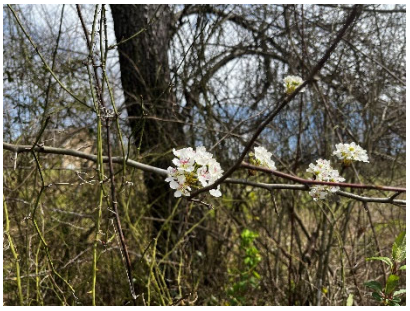

MONITORING YEAR 4 ANNUAL REPORT

FINAL

KEY MILL MITIGATION SITE
Surry County, NC
NCDEQ Contract No. 7180
DMS Project No. 100025
USACE Action ID No. SAW-2017-01504
NCDEQ DWR Certification No. 17-1045
RFP #: 16-006993 (September 16, 2016)

Yadkin River Basin
HUC 03040101

Data Collection Period: February 2023 – November 2023
Submission: February 2024

PREPARED FOR:

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

February 7, 2024

Mr. Matthew Reid
Project Manager
NCDEQ – Division of Mitigation Services
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

Subject: Draft Year 4 Monitoring Report Review
Key Mill Mitigation Site, Surry County
Yadkin River CU 03040101
DMS Project ID No. 100025 / DEQ Contract #7180

Dear Mr. Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft Year 4 Monitoring Report for the Key Mill Mitigation Site. The report and associated digital files have been updated to reflect those comments. The Final MY4 Report is included. DMS' comments are listed below in **bold**. Wildlands' responses to DMS' comments are noted in *italics*.

DMS' comment: Please ensure the Monitoring Phase Performance Bond has been updated and approved by Kristie Corson before invoicing for Task 10.

Wildlands' response: Wildlands has secured the monitoring bond for MY5, and it was approved by Kristie Corson on January 31, 2024.

DMS' comment: In an effort to identify and resolve property issues early during the monitoring period, please verify that the conservation easement boundary has been walked, marking and signage is up to spec, fencing is intact, and no encroachments have been identified.

Wildlands' response: Wildlands walked the boundary in October of 2023 to ensure that the conservation easement boundary was intact in regard to signage and fencing, as well as, free of encroachments. In early 2024, Wildlands will walk the boundary to reverify the survey boundary monuments.

DMS' comment: Thanks for including the IRT requested supplemental mobile plot in the 2022 replant area. Please include the 2022 supplemental planting on Table 14.

Wildlands' response: Wildlands has included the 2022 supplemental planting date on Table 14.

DMS' comment: Murdannia was discussed at the 2023 IRT Credit Release Meeting and WEI was actively treating the species. Invasive species treatment occurred in May and November 2023 targeting cattails, tree of heaven, privet, and multiflora rose according to the report. Can WEI provide an update on the site condition as it relates to murdannia?

Wildlands' response: Wildlands has now included in Section 2.2 of the report that, "In August of 2023, marsh dewflower (Murdannia keisak) was chemically treated in some of the riffles along UT3C. The treatment was successful in removing the vegetation from the stream bed but will likely need retreatment in the future to suppress revegetation until the riparian canopy develops. All other areas were deemed non-problematic by WEI staff." This date has been included in Table 14.

DMS' comment: A hand repair is planned for a j-hook structure on Bull Creek Reach 2 in MY5 to address active erosion and minor piping. Please include an update in the MY5 report and include before/after photos of the work.

Wildlands' response: *Noted.*

DMS' comment: Thanks for documenting all the conservation easement encroachment issues that have occurred on site since construction. Recommend adding a column to the table for "Monitoring Year". It would be helpful to easily see what monitoring year each encroachment occurred. Also, recommend revising the "MY4 Management Action" column to "Management Action" since many of the action activities did not occur in MY4.

Wildlands' response: Wildlands has added a "Monitoring Year" column and has revised the "MY4 Management Action" column to say "Management Action" in the Conservation Easement Encroachment Issues Table that is included in Section 2.2 of the report.

DMS' comment: Numerous encroachments are documented and have been resolved. Please continue to be diligent in identifying new encroachments and working with the landowner to prevent future problems. DMS is planning to conduct a Boundary Inspection this year and will notify WEI to coordinate a site visit.

Wildlands' response: Noted.

Digital Support File Comments:

DMS' comment: No comment for draft digital deliverables. Please provide updated digital deliverables with final submittal.

Wildlands' response: *The digital deliverables have been updated as needed and are included in the Final MY4 Report digital submittal.*

As requested, Wildlands has included two hard copies of the Final Monitoring Year 4 Annual Report for the Key Mill Mitigation Site with a copy of our comment response letter inserted after the report's cover page. In addition, a USB drive with the full final electronic copy of the report, our response letter, and all the electronic support files has been included and is named "***KeyMill_100025_MY4_2023***". Please let me know if you have any questions.

Sincerely,

Kristi Suggs

Kristi Suggs
Senior Environmental Scientist
ksuggs@wildlandseng.com

PREPARED BY:

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EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) implemented a full-delivery stream mitigation project at the Key Mill Mitigation Site (Site) for the North Carolina Department of Environmental Quality (DEQ) Division of Mitigation Services (DMS). The project restored, enhanced, and preserved a total of 7,437 linear feet (LF) of perennial and intermittent stream in Surry County, NC. The Site is located within the DMS targeted watershed for the Yadkin River Basin Hydrologic Unit Code (HUC) 03040101110040 and the NC Division of Water Resources (NCDWR) Sub-basin 03-07-03. The project is providing 6,107.300 cool stream mitigation units (SMUs) for the Yadkin River Basin HUC 03040101 (Yadkin 01).

The Site has a long history of agricultural activity and most of the stressors to stream functions are related to this historic and current land use practices. The major stream stressors for the Site were concentrated agricultural runoff inputs, degraded instream habitat, active stream incision, lack of stabilizing streamside vegetation, bank erosion and failure, and the lack of bedform diversity. The effects of these stressors resulted in degraded water quality and habitat throughout the Site when compared to reference conditions. The project approach for the Site focused on evaluating the Site's existing functional condition and evaluating its potential for recovery and need for intervention.

The project goals defined in the mitigation plan (Wildlands, 2019) were established with careful consideration of 2009 Upper Yadkin Pee Dee River Basin Restoration Priorities (RBRP) goals and objectives to address stressors identified in the watershed. The established project goals include:

- Improve stream channel stability,
- Stabilize eroding stream banks,
- Exclude livestock from stream channels,
- Reconnect channels with historic floodplains,
- Improve instream habitat,
- Reduce sediment and nutrient input from adjacent farm fields,
- Restore and enhance native floodplain vegetation, and
- Permanently protect the project site from degradational impacts.

Monitoring year (MY) 4 is a reduced monitoring year, so vegetation plot and cross-section data were not collected. However, visual Site assessments, documentation of management practices and easement continuity, and hydrologic monitoring are conducted and included in this report. To preserve clarity and continuity of the reporting structure, this report maintains section and appendix numbering from previous monitoring reports. Omitted sections are denoted in the Table of Contents.

Assessments and site visits were completed between February and October 2023 to assess the condition of the project. All sitewide measures that were implemented in late July of 2021 to address issues identified during the MY1 IRT Credit Release Site Walk on July 13, 2021, are still functioning as expected. Areas that were disturbed during the construction/implementation of these measures were replanted in 2022, and the results from a mobile vegetive plot, specifically requested by the IRT to be conducted in a supplementally planted area in MY4, show that the replanted areas are becoming established and trending towards success.

Overall, the Site has met the required stream, vegetation, and hydrology success criteria for MY4, and is on track to meet MY5 and MY7 performance criteria. Herbaceous vegetation has become well established throughout the Site, and the MY4 visual assessment only identified one stream area of concern and no areas of low stem density or bare ground were identified. All monitored reaches received at least one bankfull event in MY4, except for UT3C. The in-stream flow gage located on UT2 recorded 283 days of consecutive baseflow in 2023 or 100% of the monitored period for MY4. Areas of invasive species have been treated throughout the Site and will continue to be monitored and treated as

necessary. Encroachment issues have been resolved, and no other issues were observed during the Site assessment field walk in November 2023. Wildlands will continue to monitor these areas throughout the seven-year monitoring period. If necessary, adaptive maintenance measures will be implemented to benefit the ecological health of the Site.

KEY MILL MITIGATION SITE
Monitoring Year 4 Annual Report

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*Content not required for Monitoring Year 4

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Cross-section (XS)
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Division of Mitigation Services (DMS)
Hydrologic Unit Code (HUC)
Interagency Review Team (IRT)
Monitoring Year (MY)
North Carolina Division of Water Resources (NCDWR)
Stream Mitigation Unit (SMU)
Step Pool Stormwater Conveyance (SPSC)
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Unnamed Tributary (UT)
Yadkin Pee Dee River Basin Priorities (RBRP)

Section 1: PROJECT OVERVIEW

1.1 Project Quantities and Credits

The Key Mill Mitigation Site (Site) is located in Surry County approximately 7.2 miles south of City of Mount Airy, NC in the Yadkin River Basin HUC 03040101110040 and NCDWR Sub-basin 03-07-03. Located in the Smith River Allochthon of the Piedmont physiographic province (NCGS, 1985), the project watershed is predominately forested land with some areas of agriculture including the Site.

The Site is located on one parcel, bisected by Key Road creating a western side and an eastern side (herein referenced as the West side and the East side) to the project. Bull Creek is the primary stream, which flows southeast through the center of the Site. There are five unnamed tributaries (UT1, UT2, UT2A-C, UT3, and UT3A-C) that join Bull Creek within the Site limits. The West side of the project contains the upstream portion of Bull Creek (Reaches 1A, 1B, and 2), as well as UT1A, UT1B, and UT1C. UT1C joins Bull Creek Reach 2 near the bottom of the West Side of the Site and flows through a culvert under Key Road into the eastern side of the Site. The East Side of the site contains the downstream portion of Bull Creek (Reach 3 and 4), as well as UT2, UT2A-C, UT3, UT3A-C.

The final mitigation plan was submitted and accepted by DMS in October of 2018 and the IRT in January of 2019. Construction activities were completed in April 2020 by Carolina Environmental Contracting, Inc. Kee Mapping & Surveying, PLLC. completed the as-built survey in June 2020. Planting was completed following construction in April 2020 by Bruton Natural Systems, Inc. A conservation easement (CE) has been recorded and is in place on 20.8 acres.

Please refer to Table 1 for the project's stream credits and the credit summary table. Annual monitoring will be conducted for seven years with close-out anticipated to commence in 2027 given the success criteria are met.

Table 1: Project Quantities and Credits

Project Reach	Mitigation Plan Footage	As-Built Footage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Notes/Comments
Bull Creek Reach 1A	444	421	Cool	R	1.000	Priority 1 channel restoration, fence installation for cattle exclusion, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.
Bull Creek Reach 1B	722	722	Cool	R	1.000	
Bull Creek Reach 2	418	418	Cool	R	1.000	Priority 1 channel restoration with priority 2 restoration used when transitioning the restored channel to the existing channel bed elevation, fence installation for cattle exclusion, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.

Table 1: Project Quantities and Credits

Project Reach	Mitigation Plan Footage	As-Built Footage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Notes/Comments
Bull Creek Reach 3	1,674	1,676	Cool	R	1.000	Priority 2 restoration, fence installation for cattle exclusion, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.
Bull Creek Reach 4	683	683	Cool	P	10.000	The implementation of a conservation easement for protection in perpetuity.
UT1A	829	832	Cool	EII	2.500	Enhancement II implementation included isolated pockets of bank grading, fence installation for cattle exclusion, replacement of a collapsed culvert with an appropriately sized culverted crossing, profile adjustments where needed, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.
UT1B	212	212	Cool	R	1.000	Priority 2 restoration, fence installation for cattle exclusion, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.
UT1C	257	257	Cool	R	1.000	
UT2	42	42	Cool	R	1.000	Priority 2 restoration, fence installation for cattle exclusion, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.
UT2A	315	315	Cool	R	1.000	
UT2B	263	263	Cool	R	1.000	
UT2C	469	469	Cool	R	1.000	
UT3	18	18	Cool	EII	2.500	Enhancement II implementation included isolated pockets of bank grading, fence installation for cattle exclusion, profile adjustments where needed, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.
UT3A	413	390	Cool	EII	2.500	

Table 1: Project Quantities and Credits

Project Reach	Mitigation Plan Footage	As-Built Footage	Mitigation Category	Restoration Level	Mitigation Ratio (X:1)	Notes/Comments
UT3B	307	307	Cool	R	1.000	Priority 2 restoration, fence installation for cattle exclusion, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.
UT3C	412	412	Cool	R	1.000	Priority 1 channel restoration with priority 2 restoration used when transitioning the restored channel to the existing channel bed elevation, fence installation for cattle exclusion, invasive species removal/treatment, riparian plantings, and the implementation of a conservation easement for protection in perpetuity.

Credit Summary Table

Restoration Level	Stream		
	Warm	Cool	Cold
Restoration	N/A	5,535.000	N/A
Enhancement I	N/A	N/A	N/A
Enhancement II	N/A	504.000	N/A
Preservation	N/A	68.300	N/A
Total Stream Credit	**6,107.300**		

1.2 Project Goals and Objectives

The Site is providing numerous ecological benefits within the Yadkin Valley Basin. The project goals were established with careful consideration to address stressors that were identified in the RBRP (EEP, 2009). The project has improved stream functions through stream restoration and the conversion of maintained agricultural fields into riparian buffer within the Yadkin Valley River Basin, while creating a functional riparian corridor at the Site.

The following project specific goals and objectives outlined in the Mitigation Plan (Wildlands, 2019) include:

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Improve the stability of stream channels.	Construct stream channels that will maintain stable cross-sections, patterns, and profiles over time.	Reduce sediment inputs from bank erosion. Reduce shear stress on channel boundary.	BHR to remain below 1.2 and entrenchment ratio (ER) to remain above 2.2 for C/E type channels over the monitoring period with visual assessments showing progression towards stability.	15 Cross-sections will be assessed during MY1, MY2, MY3, MY5, and MY7 and visual inspections will be assessed annually.	Cross-section monitoring is not required in MY4. Visual assessments revealed that project streams are stable and have maintained the constructed riffle and pool sequence as designed. Cross-sections will be monitored again in MY5.
Reconnect channels with historic floodplains.	Reconstruct stream channels with designed bankfull dimensions and depth based on reference reach data.	Allow more frequent flood flows to disperse on the floodplain.	Four bankfull events in separate years within the 7-year monitoring period. Continuous baseflow must occur every year for at least 30 days of consecutive days during the monitoring year. This 30-day period can occur at any point during the year.	6 automated crest gages, 1 manual crest gage, and 1 automated stream gage were installed on restoration reaches and will record flow elevations and durations.	In MY4, at least one bankfull event was recorded on every monitored reach, except for reach UT3C. As of MY4 reaches UT1C (CG#2) and UT2C (CG#3) have met their hydrologic performance criteria, but they will continue to be monitored throughout the remainder of the monitoring period, along with the other reaches. The stream gage on UT2 recorded 283 days of consecutive flow or 100% of the monitoring period.

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 and streambank vegetation.	Plant native tree and understory species in riparian zones and plant native shrub and herbaceous species on streambanks.	Reduce sediment inputs from bank erosion and runoff. Increase nutrient cycling and storage in floodplain. Provide riparian habitat. Add a source of LWD and organic material to stream.	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre at MY5, and 210 stems per acre at MY7. Additionally, trees in each plot must average 7 feet in height by MY5 and 10 feet by MY7.	Eight (8) permanent and Five (5) mobile one hundred square meter vegetation plots are monitored during MY1, MY2, MY3, MY5, and MY7. During the MY3 Credit Release Meeting, the IRT requested that a mobile plot be monitored in a supplemental planting area in MY4 to document the survivability of the supplemental planted stems.	Vegetation plot monitoring is not required in MY4. Monitoring will resume in MY5. Visual assessments reveal that herbaceous cover is becoming well established and planted bare roots and live stakes appear healthy. The Site is still on track to meet the MY5 requirement of 260 stems per acre. Results from the plot in the supplemental planting area during MY4 show the survival of 647 planted stems per acre.
Improve instream habitat.	Remove man-made impoundments and culvert crossings within easement. Install habitat features such as constructed riffles, cover logs, and brush toes into restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth.	Increase and diversify available habitats for macroinvertebrates, fish, and amphibians leading to colonization and increase in biodiversity over time.	There is no required performance standard for this metric.	Visual assessment.	N/A

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Diffuse concentrated agricultural runoff.	Install stormwater BMPs in areas of concentrated agricultural runoff to diffuse and provide vegetated infiltration for runoff before it enters the stream channel.	Reduce agricultural and sediment inputs to the project, which will reduce likelihood of accumulated fines and excessive algal blooms from nutrients.	There is no required performance standard for this metric.	N/A	N/A
Permanently protect the project Site from harmful uses.	Establish conservation easements on the Site.	Protect Site from encroachment on the riparian corridor and direct impact to streams and wetlands.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.	No easement encroachments observed.
Exclude livestock from stream channels.	Install livestock fencing and watering systems as needed to exclude livestock from stream channels and riparian areas.	Reduced agricultural runoff and cattle trampling in streams.	There is no required performance standard for this metric.	Visually monitor fenced portions of the site to ensure no cattle are entering the easement.	Cattle have been observed in easement; however, they were swiftly removed and little to no damage occurred.
Stabilize eroding stream banks.	Reconstruct stream channels slated for restoration with stable dimensions. Add bank revetments and in-stream structures to reaches to protect restored/enhanced streams.	Reduce sedimentation, improve instream habitat, and bedform diversity.	Cross-sections should be stable and show little change in bankfull area, and width-to-depth ratio.	Cross-section monitoring and visual assessment.	Overall, all channels are stable and bank erosion is minimal. Reaches have maintained the constructed riffle and pool sequence.

