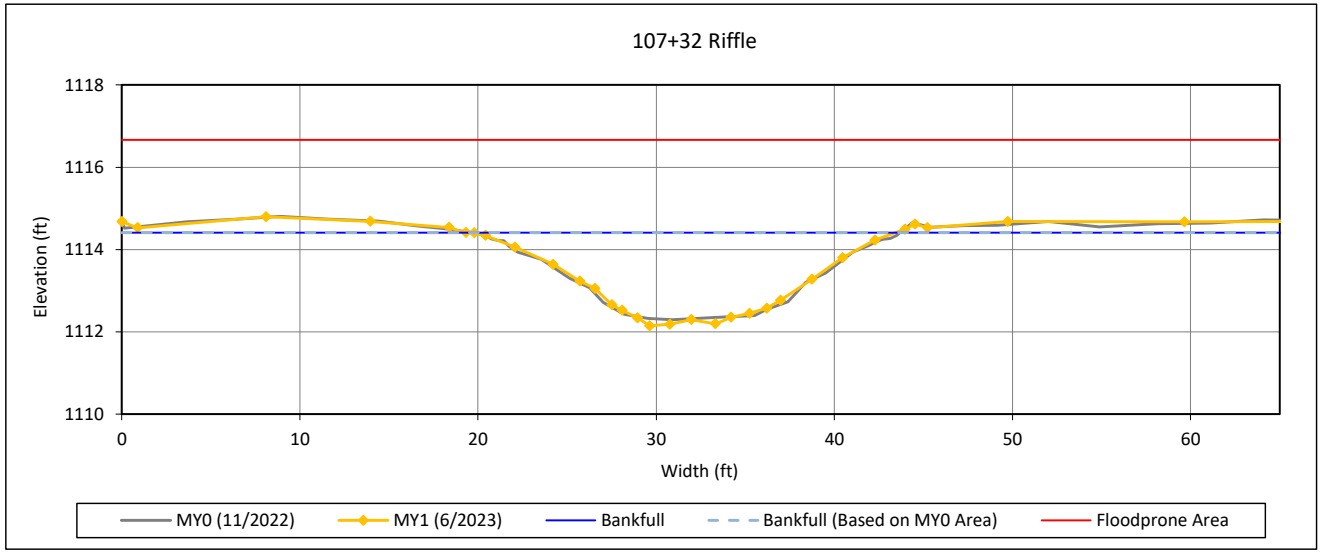
Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Cross-Section 11-East Prong Hunting Creek Reach 2



Bankfull Dimensions	
29.7	x-section area (ft.sq.)
23.6	width (ft)
1.3	mean depth (ft)
2.3	max depth (ft)
24.1	wetted perimeter (ft)
1.2	hydraulic radius (ft)
18.7	width-depth ratio
66.8	W flood prone area (ft)
2.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 6/2023
Field Crew: Wildlands Engineering

View Downstream

Table 8a. Baseline Stream Data Summary

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

	PRE-EXISTING CONDITIONS		DESIGN		MONITORING BASELINE (MY0)		
Parameter	**East Prong Hunting Creek Reach 1**						
Riffle Only	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	20.1 - 23.5		24.5		22.7		1
Floodprone Width (ft)	225.0		54.0	123.0	79.2		1
Bankfull Mean Depth	1.3 - 1.5		1.3		1.1		1
Bankfull Max Depth	2.3		1.6	2.0	1.9		1
Bankfull Cross Sectional Area (ft^2)	29.1 - 30.8		33.0		25.2		1
Width/Depth Ratio	13.8 - 18.0		18.0		20.4		1
Entrenchment Ratio	2.0 - 4.1		2.2	5.0	3.5		1
Bank Height Ratio	1.6 - 2.0		1.0 - 1.1		1.0		1
Max part size (mm) mobilized at bankfull	0.95		> 2.0		--		
Rosgen Classification	C5/B5c		C4		C		
Bankfull Discharge (cfs)	116-129		116.0		71.4		
Sinuosity	1.2		1.2		1.2		
Water Surface Slope (ft/ft)	0.0074		0.0060		0.0058		
Other	--		--		--		
Parameter	**East Prong Hunting Creek Reach 2**						
Riffle Only	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	20.1 - 23.5		24.5		23.6		1
Floodprone Width (ft)	46.0		54.0	123.0	66.9		1
Bankfull Mean Depth	1.3 - 1.5		2.0		1.3		1
Bankfull Max Depth	2.0		1.6	2.0	2.1		1
Bankfull Cross Sectional Area (ft^2)	29.1 - 30.8		33.0		29.7		1
Width/Depth Ratio	13.8 - 18.0		18.0		18.7		1
Entrenchment Ratio	2.0 - 4.1		2.2	5.0	2.8		1
Bank Height Ratio	1.6 - 2.0		1.0 - 1.1		1.0		1
Max part size (mm) mobilized at bankfull	0.95		> 2.0		--		
Rosgen Classification	C5/B5c		C4		C		
Bankfull Discharge (cfs)	116-129		129.0		108.2		
Sinuosity	1.2		1.2		1.2		
Water Surface Slope (ft/ft)	0.0074		0.0090		0.0096		
Other	--		--		--		

Note: Entrenchment Ratio for the baseline/monitoring parameters are based on the width of the cross-section, in lieu of assuming the width across the floodplain.

(---): Data was not provided, N/A: Not Applicable

Table 8b. Baseline Stream Data Summary

Laurel Valley Mitigation Site

DMS Project No. 100140

Monitoring Year 1 - 2023

	PRE-EXISTING CONDITIONS		DESIGN		MONITORING BASELINE (MY0)		
Parameter	**UT1 Reach 2**						
Riffle Only	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	7.3	11.4	11.0		8.9	12.6	3
Floodprone Width (ft)	8.0	22.0	24.0	55.0	56.4	57.6	3
Bankfull Mean Depth	0.8	1.1	0.7		0.5	0.7	3
Bankfull Max Depth	1.2	1.3	0.9	1.1	1.0	1.3	3
Bankfull Cross Sectional Area (ft^2)	7.4	8.8	8.0		5.4	8.2	3
Width/Depth Ratio	6.7	14.3	15.0		14.5	23.6	3
Entrenchment Ratio	1.1	2.0	2.2	5.0	4.6	6.4	3
Bank Height Ratio	1.6	1.9	1.0 - 1.1		1.0		3
Max part size (mm) mobilized at bankfull	0.77		> 2.0		--		
Rosgen Classification	B5c/ G5c		C4		C		
Bankfull Discharge (cfs)	22.0-25.4		29.0		22.9-34.9		
Sinuosity	1.2		1.2		1.2		
Water Surface Slope (ft/ft)	0.0088		0.0140		0.0130		
Other	--		--		--		
Parameter	**UT2**						
Riffle Only	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	7.6	14.5	11.0		9.0	12.4	2
Floodprone Width (ft)	23.5		24.0	55.0	43.4	50.4	2
Bankfull Mean Depth	0.8	0.9	1.0		0.4	0.5	2
Bankfull Max Depth	1.3	1.6	0.9	1.1	0.9	1.1	2
Bankfull Cross Sectional Area (ft^2)	6.9	8.4	8.0		3.9	6.8	2
Width/Depth Ratio	8.4	18.7	15.0		20.3	22.8	2
Entrenchment Ratio	1.3 - 3.1		2.2	5.0	4.1	4.8	2
Bank Height Ratio	1.3	1.6	1.0 - 1.1		1.0		2
Max part size (mm) mobilized at bankfull	3.80		> 2.0		--		
Rosgen Classification	B4c		C4		C		
Bankfull Discharge (cfs)	28.3-29.9		33.0		20.5-35.2		
Sinuosity	1.2		1.2		1.2		
Water Surface Slope (ft/ft)	0.0180		0.0185		0.0193		
Other	--		--		--		

Note: Entrenchment Ratio for the baseline/monitoring parameters are based on the width of the cross-section, in lieu of assuming the width across the floodplain.