1.3 Project Attributes

Prior to construction, the Site had been primarily used for agriculture. Lands upstream and downstream of the Site are predominantly forested though there are some areas of agricultural lands and small

residential areas within the watershed. Agricultural activities within the Site had led to streams in various stages of impairment. Most of the streams on the Site were impaired from limited to non-existent buffers, concentrated agricultural runoff inputs, degraded instream habitat, active stream incision, bank erosion and failure, and the lack of bedform diversity. Pre-construction conditions are outlined in Table 3 below and in Table 9 of Appendix C in the MY3 Report.

The Site drains approximately 2.15 square miles of rural land, predominantly actively grazed pasture with the downstream extent of the Site forested. Valleys throughout the West side have moderately steep walls with alluvial bottoms, whereas valleys along the upstream extents of the project's East side tributaries are narrow with colluvial bottoms. Downstream of the Site, Bull Creek continues southeast to join the Ararat River near the Cedar Hill community.

Table 3: Project Attributes

Project Information			
Project Name	Key Mill Mitigation Site	**County**	Surry County
Project Area (acres)	20.8	**Project Coordinates**	36° 23' 57.4794"N -80° 36' 11.88"W
Planted Acreage	9.8 acres (full planting) plus supplemental planting		
Project Watershed Summary Information			
Physiographic Province	Piedmont	**River Basin**	Yadkin River
USGS Hydrologic Unit 8-digit	3040101	**USGS Hydrologic Unit 14-digit**	3040101110040
Project Watershed Summary Information			
DWR Sub-basin	03-07-03	**Project Drainage Area Percentage of Impervious Area**	1%
Project Drainage Area (acres)	Bull Creek Reach 1A, 1B, & 2: (1,146); Bull Creek Reach 3 & 4: (1,293); UT1A-C: (102); UT2A-C: (32); UT2: (6); UT3 & UT3-C: (45)	**2011 NLCD Land Use Classification**	Bull Creek- Forest (58%), Cultivated (33%), Urban (9%) UT1A-C - Forest (70%), Cultivated (21%), Urban (9%) UT2A-C - Forest (32%), Cultivated (49%), Urban (19%) UT2 - Forest (55%), Cultivated (45%), Urban (0%) UT3/UT3A-C - Forest (22%), Cultivated (74%), Urban (4%)

Table 3: Project Attributes

Reach Summary Information								
Parameters	**Bull Creek Reach 1A**	**Bull Creek Reach 1B**	**Bull Creek Reach 2**	**Bull Creek Reach 3**	**Bull Creek Reach 4**	**UT1A**	**UT1B**	**UT1C**
Length of reach (linear feet) - Post-Restoration	421	722	418	1,676	683	832	212	257
Valley confinement (Confined, moderately confined, unconfined)	Confined to Moderately Confined			Moderately Confined		Confined		
Drainage area (acres)	1,146			1,293		102		
Perennial, Intermittent, Ephemeral	P	P	P	P	P	P	P	P
NCDWR Water Quality Classification	C							
Morphological Description (stream type) - Pre-Restoration	F3			F3/G3c	---	---	G4c	G4
Morphological Description (stream type) - Post-Restoration	C3		C3b	C3	---	---	B4	B4a
Evolutionary trend (Simon's Model) - Pre-Restoration	IV/V				VI	III/IV		
Parameters	**UT2**	**UT2A**	**UT2B**	**UT2C**	**UT3**	**UT3A**	**UT3B**	**UT3C**
Length of reach (linear feet) - Post-Restoration	42	315	263	469	18	390	307	412
Valley confinement (Confined, moderately confined, unconfined)	Confined		Moderately Confined		Confined		Moderately Confined	
Drainage area (acres)	6	32			45			
Perennial, Intermittent, Ephemeral	I	P	P	P	I	I/P	P	P
NCDWR Water Quality Classification	C							
Morphological Description (stream type) - Pre-Restoration	G4	G5	G5c	G5	---	---	G5	G5c
Morphological Description (stream type) - Post-Restoration	B4	B4	C4b	C4	---	---	B4	C4
Evolutionary trend (Simon's Model) - Pre- Restoration	III/IV							

Table 3: Project Attributes

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	Yes	Yes	USACE Action ID# SAW-2017-01504
Waters of the United States - Section 401	Yes	Yes	DWR# 17-1045
Division of Land Quality (Erosion and Sediment Control)	Yes	Yes	NPDES Construction Stormwater General Permit NCG010000
Endangered Species Act	Yes	Yes	Categorical Exclusion Document in Mitigation Plan
Historic Preservation Act	Yes	Yes	Categorical Exclusion Document in Mitigation Plan
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	Yes	N/A	Not located in a Special Flood Hazard Area
Essential Fisheries Habitat	No	N/A	N/A

Section 2: MONITORING YEAR 4 DATA ASSESSMENT

Annual monitoring for MY4 was conducted between February and October 2023 to assess the condition of the project. The stream, vegetation, and hydrologic success criteria for the Site follows the approved success criteria presented in the Key Mill Mitigation Plan (Wildlands, 2019). Monitoring features and locations are shown in Figures 1 – 1c. Refer to Table 14 for the project's activity and reporting history.

All areas that were successfully re-planted in early 2022 have continued to do well throughout 2023. Wildlands will continue assessing these areas throughout the seven-year monitoring period for the project.

2.1 Vegetation Assessment

Detailed vegetation inventory and analysis is not required during MY4. However, a visual assessment was conducted and indicated that vegetation on the Site is performing well and will attain the interim success criteria of 260 stems per acre, with an average height of 7-ft, at the end of MY5.

In December 2022, Wildlands supplementally planted and added soil amendments to an area of low stem density that was mapped along Bull Creek reach 1B. During the MY3 Credit Release Meeting, the IRT requested that Wildlands add a plot (SPV1) in this area in MY4 to document the survivability of the supplementally planted stems. Data from SPV1 was collected in September of 2023, and results show that the area is performing well with an average stem density of 647 planted stems per acre and an average height of 2.2 ft. Additionally, there were 9 species within the plot with no single species making up more than 50% of the plot, and no invasive species were observed.

Please refer to Appendix F for the Supplemental Vegetation Plot recorded data, field sheet, and the plot photo.

2.2 Vegetation Areas of Concern and Management Activity

Overall, herbaceous ground cover is well established and planted stems throughout the Site are thriving. An effort was put in this year in May and then in November of 2023 to treat scattered patches of invasives that were found along existing woody buffers throughout Lower Bull Creek, UT1A, UT1B and Bull Creek Reach 1B, but had overall encompassed a small percentage of the total easement acreage. Targeted invasive species treatments including mechanical removal and herbicide applications occurred in May and November of 2023, effectively treating the following species: cattails (*Typha latifolia*) tree of heaven (*Ailanthus altissima*), Chinese privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*). In August of 2023, marsh dewflower (*Murdannia keisak*) was chemically treated in some of the riffles along UT3C. The treatment was successful in removing the vegetation from the stream bed but will likely need retreatment in the future to suppress revegetation until the riparian canopy develops. All other areas were deemed non – problematic by WEI staff. Wildlands will continue to monitor for resprouts and treat them as necessary. See the vegetation condition assessment in Table 5 of Appendix A.

Conservation Easement

As discussed in the MY3 report, multiple encroachments of cattle inside the easement fence have been documented throughout the first three years of monitoring. At the DMS Credit Release Meeting for Key Mill (MY3), the IRT requested detailed encroachment information and status updates in MY4 (2023) report with resolutions proposed and implemented. A chronological list, including any encroachments documented in MY4 (2023), their description, management action, and status are described below.

MY1 (2020) - MY4 (2023) Conservation Easement Encroachment Issues				
Issue Location	**Issue Description**	**Management Action**	**MY#**	**Current Status**
Eastern side of the project	Cattle was observed within the easement due to power failure to high tensile fence in June 2020.	Cattle was immediately removed from easement by WEI. Phoned the landowner about fence line power failure. Fence line issue was repaired, and power was returned to fence (June 2020).	MY1	Resolved
UT3	Cattle was observed within the easement due to loose fencing in July 2020.	Cattle was immediately removed from easement by WEI. Phoned the landowner about the loose fence. The fence line was tightened/repaired to prevent cattle access. (July 2020).	MY1	Resolved
Eastern side of the project	Cattle was observed within the easement due to power failure to high tensile fence in July 2020.	Cattle was immediately removed from easement by WEI. Phoned the landowner about fence line power failure. Sent a follow-up text to landowner about multiple incidents of cattle encroachment due to reoccurring fencing issues. Fence line issue was repaired, and power was returned to fence (July/Aug 2020).	MY1	Resolved
Eastern side of the project	Cattle was observed within the easement due to power failure to high tensile fence in early September 2020.	Cattle was immediately removed from easement by WEI. Phoned the landowner about fence line power failure. Fence line issue was repaired, and power was returned to fence (early September 2020).	MY1	Resolved
Eastern side of the project	Cattle was observed within the easement due to power failure to high tensile fence in late September 2020.	Cattle was immediately removed from easement by WEI. Met with the landowner on-site to discuss reoccurring fencing issues and fence line power failure. Sent a follow-up letter to landowner to reiterate and reconfirm action on items discussed during field meeting. Fence line issue was repaired, and power was returned to fence (mid-October 2020).	MY1	Resolved

MY1 (2020) - MY4 (2023) Conservation Easement Encroachment Issues				
Issue Location	**Issue Description**	**Management Action**	**MY#**	**Current Status**
Western side of the project (Bull Creek Reach 1A)	Cattle was observed within the easement due to cattle physically pushing through the fence line in early November 2020.	Cattle was immediately removed from easement by WEI. Phoned the landowner about cattle access into the easement. Sent a follow-up email to landowner about the incident. Fence line issue was repaired (early November 2020).	MY1	Resolved
UT3	A single calf was observed within the easement by crawling under fence in February 2022.	The calf was immediately removed from easement by WEI. Phoned the landowner about the calf accessing the easement. The bottom fence wire was tightened/repaired to prevent access. (February 2022).	MY3	Resolved
Bull Creek Reach 3	A single calf was observed within the easement by crawling under fence in April 2022.	The calf was immediately removed from easement by WEI. Phoned the landowner about the calf accessing the easement. The bottom fence wire was tightened/repaired to prevent access. (April 2022).	MY3	Resolved
Bull Creek Reach 1A & 2B	Cattle was observed within the easement due to cattle physically squeezing through the fence line where damage was present and caused a power failure in June 2022.	Cattle was immediately removed from easement by WEI. Emailed the landowner about cattle access into the easement. The fence line was repaired (early July 2022).	MY3	Resolved
UT3	Evidence observed from cattle accessing but not currently in the easement due to a tree down on the fence in late July 2022.	The tree was removed, and the fence was repaired (late July 2022).	MY3	Resolved
Eastern side of project and UT1	Evidence observed from cattle accessing but not currently in the easement due to a tree down on the fence when cattle pasture rotation was conducted in early March 2023.	Cattle was removed from easement by landowner and repaired the fence. No landowner contact was needed (early March 2023).	MY4	Resolved
Eastern side of project	Cattle was observed within the easement due to a tree down on the fence in late March 2023.	The landowner was contacted, and the cattle were swiftly removed from the easement by the landowner. WEI repaired the fence and added horse tape to deter cattle access (late March 2023).	MY4	Resolved

Due to the reoccurrence of cattle encroachments in 2022, after none were observed in 2021, a more focused effort was implemented by Wildlands in 2023 to maintain and repair fencing as swiftly as possible. Therefore, when cattle were observed again within the easement in March 2023, the landowner was promptly contacted, and the cattle were swiftly removed with minimal damage to planted stems. Wildlands repaired the fence and added horse tape to prevent further easement violations. In addition, Wildlands identified the crossing between BCR2 and BCR3 as a potential cattle access point to the easement. After repairs were conducted along this fence line, the issue of cattle within the easement was resolved.

Since March of 2023, there have been multiple site visits by Wildlands Stewardship and Monitoring Teams, and no additional cattle encroachments nor any evidence of cattle accessing the easement have been observed. It appears that the fence is being operated and maintained properly. Wildlands will continue to closely monitor the easement and fencing throughout the monitoring period and continue to take a proactive approach to mitigate potential fencing issues before an encroachment is observed. Wildlands walked the boundary in October of 2023 to ensure that the conservation easement boundary was intact in regard to signage and fencing, as well as, free of encroachments. In early 2024, Wildlands will plan to walk the boundary to reverify the survey boundary monuments. Even though there have been multiple cattle encroachments at the Site, the vegetation continues to thrive and no areas inside the easement have been severely impacted. Management activities and vegetation areas of concern are depicted on the Current Condition Plan View (CCPV) figures.

2.3 Stream Assessment

MY4 is a reduced monitoring year and detailed geomorphologic cross-section surveys are not required. However, based on field observations during site assessments, site maintenance, and the implementation of land stewardship activities, most project reaches within the Site continue to remain stable and function as designed. Areas where current and/or former instability or stream functional issues have been noted are discussed in Section 2.4, outlined in Tables 4a-4l, and depicted in Figures 1 – 1c.

2.4 Stream Areas of Concern and Management Activity

The MY4 visual assessment revealed that the majority of the project reaches, bed and banks are stable with only minor instances of scour and localized structure issues, neither of which compromise the channel or structure integrity. However, on Bull Creek Reach 2, there is active erosion and minor piping occurring behind a j-hook structure at station 115+30 caused by continuous storm events. Wildlands will conduct hand repairs in MY5 by re-grading and re-stabilizing the left bank. Repair activities will also include re-seeding, adding herbaceous plugs and live stake fascines to stabilize the banks and prevent excess sediment from entering the stream. Wildlands will continue to monitor all areas of concern and document repairs and management activities in the MY5 report. Refer to CCPV Figures 1 – 1c and Appendix A for stream stability tables, AOC photographs.

As discussed in the MY3 report, repairs were implemented in April of 2023 on the downstream extent of Bull Creek Reach 3 at station 164+00 to address displaced and piping lunker logs. Wildlands reset one structure by keying it back into the bed and bank and added stabilizing rock material to both banks for bank revetment and structure stability. For the second structure, since the log was not acting as a grade control measure, Wildlands notched a sizable portion in the center of the log to allow water to pass freely over the log to prevent any further piping beneath and erosion around the structure. Additionally, two areas of localized aggradation (Bull Creek Reach 1A and UT3C), have remained consistent in scale over the past few years and no longer pose a threat to channel stability; therefore, they have been removed as an AOC from the CCPV maps and from Table 4. Wildlands will continue to monitor these

structures and stream areas to ensure that they are performing as intended. Refer to Appendix A for Repair Photographs and Table 4 Visual Stream Morphology Stability Assessment Table.

2.5 Stream Hydrology Assessment

Five automated pressure transducers were installed in MY0 to document stream hydrology throughout the seven-year monitoring period. At the end of the seven-year monitoring period, four or more bankfull flow events must have occurred in separate years on each of the restoration reaches and intermittent channels have maintained 30 consecutive days of baseflow in each monitoring year. Pressure transducers are programmed to record data every 2 hours and have captured many high flow events since monitoring commenced in MY1. Each gage was checked for accuracy at the beginning of MY4.

Generally, average rainfall in MY4 fell within the normal range when compared to the 30-year normal between 1993 and 2023 (NRCS, 2023; USGS 2023). Automated crest gages (CG), as well as manual crest gage 1, recorded at least one bankfull event on each of the restoration reaches, except UT3C, in MY4. Though UT3C did not record a bankfull event in MY4, it came close in June, and had previously recorded at least one bankfull event in each of the past three years. Additionally, UT2, which is monitored to confirm the continuation of intermittent baseflow conditions on the restored channel, recorded 283 days of consecutive flow, exceeding the 30-day consecutive flow requirement. Please refer to Figures 1 – 1c for gage locations and Appendix D for hydrology summary data and gage plots.

2.6 MY4 Summary

Overall, the Site has met the required stream, hydrology, and vegetation success criteria for MY4. Herbaceous ground cover is well established throughout the Site. At least one bankfull event was documented on each of the monitored reaches in MY4 except for reach UT3C, and UT2's baseflow exceeded the 30-day requirement for intermittent streams, with a total of 283 days of consecutive flow. The MY4 visual assessment identified one small area of concern on Bull Creek Reach 2, which is slotted to be repaired in MY5. A log roller riffle on Bull Creek Reach 3 that was documented in MY3 was repaired and is functioning as intended. No ongoing areas of encroachment were noted during the MY4 site walk. The invasive species populations noted in MY3 were treated in May and November 2023 of MY4, leaving the site with a good outlook on invasive control going into MY5. Supplemental planting areas are doing well and are trending towards success. Wildlands will continue to monitor the Site, and adaptive maintenance measures will be implemented as necessary throughout the seven-year monitoring period to benefit the ecological health and geomorphic stability of the Site.

Section 3: METHODOLOGY

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 the Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using ArcGIS. Crest gages, stream gages, and groundwater gages are monitored quarterly. Monitoring instrument installation and methods are in accordance with the 2016 NC IRT Stream and Wetland Compensatory Mitigation Update and NC DMS Annual Monitoring and Closeout Template (2015). Vegetation monitoring protocols followed the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008).