(---): Data was not provided, N/A: Not Applicable

Table 9. Cross-Section Morphology Monitoring Summary

Laurel Valley Mitigation Site

DMS Project No. 100140

Monitoring Year 1 - 2023

	UT1 Reach 2																							
	Cross-Section 1 (Pool)						Cross-Section 2 (Riffle)						Cross-Section 3 (Riffle)						Cross-Section 4 (Pool)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1130.5	N/A					1130.2	1130.2					1120.3	1120.3					1119.7	N/A				
Bank Height Ratio - Based on AB Bankfull[1] Area	N/A	N/A					1.0	< 1.0					1.0	1.0					N/A	N/A				
Thalweg Elevation	1127.8	1127.8					1129.1	1129.2					1119.1	1119.1					1116.6	1116.5				
LTOB[2] Elevation	1130.5	1130.4					1130.2	1130.2					1120.3	1120.4					1119.7	1119.6				
LTOB[2] Max Depth (ft)	2.7	2.7					1.1	1.0					1.3	1.3					3.1	3.1				
LTOB[2] Cross Sectional Area (ft^2)	19.2	16.0					6.7	5.9					8.2	8.9					19.4	16.1				
	UT1 Reach 2						UT2																	
	Cross-Section 5 (Riffle)						Cross-Section 6 (Riffle)						Cross-Section 7 (Pool)						Cross-Section 8 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1109.7	1109.7					1134.3	1134.3					1131.7	N/A					1131.4	1131.4				
Bank Height Ratio - Based on AB Bankfull[1] Area	1.0	1.0					1.0	1.0					N/A	N/A					1.0	< 1.0				
Thalweg Elevation	1108.7	1108.7					1133.4	1133.5					1129.5	1129.9					1130.4	1130.4				
LTOB[2] Elevation	1109.7	1109.7					1134.3	1134.2					1131.7	1131.7					1131.4	1131.3				
LTOB[2] Max Depth (ft)	1.0	0.9					0.9	0.8					2.1	1.8					1.1	1.0				
LTOB[2] Cross Sectional Area (ft^2)	5.4	5.2					3.9	3.7					18.6	15.3					6.8	5.8				
	East Prong Hunting Creek Reach 1						East Prong Hunting Creek Reach 2																	
	Cross-Section 9 (Riffle)						Cross-Section 10 (Pool)						Cross-Section 11 (Riffle)											
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7						
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	1116.8	1116.8					1114.8	N/A					1114.4	1114.4										
Bank Height Ratio - Based on AB Bankfull[1] Area	1.0	1.0					N/A	N/A					1.0	1.0										
Thalweg Elevation	1114.8	1114.8					1109.9	1110.1					1112.3	1112.2										
LTOB[2] Elevation	1116.8	1116.8					1114.8	1114.7					1114.4	1114.4										
LTOB[2] Max Depth (ft)	1.9	2.0					4.9	4.6					2.1	2.3										
LTOB[2] Cross Sectional Area (ft^2)	25.2	25.0					67.3	57.0					29.7	29.7										

[1]Bank Height Ratio (BHR) takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation.

[2]LTOB Area and Max depth - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Appendix D

Hydrology Data

Table 10. Bankfull Events

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Reach	MY1 (2023)	MY2 (2024)	MY3 (2025)	MY4 (2026)	MY5 (2025)	MY6 (2027)	MY7 (2028)
UT1 Reach 2	0	—	—	—	—	—	—
UT2	0	—	—	—	—	—	—
East Prong Hunting Creek Reach 2	0	—	—	—	—	—	—

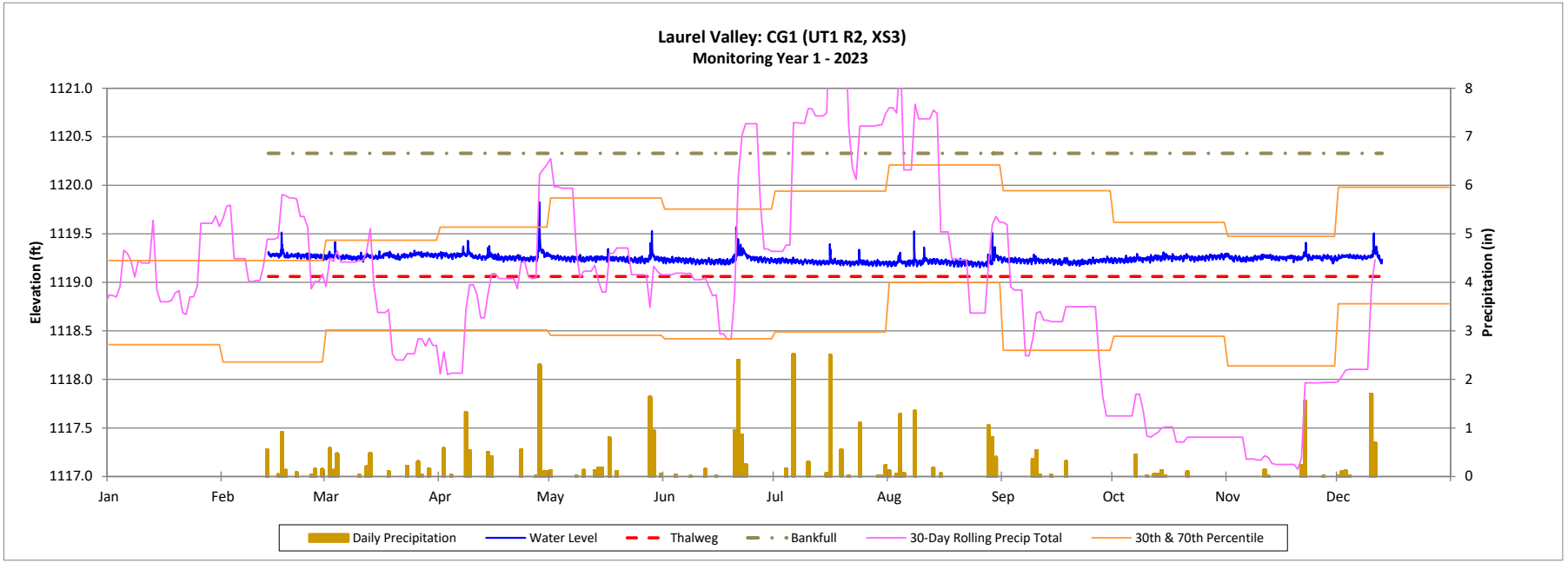
Table 11. Rainfall Summary

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

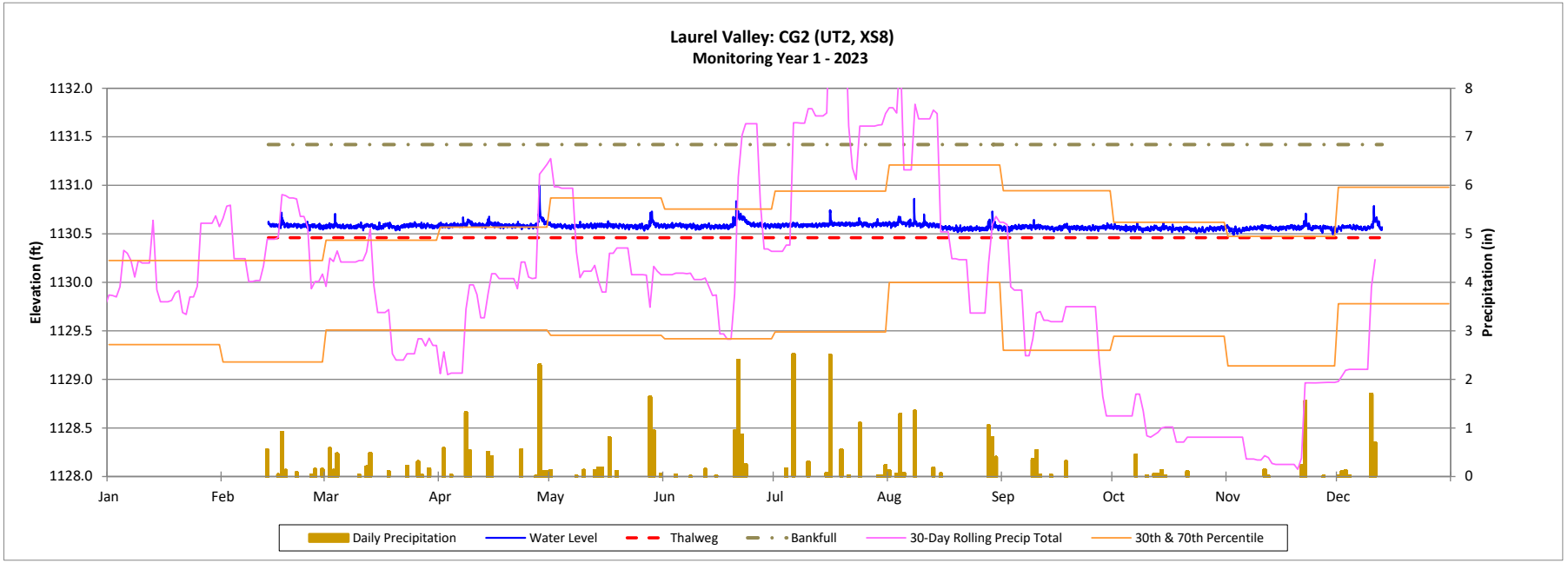
	MY1 (2021)	MY2 (2022)	MY3 (2023)	MY4 (2024)	MY5 (2025)	MY6 (2026)	MY7 (2027)
Annual Precip Total	46.85*						
WETS 30th Percentile	35.18						
WETS 70th Percentile	64.50						
Normal	*						

Station: Morganton (315838), Burke County, NC. 35.73083, -81.67167.
*Annual precipitation total was collected up until 12/12/2023. Data will be updated in MY2.