Section 4: REFERENCES

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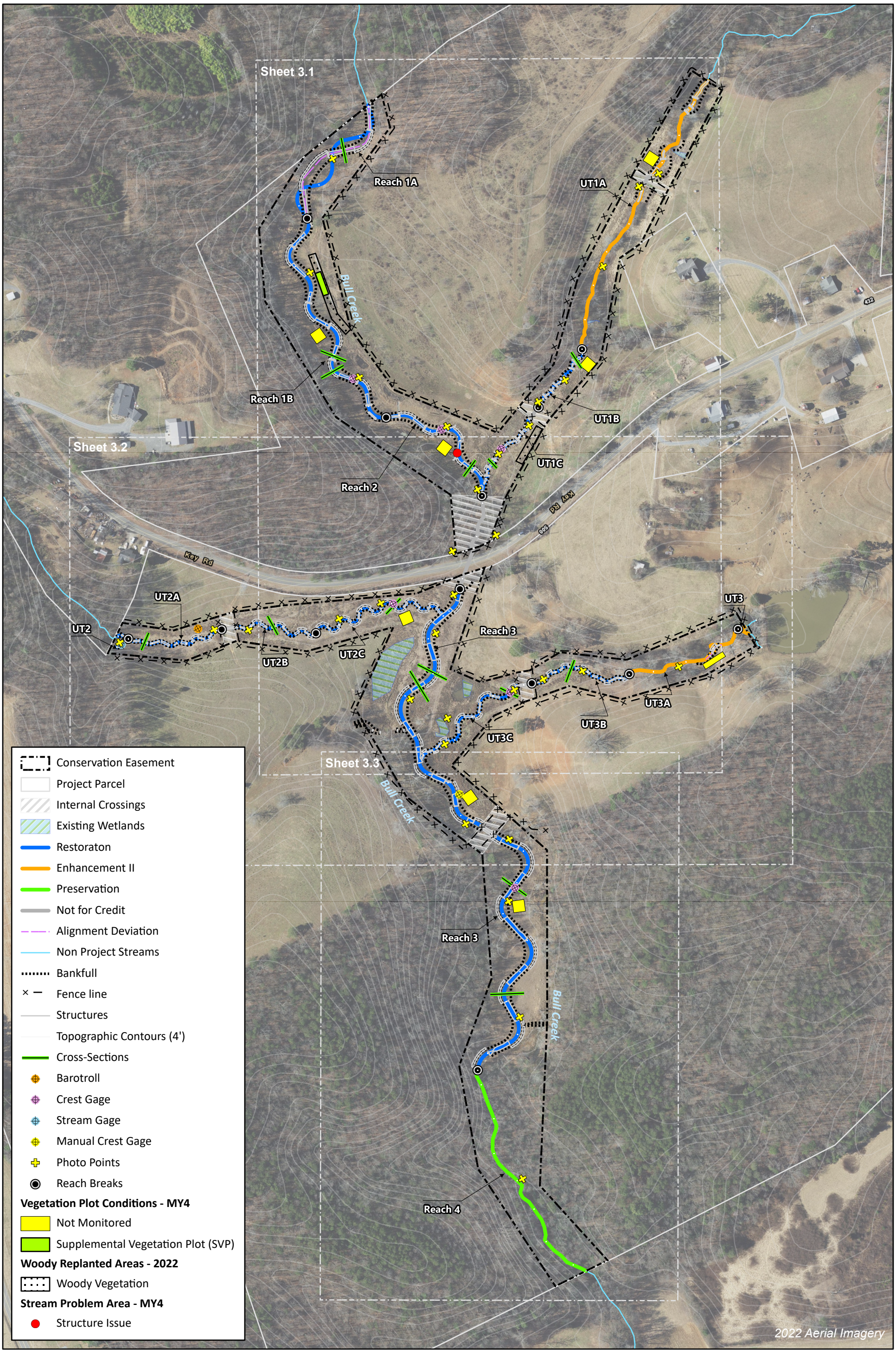
FIGURES

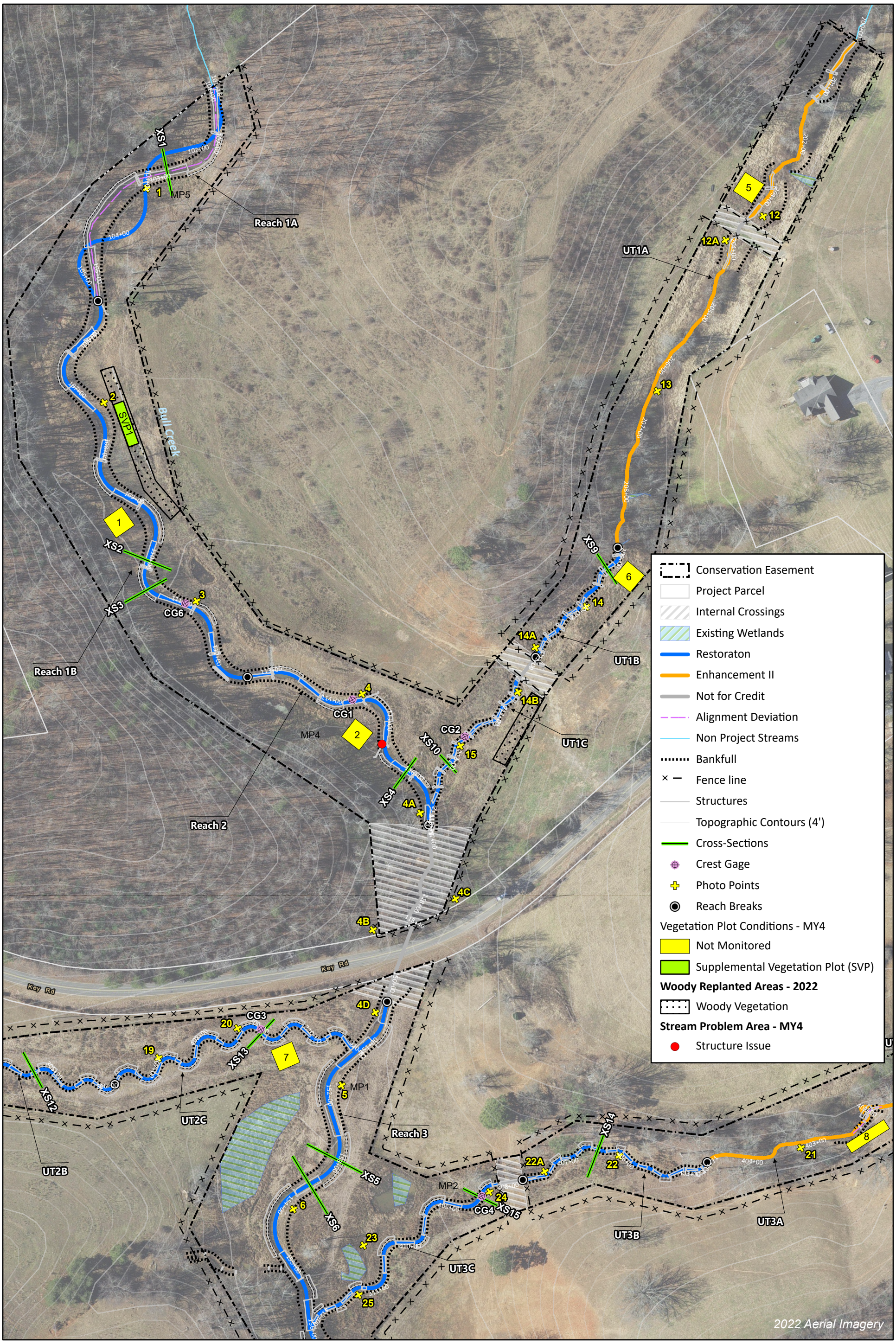


WILDLANDS ENGINEERING

Environmental Quality

0 250 500 Feet

Figure 1. Current Conditions Plan View Map (Key)
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023
Surry County, NC

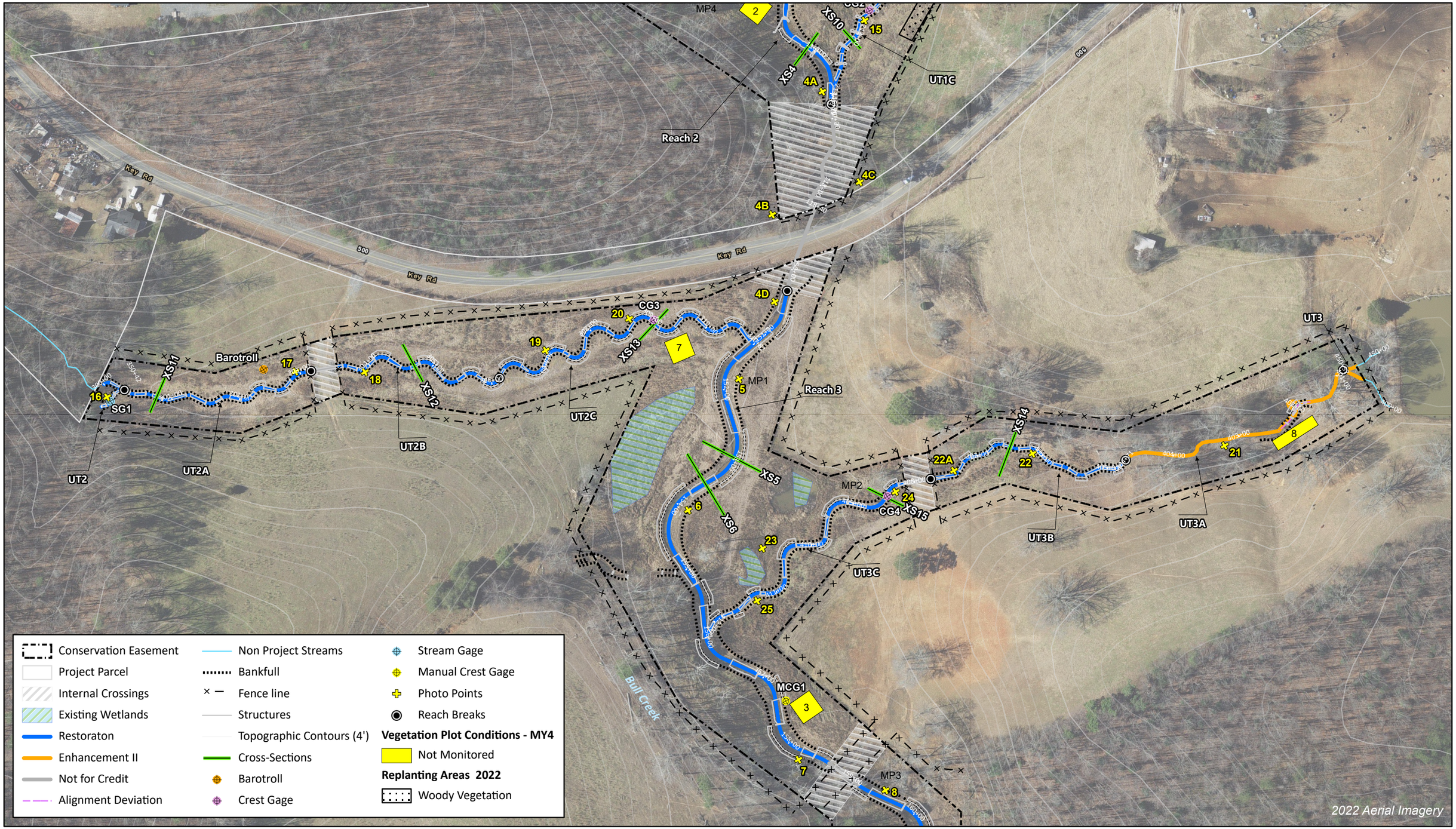


WILDLANDS ENGINEERING

Environmental Quality

0 130 260 Feet

Figure 1a. Current Condition Plan View Map
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023
Surry County, NC

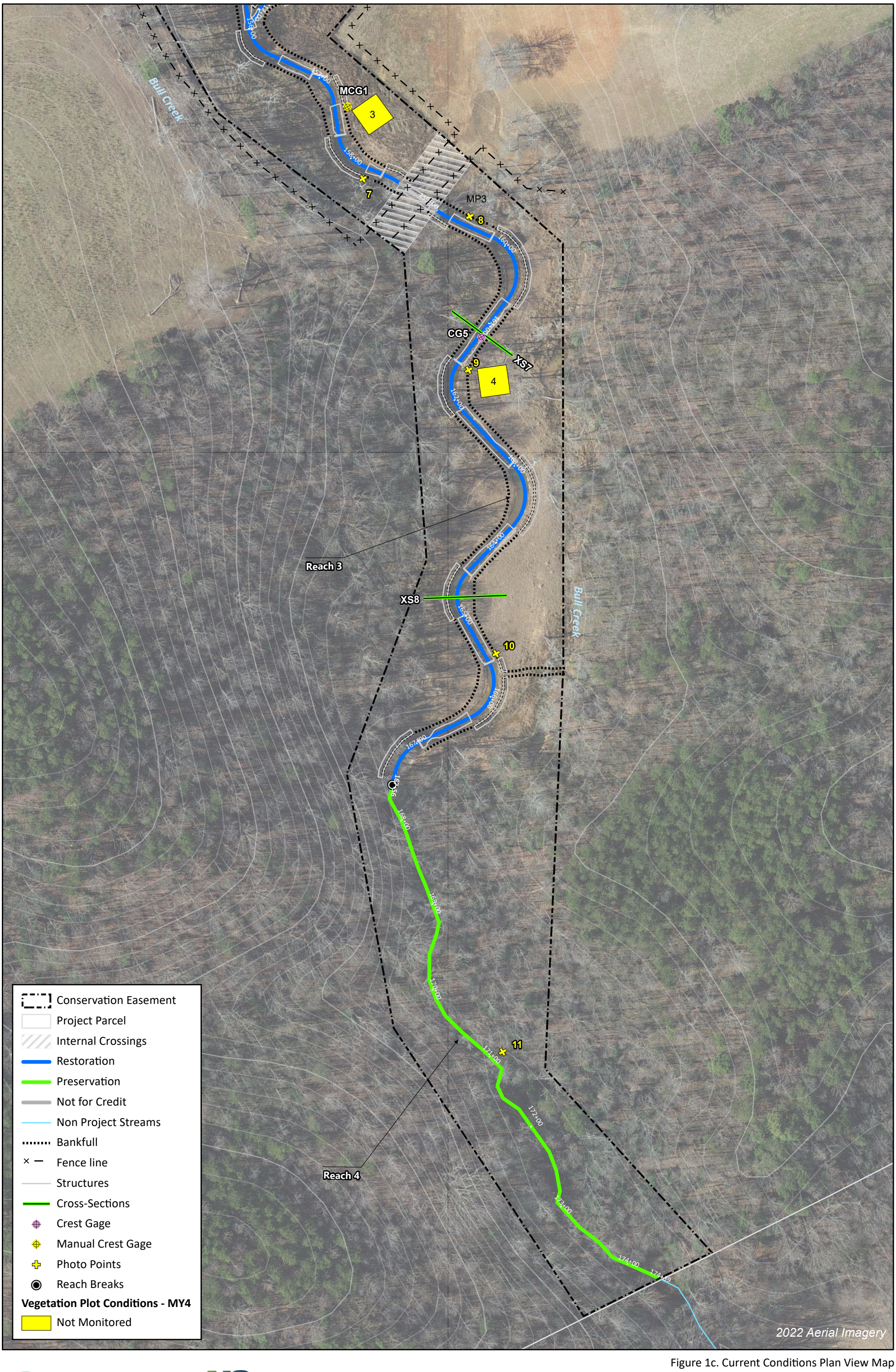


WILDLANDS ENGINEERING

Environmental Quality

0 125 250 Feet

Figure 1b. Current Conditions Plan View Map
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023
Surry County, NC



WILDLANDS ENGINEERING

Environmental Quality

0 100 200 Feet

Figure 1c. Current Conditions Plan View Map
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023
Surry County, NC

APPENDIX A. Visual Assessment Data

Table 4a. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: Bull Creek Reach 1A
Assessed Length: 421

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	3	3			100%			
	3. Meander Pool Condition	Depth Sufficient	2	2			100%			
		Length Appropriate	2	2			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	2	2			100%			
		Thalweg centering at downstream of meander bend (Glide)	2	2			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	5	5			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4b. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: Bull Creek Reach 1B
Assessed Length: 722

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	7	7			100%			
	3. Meander Pool Condition	Depth Sufficient	8	8			100%			
		Length Appropriate	8	8			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	8	8			100%			
		Thalweg centering at downstream of meander bend (Glide)	8	8			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	12	12			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	12	12			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4c. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: Bull Creek Reach 2
Assessed Length: 418

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	6	6			100%			
	3. Meander Pool Condition	Depth Sufficient	5	5			100%			
		Length Appropriate	5	5			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	5	5			100%			
		Thalweg centering at downstream of meander bend (Glide)	5	5			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	5			80%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	10	10			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4d. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: Bull Creek Reach 3
Assessed Length: 1,676

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	15	15			100%			
	3. Meander Pool Condition	Depth Sufficient	16	16			100%			
		Length Appropriate	16	16			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	15	15			100%			
		Thalweg centering at downstream of meander bend (Glide)	16	16			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	28	28			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	11	11			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	11	11			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	17	17			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	28	28			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4e. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT1B
Assessed Length: 212

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	9	9			100%			
	3. Meander Pool Condition	Depth Sufficient	9	9			100%			
		Length Appropriate	9	9			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		Thalweg centering at downstream of meander bend (Glide)	9	9			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	0	0			N/A			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	8	8			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4f. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT1C
Assessed Length: 257

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	9	9			100%			
	3. Meander Pool Condition	Depth Sufficient	10	10			100%			
		Length Appropriate	10	10			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		Thalweg centering at downstream of meander bend (Glide)	10	10			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	11	11			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	11	11			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4g. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT2
Assessed Length: 42

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	3	3			100%			
	3. Meander Pool Condition	Depth Sufficient	2	2			100%			
		Length Appropriate	2	2			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	2	2			100%			
		Thalweg centering at downstream of meander bend (Glide)	2	2			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	0	0			N/A			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	2	2			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4h. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT2A
Assessed Length: 315

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	11	11			100%			
	3. Meander Pool Condition	Depth Sufficient	11	11			100%			
		Length Appropriate	11	11			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	10	10			100%			
		Thalweg centering at downstream of meander bend (Glide)	11	11			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	12	12			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	10	10			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	12	12			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4i. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT2B
Assessed Length: 263

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	8	8			100%			
	3. Meander Pool Condition	Depth Sufficient	8	8			100%			
		Length Appropriate	8	8			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	8	8			100%			
		Thalweg centering at downstream of meander bend (Glide)	8	8			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	12	12			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	12	12			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4j. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT2C
Assessed Length: 469

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	12	12			100%			
	3. Meander Pool Condition	Depth Sufficient	11	11			100%			
		Length Appropriate	11	11			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	11	11			100%			
		Thalweg centering at downstream of meander bend (Glide)	11	11			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	13	13			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	11	11			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	13	13			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4k. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT3B
Assessed Length: 307

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	12	12			100%			
	3. Meander Pool Condition	Depth Sufficient	11	11			100%			
		Length Appropriate	11	11			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		Thalweg centering at downstream of meander bend (Glide)	11	11			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	16	16			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	11	11			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	11	11			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	16	16			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 4l. Visual Stream Morphology Stability Assessment Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023
Reach: UT3C
Assessed Length: 412

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	10	10			100%			
	3. Meander Pool Condition	Depth Sufficient	9	9			100%			
		Length Appropriate	9	9			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	9	9			100%			
		Thalweg centering at downstream of meander bend (Glide)	9	9			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	15	15			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	7	7			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	15	15			100%			

[1]Excludes constructed riffles since they are evaluated in Section 1.