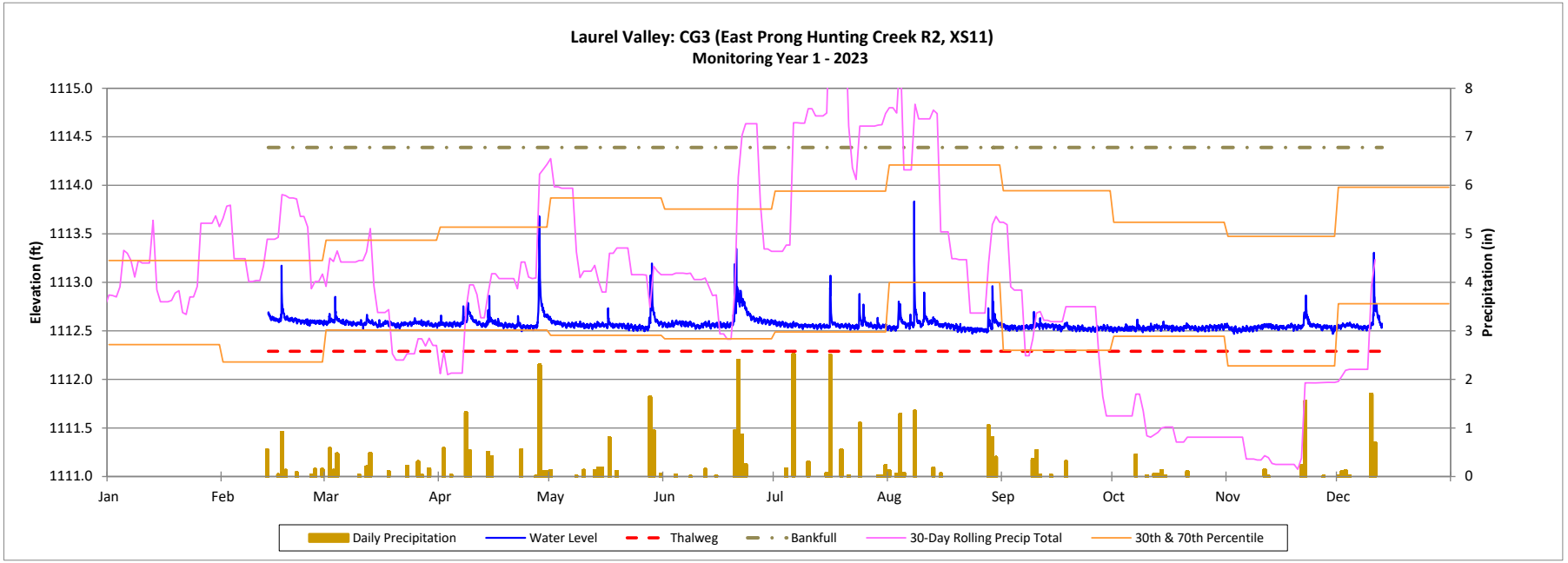
Recorded Bankfull Events Plot
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023