Table 5. Vegetation Condition Assessment Table

Key Mill Mitigation Site

DMS Project No. 100025

Monitoring Year 4 - 2023

Date of visual assessment: September 13, 2023

Planted Acreage **9.8**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	0	0.0	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 5, or 7 stem count criteria.	0.1	0	0.0	0.0%
		Total	**0**	**0.0**	**0.0%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.1	0	0.0	0.0%
		Cumulative Total	**0**	**0.0**	**0.0%**

Easement Acreage **20.8**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern[1]	Areas or points (if too small to render as polygons at map scale).	1,000	0	0.0	0.0%
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	0	0.0	0.0%

[1]Invasive species treatment effective as of November 2023 and verified by Stewardship.

STREAM PHOTOGRAPHS

Bull Creek Reach 1A – Reach 4

Monitoring Year 4

	
Photo Point 1 – looking upstream (03/08/2023)	**Photo Point 1** – looking downstream (03/08/2023)
	
Photo Point 2 – looking upstream (03/08/2023)	**Photo Point 2** – looking downstream (03/08/2023)
	
Photo Point 3 – looking upstream (03/08/2023)	**Photo Point 3** – looking downstream (03/08/2023)

	
Photo Point 4 – looking upstream (03/08/2023)	**Photo Point 4** – looking downstream (03/08/2023)
	
Photo Point 4A – looking upstream (03/08/2023)	**Photo Point 4A** – looking downstream (03/08/2023)
	
Photo Point 4B – looking north (03/08/2023)	**Photo Point 4C** – looking west (03/08/2023)

	
Photo Point 4D – looking upstream (03/08/2023)	**Photo Point 4D** – looking downstream (03/08/2023)
	
Photo Point 5 – looking upstream (03/08/2023)	**Photo Point 5** – looking downstream (03/08/2023)
	
Photo Point 6 – looking upstream (03/08/2023)	**Photo Point 6** – looking downstream (03/08/2023)

	
Photo Point 7 – looking upstream (03/08/2023)	**Photo Point 7** – looking downstream (03/08/2023)
	
Photo Point 8 – looking upstream (03/08/2023)	**Photo Point 8** – looking downstream (03/08/2023)
	
Photo Point 9 – looking upstream (03/08/2023)	**Photo Point 9** – looking downstream (03/08/2023)

	
Photo Point 10 – looking upstream (03/08/2023)	**Photo Point 10** – looking downstream (03/08/2023)
	
Photo Point 11 – looking upstream (03/08/2023)	**Photo Point 11** – looking downstream (03/08/2023)

STREAM PHOTOGRAPHS

UT1A – UT1C

Monitoring Year 4

	
Photo Point 12 – looking upstream (03/08/2023)	**Photo Point 12** – looking downstream (03/08/2023)
	
Photo Point 12A – looking upstream (03/08/2023)	**Photo Point 12A** – looking downstream (03/08/2023)
	
Photo Point 13 – looking upstream (03/08/2023)	**Photo Point 13** – looking downstream (03/08/2023)

	
Photo Point 14 – looking upstream (03/08/2023)	**Photo Point 14** – looking downstream (03/08/2023)
	
Photo Point 14A – looking upstream (03/08/2023)	**Photo Point 14A** – looking downstream (03/08/2023)
	
Photo Point 14B – looking upstream (03/08/2023)	**Photo Point 14B** – looking downstream (03/08/2023)

	
Photo Point 15 – looking upstream (03/08/2023)	**Photo Point 15** – looking downstream (03/08/2023)

STREAM PHOTOGRAPHS

UT2 – UT2C

Monitoring Year 4

	
Photo Point 16 – looking upstream (03/08/2023)	**Photo Point 16** – looking downstream (03/08/2023)
	
Photo Point 17 – looking upstream (03/08/2023)	**Photo Point 17** – looking downstream (03/08/2023)
	
Photo Point 18 – looking upstream (03/08/2023)	**Photo Point 18** – looking downstream (03/08/2023)

	
Photo Point 19 – looking upstream (03/08/2023)	**Photo Point 19** – looking downstream (03/08/2023)
	
Photo Point 20 – looking upstream (03/08/2023)	**Photo Point 20** – looking downstream (03/08/2023)

STREAM PHOTOGRAPHS

UT3A – UT3C

Monitoring Year 4

	
Photo Point 21 – looking upstream (03/08/2023)	**Photo Point 21** – looking downstream (03/08/2023)
	
Photo Point 22 – looking upstream (03/08/2023)	**Photo Point 22** – looking downstream (03/08/2023)
	
Photo Point 22A – looking upstream (03/08/2023)	**Photo Point 22A** – looking downstream (03/08/2023)

	
Photo Point 23 – wetland looking north (03/08/2023)	**Photo Point 23** – wetland looking east (03/08/2023)
	
Photo Point 23 – wetland looking south (03/08/2023)	**Photo Point 23** – wetland looking west (03/08/2023)
	
Photo Point 24 – looking upstream (03/08/2023)	**Photo Point 24** – looking downstream (03/08/2023)

	
Photo Point 25 – looking upstream (03/08/2023)	**Photo Point 25** – looking downstream (03/08/2023)

REPAIR PHOTOGRAPHS
Monitoring Year 4

	
Bull Creek Reach 3: Log roller riffle at station 164+00 with piping under one of the structure's logs (09/19/2022)	Bull Creek Reach 3: Log cut at station 164+00, water is able to flow freely (09/06/23)
	
Bull Creek Reach 3: Log roller riffle at station 164+00 with one of its header logs dislocated from its footer log (09/19/2022)	Bull Creek Reach 3: Filter Fabric added and secured to log roller at station 164+00, water is no longer piping (04/25/23)

AREA OF CONCERN PHOTOGRAPHS

Monitoring Year 4

Bull Creek Reach 2: J-hook structure at station 115+30 with piping starting to occur from bank erosion (09/13/2023)

APPENDIX B. Vegetation Plot Data

Vegetation assessment and analysis not required in Monitoring Year 4

Data Included from Monitoring Year 3

Table 6. Vegetation Plot Criteria Attainment

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Permanent Vegetation Plot	MY3 Success Criteria Met (Y/N)	Tract Mean (MY3 - 2022)	
1	Y	75%	85%
2	N		
3	Y		
4	Y		
5	N		
6	Y		
7	Y		
8	Y		
Mobile Vegetation Plot	**MY3 Success Criteria Met (Y/N)**		
1	Y	100%	
2	Y		
3	Y		
4	Y		
5	Y		

Table 7. CVS Permanent Vegetation Plot Metadata
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Report Prepared By	Freddy Ortega
Date Prepared	9/2/2022 11:11
Database Name	cvs-eep-entrytool-v2.5.0 Key Mill MY3.mdb
Database Location	C:\Users\fortega\OneDrive - Wildlands Engineering Inc\Desktop\Microsoft Access Veg Data - Work in this folder & return to original location when finished\Key Mill MY3 Veg
Computer Name	FREDDY2022
File Size	74149888
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	100025
Project Name	Key Mill Mitigation Site
Description	Full delivery mitigation project in Surry County, NC.
Sampled Plots	13

Table 8a. Planted and Total Stem Counts
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Current Permanent Vegetation Plot Data (MY3 2022)														
Scientific Name	**Common Name**	**Species Type**	**Permanent Plot 1**			**Permanent Plot 2**			**Permanent Plot 3**			**Permanent Plot 4**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	Boxelder	Tree	2	2	2							3	3	4
Acer rubrum	Red Maple	Tree									10			
Acer saccharinum	Silver Maple, Soft Maple	Tree												
Alnus serrulata	Tag Alder, Smooth Alder, Hazel Alder	Shrub Tree												
Asimina triloba	Common Pawpaw, Indian-banana	Shrub Tree												
Betula nigra	River Birch, Red Birch	Tree	4	4	4	3	3	3	6	6	6	2	2	3
Carpinus caroliniana	Ironwood	Shrub Tree	1	1	1									
Diospyros virginiana	American Persimmon	Tree												
Fagus grandifolia	American Beech	Tree												
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	1	1	1	2	2	2						
Hamamelis virginiana	Witch-hazel	Shrub Tree	2	2	2									
Ilex opaca	American Holly, Christmas Holly	Shrub Tree												
Liriodendron tulipifera	Tulip Poplar	Tree			4									
Morus rubra	Red Mulberry	Tree										1	1	1
Nyssa sylvatica	Sour Gum, Black Gum, Pepperidge	Tree							4	4	5			
Platanus occidentalis	Sycamore, Plane-tree	Tree	1	1	51	1	1	17	3	3	21	2	2	2
Quercus falcata	Spanish Oak, Southern Red Oak	Tree												
Quercus rubra	Northern Red Oak	Tree	3	3	3									
Salix nigra	Black Willow	Tree												
Viburnum dentatum	Arrow-wood	Shrub Tree	1	1	1	1	1	1				2	2	2
		Stem count	15	15	69	7	7	23	13	13	42	10	10	12
		size (ares)		1			1			1			1	
		size (ACRES)		0.0247			0.0247			0.0247			0.0247	
		Species count	8	8	9	4	4	4	3	3	4	5	5	5
		Stems per ACRE	607	607	2,792	283	283	931	526	526	1,700	405	405	486

Current Permanent Vegetation Plot Data (MY3 2022)														
Scientific Name	**Common Name**	**Species Type**	**Permanent Plot 5**			**Permanent Plot 6[1]**			**Permanent Plot 7[2]**			**Permanent Plot 8[3,4,5]**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo [4]	Boxelder	Tree										1	1	1
Acer rubrum [5]	Red Maple	Tree			37			4			13			
Acer saccharinum [2,5]	Silver Maple, Soft Maple	Tree							1	1	1	2	2	2
Alnus serrulata	Tag Alder, Smooth Alder, Hazel Alder	Shrub Tree												
Asimina triloba	Common Pawpaw, Indian-banana	Shrub Tree												
Betula nigra [4]	River Birch, Red Birch	Tree	2	2	2	2	2	2				2	2	2
Carpinus caroliniana	Ironwood	Shrub Tree												
Diospyros virginiana [3]	American Persimmon	Tree												
Fagus grandifolia	American Beech	Tree										1	1	1
Fraxinus pennsylvanica [1,2]	Green Ash, Red Ash	Tree				1	1	1	3	3	3	2	2	2
Hamamelis virginiana	Witch-hazel	Shrub Tree										1	1	1
Ilex opaca	American Holly, Christmas Holly	Shrub Tree												
Liriodendron tulipifera	Tulip Poplar	Tree			1									
Morus rubra [3]	Red Mulberry	Tree										1	1	1
Nyssa sylvatica	Sour Gum, Black Gum, Pepperidge	Tree							1	1	1			
Platanus occidentalis	Sycamore, Plane-tree	Tree	3	4	13	4	4	4	1	1	1	1	1	6
Quercus falcata	Spanish Oak, Southern Red Oak	Tree				1	1	1	2	2	2			
Quercus rubra [1]	Northern Red Oak	Tree				3	3	3	1	1	1	1	1	1
Salix nigra	Black Willow	Tree												
Viburnum dentatum	Arrow-wood	Shrub Tree	1	1	2	1	1	1						
		Stem count	6	7	55	12	12	16	9	9	22	12	12	17
		size (ares)		1			1			1			1	
		size (ACRES)		0.0247			0.0247			0.0247			0.0247	
		Species count	3	3	5	6	6	7	6	6	7	9	9	9
		Stems per ACRE	243	283	2,226	486	486	647	364	364	890	486	486	688

[1]In Permanent Plot 6, a planted stem previously mislabeled as *Fraxinus pennsylvanica* was identified as *Quercus rubra* in MY3.

[2]In Permanent Plot 7, a planted stem previously mislabeled as *Acer saccharinum* was identified as *Fraxinus pennsylvanica* in MY3.

[3]In Permanent Plot 8, a planted stem previously mislabeled as *Diospyros virginiana* was identified as *Morus rubra* in MY3.

[4]In Permanent Plot 8, a planted stem previously mislabeled as *Betula nigra* was identified as *Acer negundo* in MY3.

[5]In Permanent Plot 8, two planted stems previously mislabeled as Acer rubrum were identified as *Acer saccharinum* in MY3.

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes and the planted stems over the 50% rule.
P-all: Number of planted stems including live stakes and the planted stems over the 50% rule.
T: Total stems (All planted stems, live stakes, and volunteers)

Table 8b. Planted and Total Stem Counts
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Permanent Vegetation Plot Annual Mean														
Scientific Name	**Common Name**	**Species Type**	**MY3 (08/2022)**			**MY2 (08/2021)**			**MY1 (10/2020)**			**MY0 (4/2020)**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	Boxelder	Tree	6	6	7	5	5	5						
Acer rubrum	Red Maple	Tree			64	2	2	13			30			
Acer saccharinum	Silver Maple, Soft Maple	Tree	3	3	3	2	2	2	2	2	2	2	2	2
Alnus serrulata	Tag Alder, Smooth Alder, Hazel Alder	Shrub Tree						2						
Asimina triloba	Common Pawpaw, Indian-banana	Shrub Tree							1	1	1	5	5	5
Betula nigra	River Birch, Red Birch	Tree	21	21	22	22	22	22	19	19	23	16	16	16
Carpinus caroliniana	Ironwood	Shrub Tree	1	1	1	1	1	1	1	1	1	4	4	4
Diospyros virginiana	American Persimmon	Tree				1	1	1						
Fagus grandifolia	American Beech	Tree	1	1	1	1	1	1	2	2	2	4	4	4
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	9	9	9	9	9	9	9	9	9	12	12	12
Hamamelis virginiana	Witch-hazel	Shrub Tree	3	3	3	3	3	3						
Ilex opaca	American Holly, Christmas Holly	Shrub Tree							1	1	1	6	6	6
Liriodendron tulipifera	Tulip Poplar	Tree			5			4			9			
Morus rubra	Red Mulberry	Tree	2	2	2	2	2	2						
Nyssa sylvatica	Sour Gum, Black Gum, Pepperidge	Tree	5	5	6	5	5	5	8	8	8	6	6	6
Platanus occidentalis	Sycamore, Plane-tree	Tree	16	17	115	17	17	137	13	13	120	16	16	16
Quercus falcata	Spanish Oak, Southern Red Oak	Tree	3	3	3	3	3	3	5	5	5	7	7	7
Quercus rubra	Northern Red Oak	Tree	8	8	8	8	8	8	11	11	11	16	16	16
Salix nigra	Black Willow	Tree									1			
Viburnum dentatum	Arrow-wood	Shrub Tree	6	6	7	6	6	6	6	6	6	15	15	15
		Stem count	84	85	256	87	87	224	78	78	229	109	109	109
		size (ares)		8			8			8			8	
		size (ACRES)		0.1977			0.1977			0.1977			0.1977	
		Species count	13	13	15	15	15	17	12	12	15	12	12	12
		Stems per ACRE	425	430	1,295	440	440	1,133	395	395	1,158	551	551	551