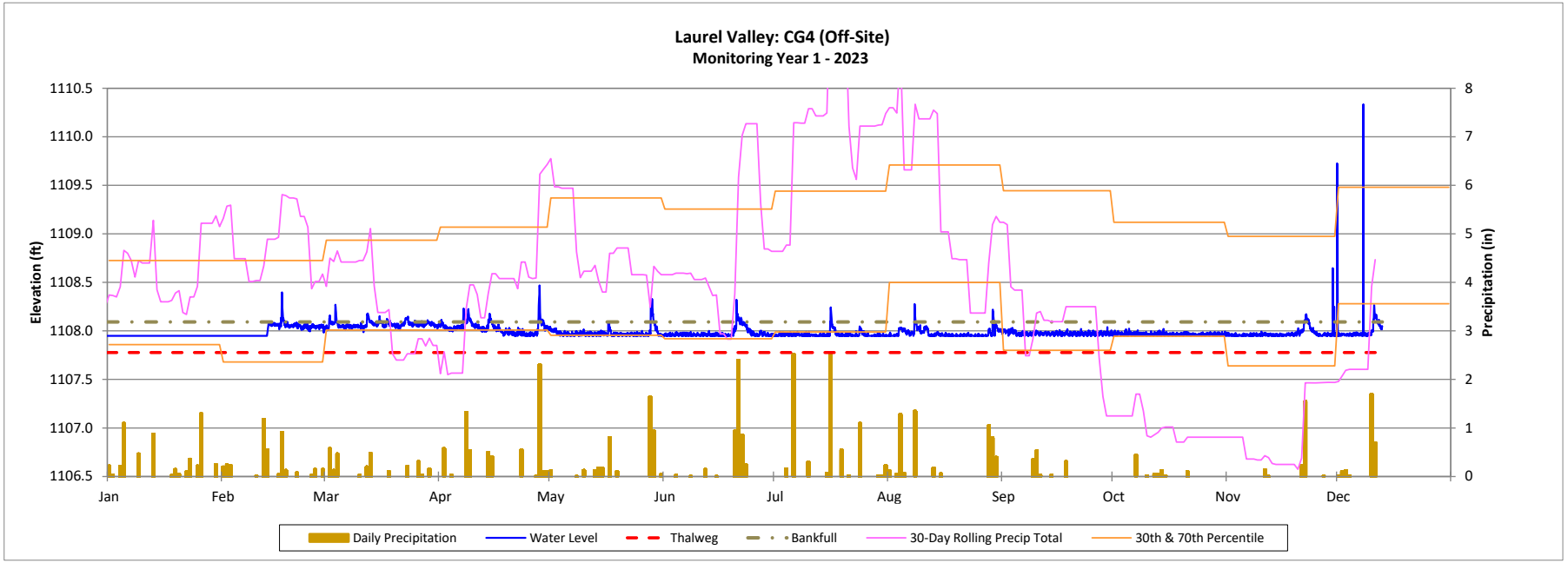
Recorded Bankfull Events Plot
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023



Recorded Bankfull Events Plot
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023



Recorded Bankfull Events Plot
Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023



Appendix E

Project Timeline and Contact Information

Table 12. Project Activity and Reporting History

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Activity or Deliverable		Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted		NA	November 2019
Mitigation Plan Approved		NA	March 2022
Construction (Grading) Completed		NA	October 2022
Planting Completed		NA	March 2023
As-Built Survey Completed		October 2022	January 2023
Baseline Monitoring Document (Year 0)	Stream Survey	November 2022	May 2023
	Vegetation Survey	January 2023	
Year 1 Monitoring	Invasive Treatment	July & August 2023	November 2023
	Stream Survey	June 2023	
	Vegetation Survey	August 2023	
Year 2 Monitoring	Stream Survey	2024	November 2024
	Vegetation Survey	2024	
Year 3 Monitoring	Stream Survey	2025	November 2025
	Vegetation Survey	2025	
Year 4 Monitoring		2026	November 2026
Year 5 Monitoring	Stream Survey	2027	November 2027
	Vegetation Survey	2027	
Year 6 Monitoring		2028	November 2028
Year 7 Monitoring	Stream Survey	2029	November 2029
	Vegetation Survey	2029	

Table 13. Project Contact Table

Laurel Valley Mitigation Site
DMS Project No. 100140
Monitoring Year 1 - 2023

Designer Eric Neuhaus, PE	**Wildlands Engineering, Inc.** 167-B Haywood Rd Asheville, NC 28806 828.774.5547
Construction Contractor	**Wildlands Construction, Inc.** 1430 S. Mint St., Suite 104 Charlotte, NC 28203
Planting Contractor	**Bruton Natural Systems, Inc.** PO Box 1197 Fremont, NC 27830
Monitoring Performers Monitoring, POC	**Wildlands Engineering, Inc.** Kristi Suggs 704.332.7754

Appendix F

Correspondence

September 20, 2023
ATTN: Erin B. Davis
Mitigation Specialist, Regulatory Division
U.S. Army Corps of Engineers, Wilmington District

RE: Notice of Mitigation Plan Addendum Approval & Initial Credit Release
Laurel Valley Mitigation Site – Burke County
Catawba River Basin Cataloging Unit 03050101
DMS Project ID #100140
USACE ACTION ID SAW-2020-00053
DWR # 20200018

Dear Erin Davis,

Wildlands Engineering, Inc. (Wildlands) has reviewed the Interagency Review Team's (IRT) comments from the Monitoring Year 0 (MY0) Report for the Laurel Valley Mitigation Site. The IRT's comments and Wildlands' responses are noted below.