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes and the planted stems over the 50% rule.
P-all: Number of planted stems including live stakes and the planted stems over the 50% rule.
T: Total stems (All planted stems, live stakes, and volunteers)

Table 8c. Planted and Total Stem Counts
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Current Mobile Vegetation Plot (MP) Data (MY3 2022)								Annual Means			
Scientific Name	**Common Name**	**Species Type**	**MP1**	**MP2**	**MP3**	**MP4**	**MP5**	**MY3 (08/2022)**	**MY2 (08/2021)**	**MY1 (10/2020)**	**MY0 (4/2020)**
			PnoLS	**PnoLS**	**PnoLS**	**PnoLS**	**PnoLS**	**PnoLS**	**PnoLS**	**PnoLS**	**PnoLS**
Acer negundo	Boxelder	Tree			1			1	4		
Acer rubrum	Red Maple	Tree							4		
Acer saccharinum	Silver Maple, Soft Maple	Tree	2	4				6		3	1
Alnus serrulata	Tag Alder, Smooth Alder, Hazel Alder	Shrub Tree									
Asimina triloba	Common Pawpaw, Indian-banana	Shrub Tree							3	1	4
Betula nigra	River Birch, Red Birch	Tree	3	1		1	2	7	11	14	15
Carpinus caroliniana	Ironwood	Shrub Tree				2		2			5
Diospyros virginiana	American Persimmon	Tree							3		
Fagus grandifolia	American Beech	Tree									4
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	2	5	1	4	5	17	5	6	7
Hamamelis virginiana	Witch-hazel	Shrub Tree									
Ilex opaca	American Holly, Christmas Holly	Shrub Tree									4
Liriodendron tulipifera	Tulip Poplar	Tree									
Morus rubra	Red Mulberry	Tree			3			3	1		
Nyssa sylvatica	Sour Gum, Black Gum, Pepperidge	Tree			1			1		6	4
Platanus occidentalis	Sycamore, Plane-tree	Tree	5	3	2	3	4	17	18	19	4
Quercus falcata	Spanish Oak, Southern Red Oak	Tree								5	1
Quercus rubra	Northern Red Oak	Tree			5		1	6	7	9	16
Salix nigra	Black Willow	Tree							4		
Viburnum dentatum	Arrow-wood	Shrub Tree			1		1	2	1		5
		Stem count	12	13	14	10	13	62	61	63	70
		size (ares)	1	1	1	1	1	5	5	5	5
		size (ACRES)	0.0247	0.0247	0.0247	0.0247	0.0247	0.1236	0.1236	0.1236	0.1236
		Species count	4	4	7	4	5	10	11	8	12
		Stems per ACRE	486	526	567	405	526	502	494	510	567

Overall Site Annual Mean						
Scientific Name	**Common Name**	**Species Type**	**MY3 (08/2022)**	**MY2 (08/2021)**	**MY1 (10/2020)**	**MY0 (4/2020)**
			PnoLS	**PnoLS**	**PnoLS**	**PnoLS**
Acer negundo	Boxelder	Tree	7	9		
Acer rubrum	Red Maple	Tree		6		
Acer saccharinum	Silver Maple, Soft Maple	Tree	9	2	5	3
Alnus serrulata	Tag Alder, Smooth Alder, Hazel Alder	Shrub Tree				
Asimina triloba	Common Pawpaw, Indian-banana	Shrub Tree		3	2	9
Betula nigra	River Birch, Red Birch	Tree	28	33	33	31
Carpinus caroliniana	Ironwood	Shrub Tree	3	1	1	9
Diospyros virginiana	American Persimmon	Tree		4		
Fagus grandifolia	American Beech	Tree	1	1	2	8
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	26	14	15	19
Hamamelis virginiana	Witch-hazel	Shrub Tree	3	3		
Ilex opaca	American Holly, Christmas Holly	Shrub Tree			1	10
Liriodendron tulipifera	Tulip Poplar	Tree				
Morus rubra	Red Mulberry	Tree	5	3		
Nyssa sylvatica	Sour Gum, Black Gum, Pepperidge	Tree	6	5	14	10
Platanus occidentalis	Sycamore, Plane-tree	Tree	33	35	32	20
Quercus falcata	Spanish Oak, Southern Red Oak	Tree	3	3	10	8
Quercus rubra	Northern Red Oak	Tree	14	15	20	32
Salix nigra	Black Willow	Tree		4		
Viburnum dentatum	Arrow-wood	Shrub Tree	8	7	6	20
		Stem count	146	148	141	179
		size (ares)	13	13	13	13
		size (ACRES)	0.3212	0.3212	0.3212	0.3212
		Species count	13	17	12	12
		Stems per ACRE	454	461	439	557

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes and the planted stems over the 50% rule.
P-all: Number of planted stems including live stakes and the planted stems over the 50% rule.
T: Total stems (All planted stems, live stakes, and volunteers)

APPENDIX C. Stream Geomorphology Data

Stream assessment and analysis not required in Monitoring Year 4

Data Included from Monitoring Year 3

Table 9a. Baseline Stream Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

		Pre-Restoration Condition												Design												As-Built/Baseline											
Parameter	Gage	Bull Creek R1A		Bull Creek R1B		Bull Creek R2		Bull Creek R3		UT1B		UT1C		Bull Creek R1A		Bull Creek R1B		Bull Creek R2		Bull Creek R3		UT1B		UT1C		Bull Creek R1A		Bull Creek R1B		Bull Creek R2		Bull Creek R3		UT1B		UT1C	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																																					
Bankfull Width (ft)		16.2	19.1	16.2	19.1	16.2	19.1	18.0	25.4	5.6	7.0	5.6	7.0	19.5		17.5		16.0		21.0		8.5		8.3		19.4		17.3		16.4		19.6	21.2	6.8		6.9	
Floodprone Width[2] (ft)		21	25	21	25	21	25	27	53	14	17	14	17	42.9	97.5	38.5	87.5	35.2	80.0	46.2	105.0	12.0	19.0	12.0	18.0	70.1		67.6		55.7		94.0	99.0	23.6		34.0	
Bankfull Mean Depth (ft)		1.1		1.1		1.1		1.1	2.1	0.7	1.0	0.7	1.0	1.6		1.3		1.2		1.5		0.6		0.6		1.5		1.7		1.4		1.6	1.8	0.6		0.8	
Bankfull Max Depth (ft)		1.8	2.1	1.8	2.1	1.8	2.1	1.6	2.7	1.0	1.5	1.0	1.5	2.0	2.8	1.7	2.4	1.4	1.9	1.8	2.4	0.7	1.0	0.7	1.1	2.8		2.9		2.5		2.7	3.0	0.9		1.3	
Bankfull Cross-sectional Area (ft[2])	N/A	18.7	21.6	18.7	21.6	18.7	21.6	26.2	39.5	3.9	6.8	3.9	6.8	30.2		23.2		19.3		31.1		5.3		4.8		28.2		29.7		22.9		33.5	36.0	3.9		5.7	
Width/Depth Ratio		14.1	16.8	14.1	16.8	14.1	16.2	8.5	22.5	7.3	8.1	7.3	8.1	12.6		13.2		13.3		14.2		13.8		14.5		13.4		10.1		11.8		10.7	13.4	11.7		8.3	
Entrenchment Ratio[2]		1.3		1.3		1.3		1.3	2.9	2.4	2.5	2.4	2.5	2.2	4.6	>2.2		6.3	7.8	>2.2		2.8	3.3	2.7	2.9	3.6		3.9		3.4		4.3	4.7	3.5		4.9	
Bank Height Ratio		3.7	4.1	3.7	4.1	3.7	4.1	1.9	2.8	5.0	7.9	5.0	7.9	1.0												1.0		1.0		1.0		1.0	1.0	1.0		1.0	
D_{50} (mm)		91.6	96.6	91.6	96.6	25.8	37.2	64.0		17.7	24.2	17.7	24.2													107.3		82.2		135.9		56.4	56.9	33.9		56.2	
Profile																																					
Riffle Length (ft)																																					
Riffle Slope (ft/ft)														0.0100	0.0148	0.0162	0.0203	0.0172	0.0318	0.0103	0.0171	0.0314	0.0801	0.0080	0.0526	0.0050	0.0140	0.0133	0.0258	0.0274	0.0377	0.0037	0.0197	0.0285	0.0604	0.0108	0.0527
Pool Length (ft)																																					
Pool Max Depth (ft)		4.9		4.9		4.9		1.5	2.3	2.6		2.6		4.0	5.6	3.5	4.8	3.2		3.9	6.5	1.3	1.8	1.7		4.3	5.0	3.1	4.6	3.3	4.2	3.0	5.4	0.9	2.0	1.2	2.4
Pool Spacing (ft)		52.0		52.0		52.0		N/A		48.0	262.0	48.0	262.0	96.0	111.0	80.0	101.0	74.6	76.7	55.8	149.0	20.0	54.0	20.0	27.0	230.4		76.6	110.1	59.3	99.2	60.8	187.8	19.9	63.0	18.2	51.5
Pool Volume (ft[3])																																					
Pattern																																					
Channel Beltwidth (ft)		---		---		---		---		---		---		68.8	89.4	53.4	81.3	45.0	69.2	39.0	108.4	N/A[1]	N/A[1]	N/A[1]	N/A[1]	68.8	89.4	53.4	81.3	45.0	69.2	39.0	108.4	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Radius of Curvature (ft)		---		---		---		---		---		---		35.0	50.0	32.0	50.0	30.0	50.5	36.0	85.6	N/A[1]	N/A[1]	N/A[1]	N/A[1]	35.0	50.0	32.0	50.0	30.0	50.5	36.0	85.6	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Rc/Bankfull Width	N/A	---		---		---		---		---		---		1.8	2.6	1.8	2.9	1.9	3.2	1.7	4.1	N/A[1]	N/A[1]	N/A[1]	N/A[1]	1.8	2.6	1.8	2.9	1.9	3.2	1.7	4.1	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Meander Length (ft)		---		---		---		---		---		---		192.2	207.2	179.2	199.8	149.3	171.4	177.0	312.4	N/A[1]	N/A[1]	N/A[1]	N/A[1]	192.2	207.2	179.2	199.8	149.3	171.4	177.0	312.4	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Meander Width Ratio		---		---		---		---		---		---		3.5	4.6	3.1	4.6	2.8	4.3	1.9	5.2	N/A[1]	N/A[1]	N/A[1]	N/A[1]	3.5	4.6	3.1	4.6	2.8	4.3	1.9	5.2	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Substrate, Bed and Transport Parameters																																					
Ri%/Ru%/P%/G%/S%																																					
SC%/Sa%/G%/C%/B%/Be%																																					
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	N/A	0.3/2.8/34.3/167.3/287.3/ >2048				0.5/9.2/13.7/ 100.0/180.0/ 362.0		0.5/3.4/13.3/ 109.5/166.9/ 256.0		0.3/8.0/13.5/33.6/75.9/ 180.0																		0.1/5.6/20.7/ 113.8/171.4/ 362.0		0.1/5.6/28.5/ 151.8/256.0/ 362.0		SC/0.3/11.0/ 222.4/346.7/ 512.0		0.2/0.5/19.0/ 96.0/146.7/ 362.0		0.3/6.4/12.8/45.0 /101.2/ 256.0		0.3/1.8/8.9/ 87.3/137.0/ 1024.0	
Reach Shear Stress (Competency) lb/ft[2]														0.64		0.98		1.76		1.02		1.19		1.50		0.66		1.32		2.17		0.92		1.31		2.03	
Max part size (mm) mobilized at bankfull														49		77		140		80		94		119		29.0		60.0		89.0		42.0	47.0	53.0		94.0	
Stream Power (Capacity) W/m[2]																																					
Additional Reach Parameters																																					
Drainage Area (SM)		1.63		1.68		1.79		2.02		0.16		0.16		1.63		1.68		1.79		2.02		0.16		0.16		1.63		1.68		1.79		2.02		0.16		0.16	
Watershed Impervious Cover Estimate (%)		1%								<1%				1%								<1%				1%								<1%			
Rosgen Classification		F3		F3		F3		F3/G3c		G4c		G4		C3		C3		C3b		C3		B4		B4a		C3		C3		C3b		C3		B4		B4a	
Bankfull Velocity (fps)		4.8	4.9	4.8	4.9	4.8	4.9	4.2	4.3	3.5	5.0	3.5	5.0	3.2		3.9		5.2		3.9		3.8		4.1		3.8		5.6		6.6		4.7	5.1	4.4		6.2	
Bankfull Discharge (cfs)		90.0		90.0		99.0		116.0		19.0		19.0		90.0		90.0		99.0		116.0		19.0		19.00		107		166		151		157	184	17		35	
Q-NFF regression (2-yr)																																					
Q-USGS extrapolation (1.2-yr)	N/A													111				119		130		20		20													
Max Q-Mannings														1,484				N/A		922		1,159															
Valley Slope (ft/ft)		0.0100		0.0120		0.0270		0.0080		0.0240		0.0370		0.0086		0.0150		0.0295		0.0118		0.0335		0.0458		---		---		---		---		---		---		---	
Channel Thalweg Length (ft)		435		876		403		2,291		188		332		444		722		418		1,674		212		257		421		722		418		1,676		212		257	
Sinuosity		1.2		1.2		1.2		1.2		1.1		1.3		1.3		1.2		1.2		1.3		1.1		1.1		1.2		1.2		1.2		1.3		1.1		1.1	
Bankfull/Channel Slope (ft/ft)		0.0130		0.0090		0.0160		0.0190		0.0140		0.0440		0.0069		0.0123		0.0242		0.0076	0.0114	0.0316		0.0425		0.0071		0.0124		0.0249		0.0092		0.0349		0.0407	

1. Pattern data is not applicable for A-type and B-type channels
2. ER for the baseline/monitoring parameters are based on the width of the cross-section, in lieu of assuming the width across the floodplain.
SC: Silt/Clay <0.062 mm diameter particles
(---): Data was not provided
N/A: Not Applicable

Table 9b. Baseline Stream Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

		Pre-Restoration Condition												Design												As-Built/Baseline											
Parameter	**Gage**	**UT2**		**UT2A**		**UT2B**		**UT2C**		**UT3B**		**UT3C**		**UT2**		**UT2A**		**UT2B**		**UT2C**		**UT3B**		**UT3C**		**UT2**		**UT2A**		**UT2B**		**UT2C**		**UT3B**		**UT3C**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																																					
Bankfull Width (ft)		5.3		5.3		5.3		5.3		3.9	5.7	3.9	5.7	3.5		6.0		6.0		6.8		7.0		7.5		N/A		6.8		8.1		7.8		6.9		8.8	
Floodprone Width[2] (ft)		84	112	84	112	84	112	84	112	9	14	9	14	5.0	8.0	8.0	13.0	13.0	30.0	15.0	34.0	10.0	15.0	16.5	37.5	N/A		30.3		32.0		48.2		21.4		55.8	
Bankfull Mean Depth (ft)		1.1	1.4	1.1	1.4	1.1	1.4	1.1	1.4	0.7		0.7		0.2		0.5		0.5		0.5		0.5		0.6		N/A		0.5		0.6		0.7		0.5		0.8	
Bankfull Max Depth (ft)		1.9	2.0	1.9	2.0	1.9	2.0	1.9	2.0	0.8	1.2	0.8	1.2	0.3	0.4	0.5	0.7	0.5	0.7	0.6	0.8	0.6	0.8	0.8	1.0	N/A		0.8		1.1		1.1		0.8		1.3	
Bankfull Cross-sectional Area (ft^2)	N/A	5.7	7.4	5.7	7.4	5.7	7.4	5.7	7.4	2.8	4.1	2.8	4.1	0.9		2.7		2.6		3.2		3.6		4.7		N/A		3.4		4.8		5.8		3.5		6.8	
Width/Depth Ratio		3.7	4.8	3.7	4.8	3.7	4.8	3.7	4.8	5.4	7.8	5.4	7.8	14.2		13.3		13.3		12.9		13.7		12.0		N/A		13.9		11.7		10.5		13.4		11.3	
Entrenchment Ratio[2]		16.0	21.2	16.0	21.2	16.0	21.2	16.0	21.2	1.6	3.5	1.6	3.5	1.4	2.2	2.8	5.7	5.0	7.5	5.1	6.6	3.1	6.0	>2.2		N/A		4.4		3.5		6.2		3.1		6.3	
Bank Height Ratio		1.4	1.9	1.4	1.9	1.4	1.9	1.4	1.9	2.7	3.8	2.7	3.8	1.0												N/A		1.0		1.0		1.0		1.0		1.0	
D_{50} (mm)		SC	0.1	SC	1.1	SC	2.1	SC	3.1	3.6	6.4	3.6	6.4													N/A		58.6		69.3		49.0		21.1		28.2	
Profile																																					
Riffle Length (ft)																																					
Riffle Slope (ft/ft)														0.0457	0.0681	0.0287	0.0414	0.0135	0.0409	0.0135	0.0449	0.0385	0.0488	0.0198	0.0266	N/A		0.0046	0.0347	0.0054	0.0371	0.0132	0.0510	0.0113	0.0530	0.0081	0.0249
Pool Length (ft)	N/A																																				
Pool Max Depth (ft)		---		---		---		---		---		---		1.6		1.3		1.4		1.5		1.6		1.9		N/A		1.4	2.2	1.6	2.2	1.4	2.1	0.9	2.6	1.8	2.5
Pool Spacing (ft)		---		---		---		---		---		---		21.0		22.0	33.0	23.0	44.0	30.0	47.0	24.0	29.0	31.0	58.0	N/A		18.6	39.9	20.5	44.1	26.1	55.9	19.5	30.4	17.4	79.9
Pool Volume (ft^3)																																					
Pattern																																					
Channel Beltwidth (ft)		---		---		---		---		---		---		N/A[1]	N/A[1]	N/A[1]	N/A[1]	19.0	26.0	23.0	34.0	N/A[1]	N/A[1]	17.2	44.8	N/A[1]	N/A[1]	N/A[1]	N/A[1]	19.0	26	23.0	34.0	N/A[1]	N/A[1]	17.2	44.8
Radius of Curvature (ft)		---		---		---		---		---		---		N/A[1]	N/A[1]	N/A[1]	N/A[1]	12.0	15.0	13.0	17.0	N/A[1]	N/A[1]	12.0	22.0	N/A[1]	N/A[1]	N/A[1]	N/A[1]	12.0	15.0	13.0	17.0	N/A[1]	N/A[1]	12.0	22.0
Rc/Bankfull Width	N/A	---		---		---		---		---		---		N/A[1]	N/A[1]	N/A[1]	N/A[1]	2.0	2.5	1.9	2.5	N/A[1]	N/A[1]	1.6	2.9	N/A[1]	N/A[1]	N/A[1]	N/A[1]	2.0	2.5	1.9	2.5	N/A[1]	N/A[1]	1.6	2.9
Meander Length (ft)		---		---		---		---		---		---		N/A[1]	N/A[1]	N/A[1]	N/A[1]	56.0	76.0	73.0	90.0	N/A[1]	N/A[1]	65.2	118.0	N/A[1]	N/A[1]	N/A[1]	N/A[1]	56.0	76.0	73.0	90.0	N/A[1]	N/A[1]	65.2	118.0
Meander Width Ratio		---		---		---		---		---		---		N/A[1]	N/A[1]	N/A[1]	N/A[1]	3.2	4.3	3.3	4.9	N/A[1]	N/A[1]	2.2	6.0	N/A[1]	N/A[1]	N/A[1]	N/A[1]	3.2	4.3	3.3	4.9	N/A[1]	N/A[1]	2.2	6.0
Substrate, Bed and Transport Parameters																																					
Ri%/Ru%/P%/G%/S%																																					
SC%/Sa%/G%/C%/B%/Be%																																					
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	N/A	N/A		SC/0.1/0.2/8.4/12.5/32.0						SC/0.5/5.9/21.0/100.0/256.0																N/A		SC/0.1/0.8/ 64.0/ 85.4/128.0		SC/0.1/1.3/ 85.4/137.0/256.0		SC/0.1/8.9/92.5/ 124.6/256.0		0.8/4.2/9.4/ 64.0/165.3/362.0		0.1/0.3/4.0/73.4/ 148.1/256.0	
Reach Shear Stress (Competency) lb/ft^2														1.06		1.05		0.52		0.38		1.13		0.55		N/A		0.74		0.69		0.59		0.99		0.66	
Max part size (mm) mobilized at bankfull														84		83		40		29		89		42		N/A		36.0		35.0		28.0		50.0		28.0	
Stream Power (Capacity) W/m^2																																					
Additional Reach Parameters																																					
Drainage Area (SM)		0.01		0.05		0.05		0.05		0.07		0.07		0.01		0.04		0.05		0.05		0.07		0.07		0.01		0.04		0.05		0.05		0.07		0.07	
Watershed Impervious Cover Estimate (%)		<1%												<1%												<1%											
Rosgen Classification		G4		G5		G5c		G5		G5		G5c		B4		B4		C4b		C4		B4		C4		B4		B4		C4b		C4		B4		C4	
Bankfull Velocity (fps)		1.9	2.2	1.9	2.2	1.9	2.2	1.9	2.2	4.0	4.2	4.0	4.2	3.0		2.7		2.4		2.2		3.3		2.4		N/A		3.6		3.7		3.3		4.2		3.4	
Bankfull Discharge (cfs)		3.0		7.0		7.0		7.0		12.0		12.0		3.0		7.0		7.0		7.0		12.0		12.0		N/A		12		18		19		15		23	
Q-NFF regression (2-yr)																																					
Q-USGS extrapolation (1.2-yr)	N/A													3		9						11															
Max Q-Mannings														N/A		62						102															
Valley Slope (ft/ft)		0.0640		0.0290		0.0310		0.0190		0.0360		0.0160		0.0731		0.0272		0.0234		0.0179		0.0329		0.0153		---		---		---		---		---		---		---	
Channel Thalweg Length (ft)		61		349		299		223		414		296		42		315		263		469		307		412		42		315		263		469		307		412	
Sinuosity		1.1		1.1		1.2		1.1		1.5		1.2		N/A		1.1		1.2		1.3		1.1		1.2		N/A		1.1		1.2		1.3		1.1		1.2	
Bankfull/Channel Slope (ft/ft)		0.0470		0.0220		0.0170		0.0200		0.0230		0.0170		0.0580		0.0229	0.0387	0.0200		0.0135		0.0304	0.0363	0.0121	0.0146	N/A		0.0237		0.0184		0.0134		0.0317		0.0132	

1. Pattern data is not applicable for A-type and B-type channels
2. ER for the baseline/monitoring parameters are based on the width of the cross-section, in lieu of assuming the width across the floodplain.
SC: Silt/Clay <0.062 mm diameter particles
(---): Data was not provided
N/A: Not Applicable

Table 10. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

	Bull Creek Reach 1A Cross-Section 1, Riffle								Bull Creek Reach 1B Cross-Section 2, Riffle[4]								Bull Creek Reach 1B Cross-Section 3, Pool								Bull Creek Reach 2 Cross-Section 4, Riffle							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation[1]	1106.41	1106.62	1106.65	1106.62					1099.36	1099.30	1099.26	1099.37					1098.70	1098.92	1098.83	1098.85					1088.01	1087.72	1087.70	1087.78				
Low Bank Elevation	1106.41	1106.54	1106.31	1106.23					1099.36	1099.16	1099.24	1099.06					1098.70	1098.92	1098.83	1098.85					1088.01	1088.08	1087.60	1087.90				
Bankfull Width (ft)	19.4	20.6	16.1	15.4					17.3	17.2	18.4	16.3					24.4	30.4	30.1	30.4					16.4	17.9	15.6	16.3				
Floodprone Width (ft)[2]	70.1	70.0	69.5	69.5					67.6	67.6	66.2	67.5					-	-	-	-					55.7	55.6	55.6	55.6				
Bankfull Mean Depth (ft)	1.5	1.3	1.4	1.4					1.7	1.6	1.6	1.5					2.3	2.8	2.7	2.7					1.4	1.6	1.4	1.5				
Bankfull Max Depth (ft)	2.8	2.8	2.5	2.6					2.9	2.7	3.0	2.6					5.3	6.0	5.9	5.7					2.5	2.9	2.3	2.6				
Bankfull Cross-Sectional Area (ft^2)	28.2	26.7	22.6	22.0					29.7	27.3	29.3	24.4					56.8	84.5	79.9	83.0					22.9	29.0	21.3	25.1				
Bankfull Width/Depth Ratio	13.4	16.0	11.5	10.8					10.1	10.8	11.6	11.0					10.5	10.9	11.3	11.2					11.8	11.0	11.4	10.6				
Bankfull Entrenchment Ratio[3]	3.6	3.4	4.3	4.5					3.9	3.9	3.6	4.1					-	-	-	-					3.4	3.1	3.6	3.4				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9	0.9					1.0	1.0	1.0	0.9					-	-	-	-					1.0	1.1	1.0	1.0				

	Bull Creek Reach 3 Cross-Section 5, Pool								Bull Creek Reach 3 Cross-Section 6, Riffle								Bull Creek Reach 3 Cross-Section 7, Riffle								Bull Creek Reach 3 Cross-Section 8, Pool							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation[1]	1079.64	1079.57	1079.48	1079.60					1079.35	1079.51	1079.46	1079.53					1073.27	1072.90	1072.76	1072.88					1068.53	1068.20	1067.99	1067.45				
Low Bank Elevation	1079.64	1079.57	1079.48	1079.60					1079.35	1079.42	1079.33	1079.42					1073.27	1072.62	1072.37	1072.36					1068.53	1068.20	1067.99	1067.45				
Bankfull Width (ft)	27.0	26.2	26.7	27.5					21.2	21.4	20.9	21.0					19.6	23.5	21.3	18.4					29.3	32.2	22.2	20.1				
Floodprone Width (ft)[2]	-	-	-	-					99.0	99.0	98.9	98.6					84.0	84.0	84.0	83.9					-	-	-	-				
Bankfull Mean Depth (ft)	1.8	1.9	1.8	1.9					1.6	1.5	1.5	1.5					1.8	1.2	1.3	1.4					1.9	1.4	1.9	1.5				
Bankfull Max Depth (ft)	3.7	4.8	4.8	5.0					2.7	2.4	2.3	2.4					3.0	2.5	2.5	2.3					4.3	3.8	3.9	3.2				
Bankfull Cross-Sectional Area (ft^2)	49.0	50.3	48.8	51.3					33.5	31.7	30.7	31.1					36.0	29.2	27.7	25.8					55.1	45.7	42.3	30.6				
Bankfull Width/Depth Ratio	14.9	13.6	14.6	14.8					13.4	14.5	14.3	14.2					10.7	18.9	16.5	13.1					15.6	22.7	11.6	13.2				
Bankfull Entrenchment Ratio[3]	-	-	-	-					4.7	4.6	4.7	4.7					4.3	3.6	3.9	4.6					-	-	-	-				
Bankfull Bank Height Ratio[1]	-	-	-	-					1.0	1.0	0.9	1.0					1.0	0.9	0.9	0.8					-	-	-	-				

	UT1B Cross-Section 9, Riffle								UT1C Cross-Section 10, Riffle								UT2A Cross-Section 11, Riffle								UT2B Cross-Section 12, Riffle							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation[1]	1101.94	1102.09	1102.13	1102.01					1089.27	1088.91	1088.90	1088.97					1096.25	1096.44	1096.48	1096.43					1088.43	1088.53	1088.49	1088.51				
Low Bank Elevation	1101.94	1102.05	1101.93	1102.29					1089.27	1089.29	1089.21	1089.27					1096.25	1096.40	1096.43	1096.36					1088.43	1088.57	1088.45	1088.46				
Bankfull Width (ft)	6.8	6.3	5.8	7.4					6.9	6.4	7.3	6.6					6.8	7.3	8.2	7.3					8.1	8.8	8.5	7.8				
Floodprone Width (ft)[2]	23.6	26.9	18.8	33.7					34.0	35.4	34.9	35.2					30.3	31.4	30.0	29.0					32.0	30.9	28.0	29.8				
Bankfull Mean Depth (ft)	0.6	0.6	0.5	0.8					0.8	1.2	1.1	1.1					0.5	0.4	0.4	0.4					0.6	0.5	0.5	0.5				
Bankfull Max Depth (ft)	0.9	1.2	0.9	1.5					1.3	1.9	1.9	1.9					0.8	0.7	0.6	0.7					1.1	1.0	0.9	1.0				
Bankfull Cross-Sectional Area (ft^2)	3.9	3.7	2.6	5.8					5.7	8.0	7.7	7.5					3.4	3.1	3.0	2.9					4.8	4.5	3.9	3.8				
Bankfull Width/Depth Ratio	11.7	10.8	12.8	9.5					8.3	5.2	6.9	5.8					13.9	17.3	22.5	18.6					13.4	17.1	18.6	15.8				
Bankfull Entrenchment Ratio[3]	3.5	4.3	3.2	4.6					4.9	5.5	4.8	5.3					4.4	4.3	3.6	4.0					4.0	3.5	3.3	3.8				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.8	1.2					1.0	1.3	1.2	1.2					1.0	0.9	0.9	0.9					1.0	1.0	1.0	1.0				

	UT2C Cross-Section 13, Riffle								UT3B Cross-Section 14, Riffle								UT3C Cross-Section 15, Riffle							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Bankfull Elevation[1]	1081.59	1081.67	1081.59	1081.67					1084.57	1084.34	1084.52	1084.68					1081.13	1081.26	1081.24	1081.33				
Low Bank Elevation	1081.59	1081.68	1081.48	1081.61					1084.57	1084.80	1084.74	1084.73					1081.13	1081.21	1081.07	1081.20				
Bankfull Width (ft)	7.8	8.2	7.7	7.8					6.9	7.4	6.9	6.8					8.8	8.4	7.9	8.0				
Floodprone Width (ft)[2]	48.2	50.0	46.1	48.4					21.4	61.3	43.6	29.7					55.8	55.8	55.4	55.6				
Bankfull Mean Depth (ft)	0.7	0.7	0.6	0.7					0.5	0.8	0.7	0.6					0.8	0.8	0.7	0.7				
Bankfull Max Depth (ft)	1.1	1.2	1.1	1.1					0.8	1.7	1.3	1.0					1.3	1.4	1.3	1.4				
Bankfull Cross-Sectional Area (ft^2)	5.8	5.8	5.0	5.3					3.5	6.1	4.8	3.8					6.8	6.4	5.4	5.7				
Bankfull Width/Depth Ratio	10.5	11.6	12.0	11.5					13.4	8.9	9.9	12.1					11.3	11.1	11.5	11.1				
Bankfull Entrenchment Ratio[3]	6.2	6.1	6.0	6.2					3.1	8.3	6.3	4.4					6.3	6.6	7.0	7.0				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9	1.0					1.0	1.4	1.2	1.0					1.0	1.0	0.9	0.9				

[1]Bankfull elevation for riffles are based on the MY0 cross-sectional area. MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.
[2]Floodprone width is calculated from the width of cross-section but valley width may extend further.
[3]ER for the baseline/monitoring parameters is based on the width of the cross-section, in lieu of assuming the width across the floodplain.
[4]Repairs conducted during MY1 resulted in a slight shift in the cross-section alignment between the MY0 and MY1 cross-section pin locations; therefore the plot was adjusted so that cross-sections lined up for easier comparison.

Table 11a. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Bull Creek Reach 1A

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[1]																
Bankfull Width (ft)	19.4		20.6		16.1		15.4									
Floodprone Width (ft)	70		70		70		70									
Bankfull Mean Depth (ft)	1.5		1.3		1.4		1.4									
Bankfull Max Depth (ft)	2.8		2.8		2.5		2.6									
Bankfull Cross-sectional Area (ft^2)	28.2		26.7		22.6		22.0									
Width/Depth Ratio	13.4		16.0		11.5		10.8									
Entrenchment Ratio	3.6		3.4		4.3		4.5									
Bank Height Ratio	1.0		1.0		0.9		0.9									
D_{50} (mm)	107.3															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.005	0.014														
Pool Length (ft)																
Pool Max Depth (ft)	4.3	5.0														
Pool Spacing (ft)	230.4															
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	68.8	89.4														
Radius of Curvature (ft)	35.0	50.0														
Rc/Bankfull Width (ft/ft)	1.8	2.6														
Meander Length (ft)	192.2	207.2														
Meander Width Ratio	3.5	4.6														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.1/5.6/20.7/113.8/171.4/362.0		0.1/0.2/11.0/120.1/174.0/512.0		SC/0.2/1.0/114.7/171.4/362.0											
Reach Shear Stress (Competency) lb/ft^2	0.66															
Max part size (mm) mobilized at bankfull	29.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	1.63															
Watershed Impervious Cover Estimate (%)	1%															
Rosgen Classification	C3															
Bankfull Velocity (fps)	3.8															
Bankfull Discharge (cfs)	107.0															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	421															
Sinuosity	1.20															
Bankfull/Channel Slope (ft/ft)	0.0071															

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11b. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Bull Creek Reach 1B

Parameter	As-Built/Baseline		MY1[2]		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[1]																
Bankfull Width (ft)	17.3		17.2		18.4		16.3									
Floodprone Width (ft)	68		68		66		68									
Bankfull Mean Depth (ft)	1.7		1.6		1.6		1.5									
Bankfull Max Depth (ft)	2.9		2.7		3.0		2.6									
Bankfull Cross-sectional Area (ft^2)	29.7		27.3		29.3		24.4									
Width/Depth Ratio	10.1		10.8		11.6		11.0									
Entrenchment Ratio	3.9		3.9		3.6		4.1									
Bank Height Ratio	1.0		1.0		1.0		0.9									
D_{50} (mm)	82.2															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.013	0.026														
Pool Length (ft)																
Pool Max Depth (ft)	3.1	4.6														
Pool Spacing (ft)	76.6	110.1														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	53.4	81.3														
Radius of Curvature (ft)	32.0	50.0														
Rc/Bankfull Width (ft/ft)	1.8	2.9														
Meander Length (ft)	179.2	199.8														
Meander Width Ratio	3.1	4.6														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.1/5.6/28.5/ 151.8/256.0/ 362.0		0.1/0.3/37.9/168.1/304.4 /512.0		0.1/0.4/2.0/148.1/234.4/ 512.0											
Reach Shear Stress (Competency) lb/ft^2	1.32															
Max part size (mm) mobilized at bankfull	60.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	1.68															
Watershed Impervious Cover Estimate (%)	1%															
Rosgen Classification	C3															
Bankfull Velocity (fps)	5.6															
Bankfull Discharge (cfs)	166															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	722															
Sinuosity	1.22															
Bankfull/Channel Slope (ft/ft)	0.0124															