IRT Comments:

Mitigation Plan Addendum and Modification Request:

Maria Polizzi, DWR

1. *I have no issues with the Mitigation Plan addendum.*

   Wildlands Response: Noted

Dave McHenry, WRC

1. *No comments on the addendum.*

   Wildlands Response: Noted

Erin Davis, USACE

1. *DMS' questions/comments regarding the proposed Addendum and MY0 Report (comment #5) provided clarity and transparency, which was helpful for this review and understanding the modification request.*

   Wildlands Response: Noted

As-built Drawings and MY0 Report:

Maria Polizzi, DWR

1. *As-built plans show numerous substitutions of brush toe for cover logs. Can you explain why this change was needed?*

   Wildlands Response: Site clearing did not produce the anticipated amount of required brush to construct the brush toes as designed. Rather than seeking brush outside the site limits, logs generated on site were utilized as cover logs. Cover logs provide bank stability, refuge habitat, and undercut banks, consistent with the goals of brush toe as designed.

2. *Based on Photo Point 3 the crossing at UT1-Reach 1 does not appear to be embedded per plan.*

   Wildlands Response: Photo Point 3 is of the upstream side of the existing driveway crossing. This crossing was not designed or installed by Wildlands and was approved to remain as part of the mitigation plan. As much water as possible was backed up the pipe via the next head of riffle grade to facilitate aquatic organism passage, while retaining similar flow conditions of the crossings.

3. *I like the layout of the longitudinal profiles; these are much easier to read than others I have seen.*

   Wildlands Response: Noted

Dave McHenry, WRC

1. *I don't have appreciable comments on YR 0 report. But what stands out to me is the apparently wide scour and/or excavated pools of culvert outlets at ~ sta. 101 and ~ sta. 206+40. I have seen this on a few projects lately, versus restoring a more natural channel width, and I realize engineers may be trying to minimize the risk associated with existing pipes that are retained. So, it's probably just worth watching (as I am planning, as possible) to gage that sediment deposition, lateral scour, and or pool outlet lowering don't develop over the years. The UT at 101 is small too. Fortunately, these culverts are backwatered.*

   Wildlands Response: The pools were already over widened at the site downstream of the existing culverts that are referenced in the comments. Shallow fill on banks in a plunge pool downstream of a culvert is an unstable scenario that will result in downstream sediment inputs. Banks were stabilized with brush toes creating roughness, and upstream sediments along with vegetation will adjust the pool width over time if needed.

Erin Davis, USACE

1. *Section 2 and Table 10 both state that the veg survey was completed in January 2023 and that construction planting of the site was completed in March 2023. How was the veg survey done before the completion of site planting?*

Wildlands Response: The majority of the site, including all permanent and mobile vegetation plots were planted prior to the January vegetation survey. A few small areas were not planted until March due to a supply shortage of trees.

2. *There were numerous bank treatment changes from brush toe to cover logs. On other projects we have observed that cover logs can become displaced or eroded behind. Are these concerns based on the number of substitutions and size of the stream reaches? Also, based on the redline it appears that in some channel bends include a cover log sandwiched between brush toe sections, is this accurate?*

   Wildlands Response: Site clearing did not produce the anticipated amount of required brush to construct the brush toes as designed. Rather than seeking brush outside the site limits, logs generated on site were utilized as cover logs. Cover logs provide bank stability, refuge habitat, and undercut banks, consistent with the goals of brush toe as designed. Wildlands has worked to improve the design and implementation of cover logs as bank revetment based on previous failures. On larger channels with longer pool arc lengths, brush toe was installed upstream and downstream of the cover log where the log is keyed to the banks. Wildlands has found these short sections of bank are vulnerable to instability and have implemented this on other similar projects with success.

3. *DWR made a mitigation plan comment (#25) about impacts and potential mortality of existing trees proposed to remain along designed stream channels. Since the three sections of channel realignment were done in order to save trees, please track mature tree survival in these areas through monitoring.*

   Wildlands Response: Upstream and downstream mature tree photo points of the three channel realignment areas will be included in the annual monitoring report photologs throughout the monitoring period (MY1 – MY7). Each mature tree photo point will be mapped using GPS and documented in the Current Condition Plan View (CCPV) Maps beginning in MY1.

4. *DWR previously asked whether outlet stabilizations included rock placement and Wildlands responded no except for the floodplain pool (comment/response #28). Were non-hardened options considered for wetland/floodplain outlets along UT1 and UT2? Please include photos of rock sills and rock outlet stabilizations added along UT1 (Sta. 206+96 & Sta. 224+05) in MY1 report.*

   Wildlands Response: Non-hardened options were considered but there were field concerns about head cuts at the outlets based on slope and flow. Rock sills were installed in lieu of using rip rap or similar rock cover to provide grade control while continuing to enhance wet weather drainage habitat. As requested, a photo will be taken of the rock sills along the drainage swale on UT1 at STA 206+96 and the outlet stabilization at STA 224+05 and included in the MY1 report.

5. *Why was the plunge pool depth not modified downstream of the existing crossing at Sta. 101 along East Prong Hunting Creek? Is the mid channel bar in this area shown in PP19 a concern?*

Wildlands Response: The plunge pool downstream of the crossing was not modified because it's existing depth and length were reasonably within the proposed plan (1113.8' proposed vs 1113.4' in field). The material/elevation lacking on the glide will be provided via upstream sediments. Grade control was provided at the head of riffle at station 102+22, providing a depositional area behind it. The mid-channel bar is a result of upstream sediments from a very actively eroding section of channel off property. The restored section of East Prong Hunting Creek is intended to process these sediments out onto the floodplain, but it may take multiple out of bank events. Wildlands will continue to monitor the mid-channel bar as the project moves into monitoring.

6. *Please include a photo of the new French drain installed along CE and driveway boundary in the MY1 report.*

   Wildlands Response: Photos of the French drain will be included in the MY1 report.

7. *The project fencing is shown in the middle of the utility corridor where the easements overlap. Has the extent of veg maintenance area been clearly marked inside the fence line? Per Wildlands response to USACE mitigation plan comment #34, CE signs were to be installed.*

   Wildlands Response: Conservation easement signs have been placed along the utility easement boundary and photos will be included in the MY1 report.

A copy of these NCIRT comments and our response letter will be included in the MY1 report. Please let me know if you have any questions.

Sincerely,

Eric Neuhaus, PE

Project Manager
eneuhaus@wildlandseng.com

December 12, 2023
ATTN: Harry Tsomides
Project Manager
NCDEQ – Division of Mitigation Service

RE: Laurel Valley Mitigation Site
Task 7 – Monitoring Year 1 (MY1) Report
Catawba River Basin Cataloging Unit 03050101
DMS Project ID #100140
USACE ACTION ID SAW-2020-00053
DWR # 20200018

Dear Harry Tsomides,

Wildlands Engineering, Inc. (Wildlands) has reviewed the NC Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 1 (MY1) Report for the Laurel Valley Mitigation Site. The DMS's comments and Wildlands' responses are noted below.

DMS Comments:

- *During the 2023 baseline MY0 site visit with Wildlands there were some sections where in stream vegetation was becoming established along UT2 and UT1 Reach 2, near wetland areas; thank you for conducting the Murdannia treatments, and please continue to keep an eye on these reaches.*

  Wildlands Response: Wildlands will continue to monitor these areas and will conduct treatments if deemed necessary.

- *Thank you for addressing the boundary inspection items sent to you on 3/15/2023; also thanks for providing Appendix responses to the IRT comments on the As-built Drawings and MY0 Report.*

  Wildlands Response: Noted

- *Photo Point #1 (UT1 Reach 1 culvert) shows some sediments in the culvert (it looks like 30-40%); photo dated 8/29/23. Compared to the MY0 photo (2/20/2023) this has worsened. Please continue to photograph, and please add a brief discussion in this report. If possible, for the culvert photos please include a photo from each side of the culvert, looking at the culvert from each direction, especially where there is a potential issue (sedimentation, debris jam, perching, etc).*

Wildlands Response: Wildlands will continue to photograph and monitor this area and will include culvert photographs of both sides in future monitoring reports. A brief discussion will be included in the final report. Photographs taken on 12/12/23 at Photo Point #1 are shown below.

Photo Point #1 - view upstream (12/12/2023)

Upstream of Photo Point #1 – view downstream (12/12/2023)

- *The French drain and fence repairs look great, thank you.*

  Wildlands Response: Noted

Digital Support Files

- *Please note for future submission that any areas of concern or remediation (such as invasive species treatment locations) indicated on the CCPV or referenced in the report should be included in the spatial digital submission. No need for resubmission of MY1 data.*

  Wildlands Response: Noted

A copy of these DMS comments and our response letter will be included inside the front cover of the MY1 report as well as in the digital support files. Please note that the final report includes additional hydrological data that was collected after the draft submittal. Please let me know if you have any questions.

Sincerely,

Eric Neuhaus, PE

Project Manager
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