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

[2]Repairs conducted during MY1 resulted in a slight shift in the cross-section alignment between the cross-section pins; therefore the plot was adjusted so that cross-sectional areas lined up for easier comparison.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11c. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Bull Creek Reach 2

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[1]																
Bankfull Width (ft)	16.4		17.9		15.6		16.3									
Floodprone Width (ft)	56		56		56		56									
Bankfull Mean Depth (ft)	1.4		1.6		1.4		1.5									
Bankfull Max Depth (ft)	2.5		2.9		2.3		2.6									
Bankfull Cross-sectional Area (ft^2)	22.9		29.0		21.3		25.1									
Width/Depth Ratio	11.8		11.0		11.4		10.6									
Entrenchment Ratio	3.4		3.1		3.6		3.4									
Bank Height Ratio	1.0		1.1		1.0		1.0									
D_{50} (mm)	135.9															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.027	0.038														
Pool Length (ft)																
Pool Max Depth (ft)	3.3	4.2														
Pool Spacing (ft)	59.3	99.2														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	45.0	69.2														
Radius of Curvature (ft)	30.0	50.5														
Rc/Bankfull Width (ft/ft)	1.9	3.2														
Meander Length (ft)	149.3	171.4														
Meander Width Ratio	2.8	4.3														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	SC/0.3/11.0/ 222.4/346.7/ 512.0		SC/0.4/32.0/118.0/256.0 /1024.0		0.1/0.5/1.8/222.4/326.3 /1024.0											
Reach Shear Stress (Competency) lb/ft^2	2.17															
Max part size (mm) mobilized at bankfull	89.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	1.79															
Watershed Impervious Cover Estimate (%)	1%															
Rosgen Classification	C3b															
Bankfull Velocity (fps)	6.6															
Bankfull Discharge (cfs)	151															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	418															
Sinuosity	1.22															
Bankfull/Channel Slope (ft/ft)	0.0249															

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11d. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Bull Creek Reach 3

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[1]																
Bankfull Width (ft)	19.6	21.2	21.4	23.5	20.9	21.3	18.4	21.0								
Floodprone Width (ft)	94	99	84	99	84	99	84	99								
Bankfull Mean Depth (ft)	1.6	1.8	1.2	1.5	1.3	1.5	1.4	1.5								
Bankfull Max Depth (ft)	2.7	3.0	2.4	2.5	2.3	2.5	2.3	2.4								
Bankfull Cross-sectional Area (ft^2)	33.5	36.0	29.2	31.7	27.7	30.7	25.8	31.1								
Width/Depth Ratio	10.7	13.4	14.5	18.9	14.3	16.5	13.1	14.2								
Entrenchment Ratio	4.3	4.7	3.6	4.6	3.9	4.7	4.6	4.7								
Bank Height Ratio	1.0	1.0	0.9	1.0	0.9	0.9	0.8	1.0								
D_{50} (mm)	56.4	56.9														
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.004	0.020														
Pool Length (ft)																
Pool Max Depth (ft)	3.0	5.4														
Pool Spacing (ft)	60.8	187.8														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	39.0	108.4														
Radius of Curvature (ft)	36.0	85.6														
Rc/Bankfull Width (ft/ft)	1.7	4.1														
Meander Length (ft)	177.0	312.4														
Meander Width Ratio	1.9	5.2														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.2/0.5/19.0/ 96.0/146.7/ 362.0		0.1/0.2/22.6/143.4/ 256.0/512.0		0.2/0.5/26.9/125.2/180.0 /362.0											
Reach Shear Stress (Competency) lb/ft^2	0.92															
Max part size (mm) mobilized at bankfull	42.0	47.0														
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	2.02															
Watershed Impervious Cover Estimate (%)	1%															
Rosgen Classification	C3															
Bankfull Velocity (fps)	4.7	5.1														
Bankfull Discharge (cfs)	157	184														
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	1,676															
Sinuosity	1.28															
Bankfull/Channel Slope (ft/ft)	0.0092															

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11e. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

UT1B

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[2]																
Bankfull Width (ft)	6.8		6.3		5.8		7.4									
Floodprone Width (ft)	24		27		19		34									
Bankfull Mean Depth (ft)	0.6		0.6		0.5		0.8									
Bankfull Max Depth (ft)	0.9		1.2		0.9		1.5									
Bankfull Cross-sectional Area (ft^2)	3.9		3.7		2.6		5.8									
Width/Depth Ratio	11.7		10.8		12.8		9.5									
Entrenchment Ratio	3.5		4.3		3.2		4.6									
Bank Height Ratio	1.0		1.0		0.8		1.2									
D_{50} (mm)	33.9															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.029	0.060														
Pool Length (ft)																
Pool Max Depth (ft)	0.9	2.0														
Pool Spacing (ft)	19.9	63.0														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	N/A[1]	N/A[1]														
Radius of Curvature (ft)	N/A[1]	N/A[1]														
Rc/Bankfull Width (ft/ft)	N/A[1]	N/A[1]														
Meander Length (ft)	N/A[1]	N/A[1]														
Meander Width Ratio	N/A[1]	N/A[1]														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.3/6.4/12.8/45.0/101.2 / 256.0		0.3/8.0/22.6/69.0/113.8 /180.0		0.4/1.7/16.7/65.7/87.7/ 256.0											
Reach Shear Stress (Competency) lb/ft^2	1.31															
Max part size (mm) mobilized at bankfull	53.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.16															
Watershed Impervious Cover Estimate (%)	<1%															
Rosgen Classification	B4															
Bankfull Velocity (fps)	4.4															
Bankfull Discharge (cfs)	17															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	212															
Sinuosity	1.10															
Bankfull/Channel Slope (ft/ft)	0.0349															

[1]Pattern data is not applicable for A-type and B-type channels

[2]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11f. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

UT1C

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[2]																
Bankfull Width (ft)	6.9		6.4		7.3		6.6									
Floodprone Width (ft)	34		35		35		35									
Bankfull Mean Depth (ft)	0.8		1.2		1.1		1.1									
Bankfull Max Depth (ft)	1.3		1.9		1.9		1.9									
Bankfull Cross-sectional Area (ft^2)	5.7		8.0		7.7		7.5									
Width/Depth Ratio	8.3		5.2		6.9		5.8									
Entrenchment Ratio	4.9		5.5		4.8		5.3									
Bank Height Ratio	1.0		1.3		1.2		1.2									
D_{50} (mm)	56.2															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.011	0.053														
Pool Length (ft)																
Pool Max Depth (ft)	1.2	2.4														
Pool Spacing (ft)	18.2	51.5														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	N/A[1]	N/A[1]														
Radius of Curvature (ft)	N/A[1]	N/A[1]														
Rc/Bankfull Width (ft/ft)	N/A[1]	N/A[1]														
Meander Length (ft)	N/A[1]	N/A[1]														
Meander Width Ratio	N/A[1]	N/A[1]														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.3/1.8/8.9/ 87.3/137.0/ 1024.0		0.3/2.0/17.7/83.2/128.0 /180.0		0.1/1.8/14.4/84.1/137.0/ 362.0											
Reach Shear Stress (Competency) lb/ft^2	2.03															
Max part size (mm) mobilized at bankfull	94.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.16															
Watershed Impervious Cover Estimate (%)	<1%															
Rosgen Classification	B4a															
Bankfull Velocity (fps)	6.2															
Bankfull Discharge (cfs)	35															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	257															
Sinuosity	1.10															
Bankfull/Channel Slope (ft/ft)	0.0407															

[1]Pattern data is not applicable for A-type and B-type channels

[2]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11g. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

UT2A

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[2]																
Bankfull Width (ft)	6.8		7.3		8.2		7.3									
Floodprone Width (ft)	30		31		30		29									
Bankfull Mean Depth (ft)	0.5		0.4		0.4		0.4									
Bankfull Max Depth (ft)	0.8		0.7		0.6		0.7									
Bankfull Cross-sectional Area (ft^2)	3.4		3.1		3.0		2.9									
Width/Depth Ratio	13.9		17.3		22.5		18.6									
Entrenchment Ratio	4.4		4.3		3.6		4.0									
Bank Height Ratio	1.0		0.9		0.9		0.9									
D_{50} (mm)	58.6															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.005	0.035														
Pool Length (ft)																
Pool Max Depth (ft)	1.4	2.2														
Pool Spacing (ft)	18.6	39.9														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	N/A[1]	N/A[1]														
Radius of Curvature (ft)	N/A[1]	N/A[1]														
Rc/Bankfull Width (ft/ft)	N/A[1]	N/A[1]														
Meander Length (ft)	N/A[1]	N/A[1]														
Meander Width Ratio	N/A[1]	N/A[1]														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	SC/0.1/0.8/ 64.0/ 85.4/128.0		0.2/0.4/11.0/62.0/111.2 /180.0		SC/0.2/8.0/94.6/124.8/ 180.0											
Reach Shear Stress (Competency) lb/ft^2	0.74															
Max part size (mm) mobilized at bankfull	36.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.04															
Watershed Impervious Cover Estimate (%)	<1%															
Rosgen Classification	B4															
Bankfull Velocity (fps)	3.6															
Bankfull Discharge (cfs)	12															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	315															
Sinuosity	1.10															
Bankfull/Channel Slope (ft/ft)	0.0237															

[1]Pattern data is not applicable for A-type and B-type channels

[2]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11h. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

UT2B

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[1]																
Bankfull Width (ft)	8.1		8.8		8.5		7.8									
Floodprone Width (ft)	32		31		28		30									
Bankfull Mean Depth (ft)	0.6		0.5		0.5		0.5									
Bankfull Max Depth (ft)	1.1		1.0		0.9		1.0									
Bankfull Cross-sectional Area (ft^2)	4.8		4.5		3.9		3.8									
Width/Depth Ratio	11.7		17.1		18.6		15.8									
Entrenchment Ratio	3.5		3.5		3.3		3.8									
Bank Height Ratio	1.0		1.0		1.0		1.0									
D_{50} (mm)	69.3															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.005	0.037														
Pool Length (ft)																
Pool Max Depth (ft)	1.6	2.2														
Pool Spacing (ft)	20.5	44.1														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	19.0	26.0														
Radius of Curvature (ft)	12.0	15.0														
Rc/Bankfull Width (ft/ft)	2.0	2.5														
Meander Length (ft)	56.0	76.0														
Meander Width Ratio	3.2	4.3														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	SC/0.1/1.3/ 85.4/137.0/256.0		SC/0.1/0.4/77.1/121.7/ 180.0		SC/1.1/4.7/59.6/137.0/ 256.0											
Reach Shear Stress (Competency) lb/ft^2	0.69															
Max part size (mm) mobilized at bankfull	35.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.05															
Watershed Impervious Cover Estimate (%)	<1%															
Rosgen Classification	C4b															
Bankfull Velocity (fps)	3.7															
Bankfull Discharge (cfs)	18															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	263															
Sinuosity	1.20															
Bankfull/Channel Slope (ft/ft)	0.0184															

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11i. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

UT2C

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[1]																
Bankfull Width (ft)	7.8		8.2		7.7		7.8									
Floodprone Width (ft)	48		50		46		48									
Bankfull Mean Depth (ft)	0.7		0.7		0.6		0.7									
Bankfull Max Depth (ft)	1.1		1.2		1.1		1.1									
Bankfull Cross-sectional Area (ft^2)	5.8		5.8		5.0		5.3									
Width/Depth Ratio	10.5		11.6		12.0		11.5									
Entrenchment Ratio	6.2		6.1		6.0		6.2									
Bank Height Ratio	1.0		1.0		0.9		1.0									
D_{50} (mm)	49.0															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.013	0.051														
Pool Length (ft)																
Pool Max Depth (ft)	1.4	2.1														
Pool Spacing (ft)	26.1	55.9														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	23.0	34.0														
Radius of Curvature (ft)	13.0	17.0														
Rc/Bankfull Width (ft/ft)	1.9	2.5														
Meander Length (ft)	73.0	90.0														
Meander Width Ratio	3.3	4.9														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	SC/0.1/8.9/92.5/124.6/256.0		SC/11.0/24.2/79.2/119.3/256.0		SC/0.2/12.1/75.9/115.2/180.0											
Reach Shear Stress (Competency) lb/ft^2	0.59															
Max part size (mm) mobilized at bankfull	28.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.05															
Watershed Impervious Cover Estimate (%)	<1%															
Rosgen Classification	C4															
Bankfull Velocity (fps)	3.3															
Bankfull Discharge (cfs)	19															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	469															
Sinuosity	1.30															
Bankfull/Channel Slope (ft/ft)	0.0134															

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11j. Monitoring Data - Stream Reach Data Summary
Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

UT3B

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[2]																
Bankfull Width (ft)	6.9		7.4		6.9		6.8									
Floodprone Width (ft)	21		61		44		30									
Bankfull Mean Depth (ft)	0.5		0.8		0.7		0.6									
Bankfull Max Depth (ft)	0.8		1.7		1.3		1.0									
Bankfull Cross-sectional Area (ft^2)	3.5		6.1		4.8		3.8									
Width/Depth Ratio	13.4		8.9		9.9		12.1									
Entrenchment Ratio	3.1		8.3		6.3		4.4									
Bank Height Ratio	1.0		1.4		1.2		1.0									
D_{50} (mm)	21.1															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.011	0.053														
Pool Length (ft)																
Pool Max Depth (ft)	0.9	2.6														
Pool Spacing (ft)	19.5	30.4														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	N/A[1]	N/A[1]														
Radius of Curvature (ft)	N/A[1]	N/A[1]														
Rc/Bankfull Width (ft/ft)	N/A[1]	N/A[1]														
Meander Length (ft)	N/A[1]	N/A[1]														
Meander Width Ratio	N/A[1]	N/A[1]														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.8/4.2/9.4/ 64.0/165.3/362.0		0.7/13.3/27.3/81.3/ 146.7/256.0		SC/1.8/22.6/124.3/202.4 /362.0											
Reach Shear Stress (Competency) lb/ft^2	0.99															
Max part size (mm) mobilized at bankfull	50.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.07															
Watershed Impervious Cover Estimate (%)	<1%															
Rosgen Classification	B4															
Bankfull Velocity (fps)	4.2															
Bankfull Discharge (cfs)	15															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	307															
Sinuosity	1.10															
Bankfull/Channel Slope (ft/ft)	0.0317															

[1]Pattern data is not applicable for A-type and B-type channels

[2]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

(---): Data was not provided

N/A: Not Applicable

Table 11k. Monitoring Data - Stream Reach Data Summary

Key Mill Mitigation Site

DMS Project No. 100025

Monitoring Year 3 - 2022

UT3C

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle[1]																
Bankfull Width (ft)	8.8		8.4		7.9		8.0									
Floodprone Width (ft)	56		56		55		56									
Bankfull Mean Depth (ft)	0.8		0.8		0.7		0.7									
Bankfull Max Depth (ft)	1.3		1.4		1.3		1.4									
Bankfull Cross-sectional Area (ft^2)	6.8		6.4		5.4		5.7									
Width/Depth Ratio	11.3		11.1		11.5		11.1									
Entrenchment Ratio	6.3		6.6		7.0		7.0									
Bank Height Ratio	1.0		1.0		0.9		0.9									
D_{50} (mm)	28.2															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.008	0.025														
Pool Length (ft)																
Pool Max Depth (ft)	1.8	2.5														
Pool Spacing (ft)	17.4	79.9														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	17.2	44.8														
Radius of Curvature (ft)	12.0	22.0														
Rc/Bankfull Width (ft/ft)	1.6	2.9														
Meander Length (ft)	65.2	118.0														
Meander Width Ratio	2.2	6.0														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.1/0.3/4.0/73.4/148.1/256.0		0.1/0.5/19.5/84.6/151.8/1024.0		SC/0.3/0.5/72.7/128.0/180.0											
Reach Shear Stress (Competency) lb/ft^2	0.66															
Max part size (mm) mobilized at bankfull	28.0															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.07															
Watershed Impervious Cover Estimate (%)	<1%															
Rosgen Classification	C4															
Bankfull Velocity (fps)	3.4															
Bankfull Discharge (cfs)	23															
Valley Slope (ft/ft)	---															
Channel Thalweg Length (ft)	412															
Sinuosity	1.20															
Bankfull/Channel Slope (ft/ft)	0.0132															

[1]MY1-MY7 Bank Height Ratio is calculated based on the As-built (MY0) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the current low bank height.

SC: Silt/Clay <0.062 mm diameter particles

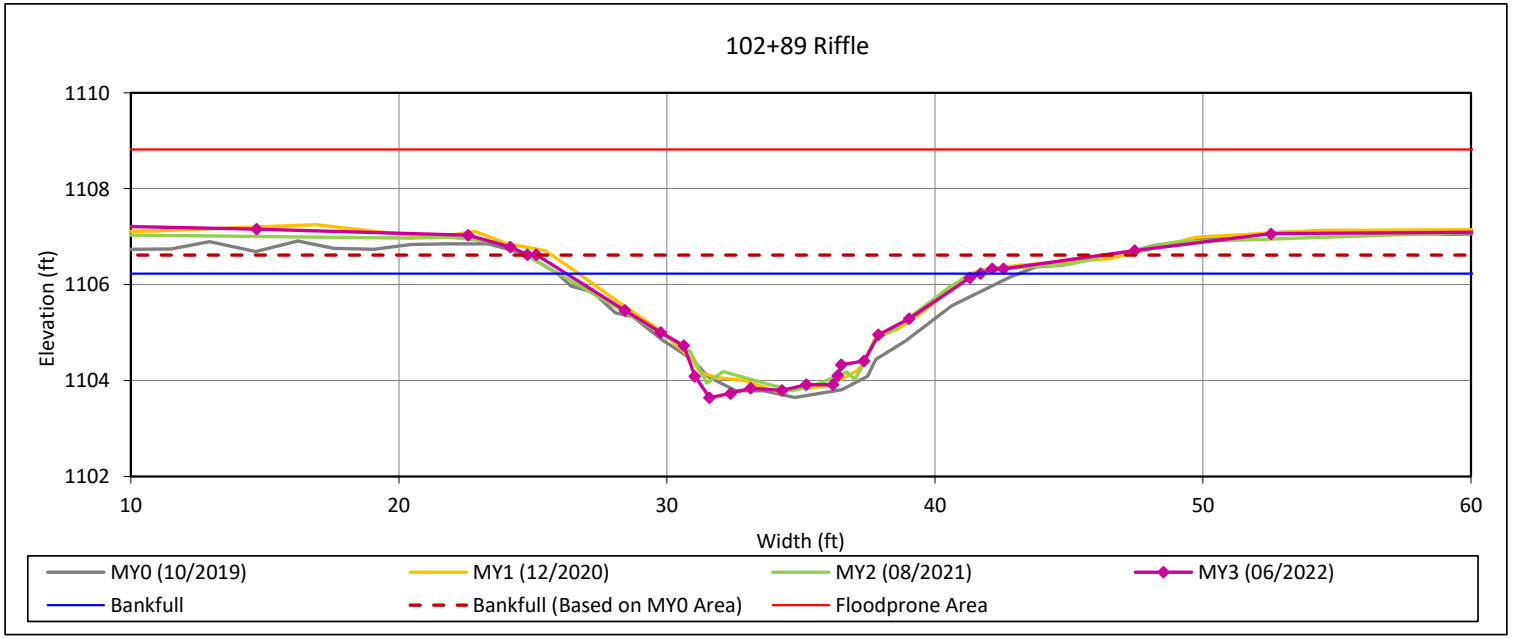
(---): Data was not provided

N/A: Not Applicable

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 1-Bull Creek Reach 1A



Bankfull Dimensions	
22.0	x-section area (ft.sq.)
15.4	width (ft)
1.4	mean depth (ft)
2.6	max depth (ft)
16.9	wetted perimeter (ft)
1.3	hydraulic radius (ft)
10.8	width-depth ratio
69.5	W flood prone area (ft)
4.5	entrenchment ratio
0.9	low bank height ratio

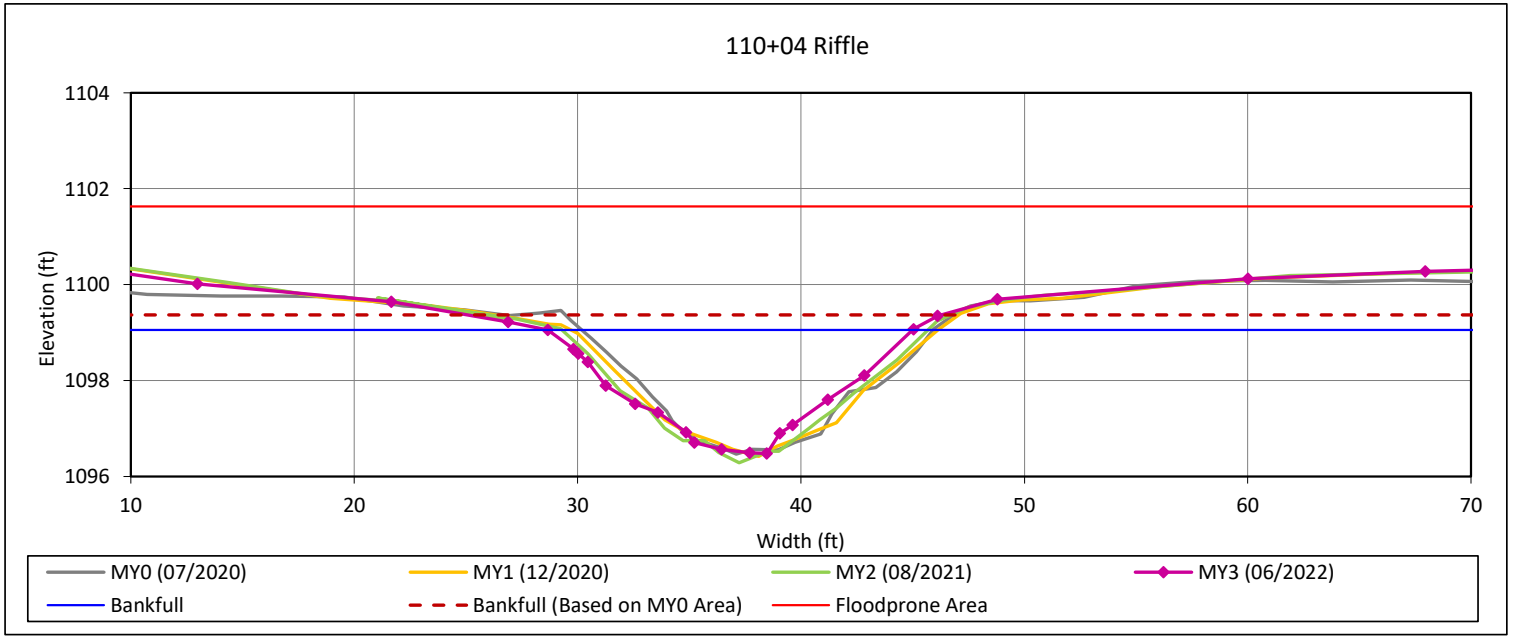
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 2-Bull Creek Reach 1B



Bankfull Dimensions	
24.4	x-section area (ft.sq.)
16.3	width (ft)
1.5	mean depth (ft)
2.6	max depth (ft)
17.3	wetted perimeter (ft)
1.4	hydraulic radius (ft)
11.0	width-depth ratio
67.5	W flood prone area (ft)
4.1	entrenchment ratio
0.9	low bank height ratio

Survey Date: 06/2022
Field Crew: Wildlands Engineering

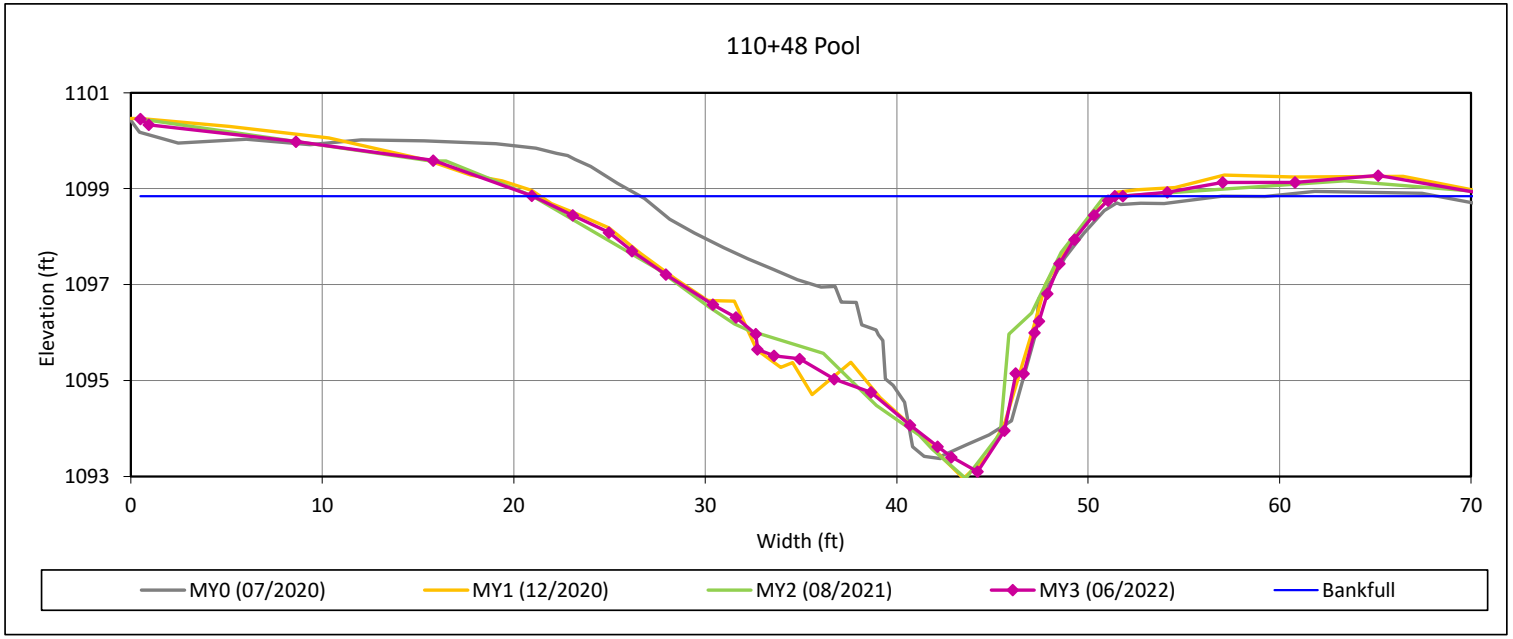
*Repairs conducted during MY1 resulted in a slight shift in the cross-section alignment between the MY0 and MY1 cross-section pin locations; therefore the plot was adjusted so that the cross-sections lined up for easier comparison.

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 3-Bull Creek Reach 1B



Bankfull Dimensions	
83.0	x-section area (ft.sq.)
30.4	width (ft)
2.7	mean depth (ft)
5.7	max depth (ft)
33.8	wetted perimeter (ft)
2.5	hydraulic radius (ft)
11.2	width-depth ratio

Survey Date: 06/2022
Field Crew: Wildlands Engineering

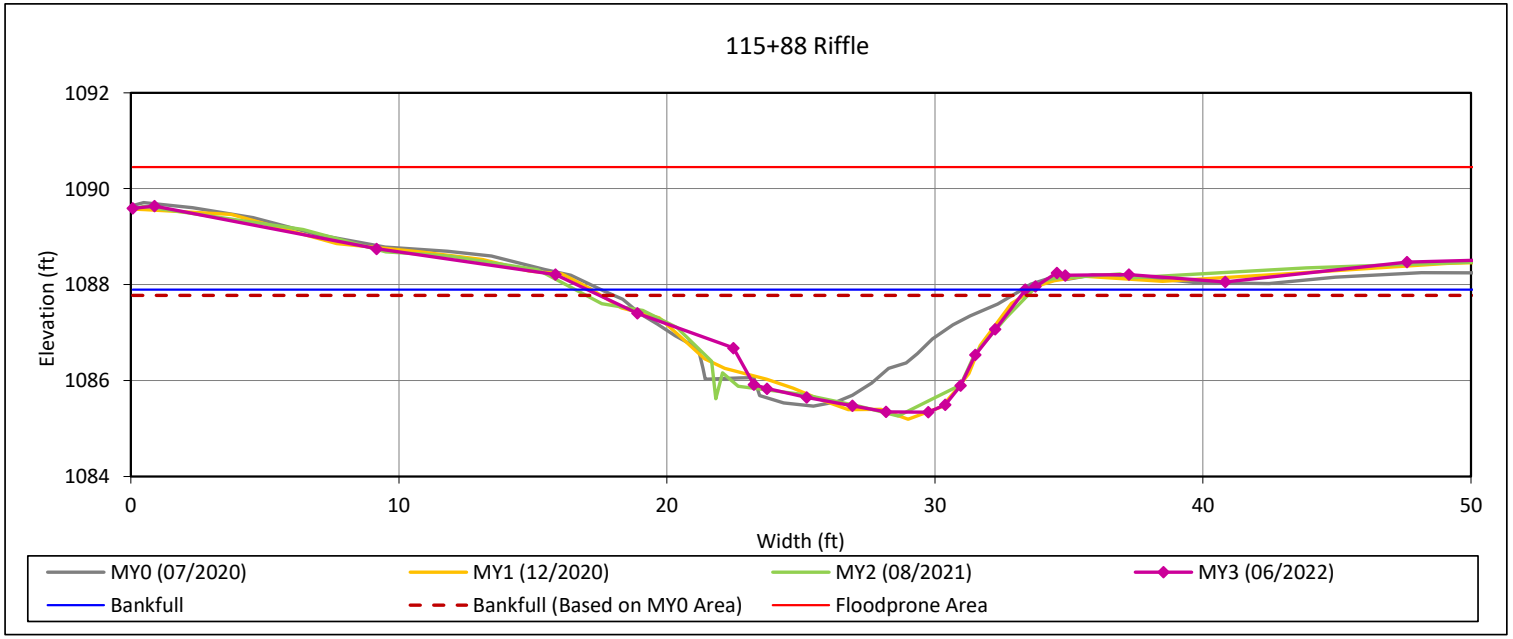
*Repairs were conducted on the left bank of XS3 during MY1 prior to the collection of the MY1 cross-section data and photos. The MY1 plot line shows the repaired cross -sectional profile. Also the station number for XS3 was incorrectly reported on the MY0 cross-section plot, it should have been reported as Station 110+48 as shown in the above plot.

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 4-Bull Creek Reach 2



Bankfull Dimensions	
25.1	x-section area (ft.sq.)
16.3	width (ft)
1.5	mean depth (ft)
2.6	max depth (ft)
17.7	wetted perimeter (ft)
1.4	hydraulic radius (ft)
10.6	width-depth ratio
55.6	W flood prone area (ft)
3.4	entrenchment ratio
1.0	low bank height ratio
Survey Date:	06/2022
Field Crew:	Wildlands Engineering

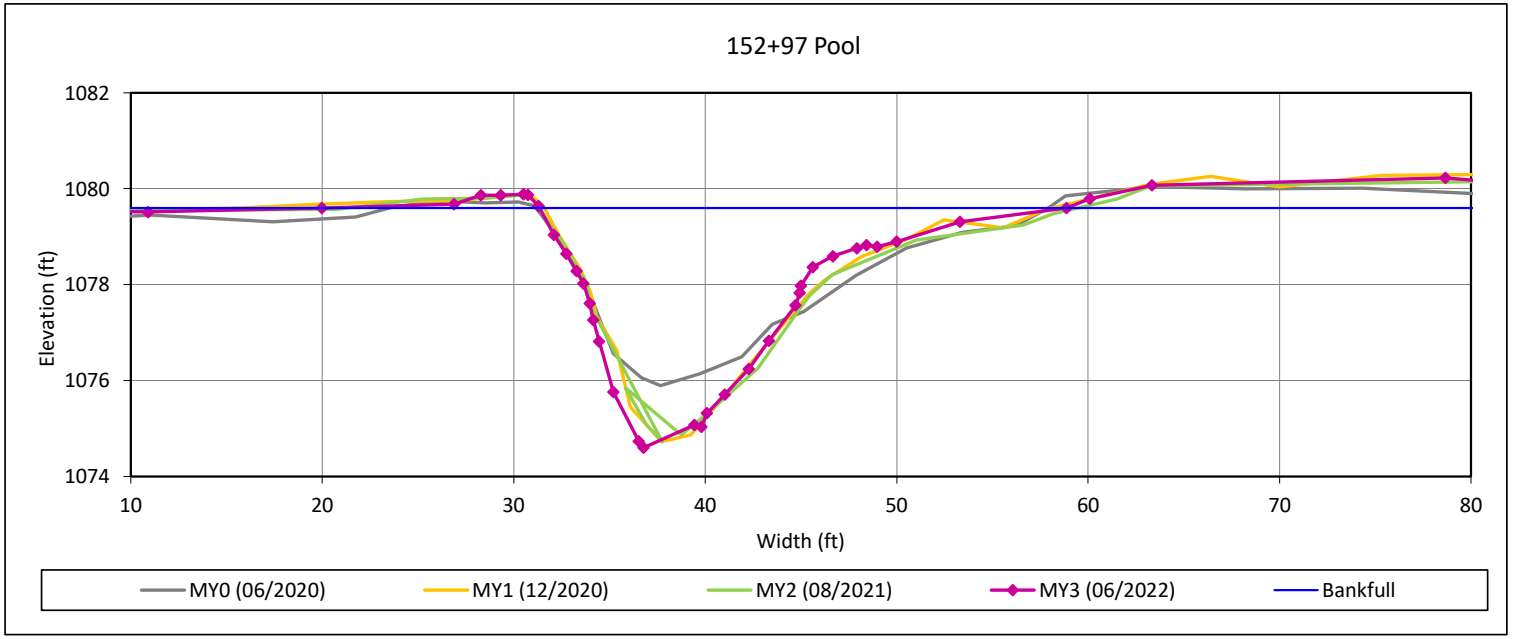
*Repairs were conducted on the right bank of XS4 during MY1 prior to the collection of the MY1 cross-section data and photos. The MY1 plot line shows the repaired cross-sectional profile. Also the station number for XS4 was incorrectly reported on the MY0 cross-section plot, it should have been reported as Station 115+88 as shown in the above plot.

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 5-Bull Creek Reach 3



Bankfull Dimensions	
51.3	x-section area (ft.sq.)
27.5	width (ft)
1.9	mean depth (ft)
5.0	max depth (ft)
30.7	wetted perimeter (ft)
1.7	hydraulic radius (ft)
14.8	width-depth ratio

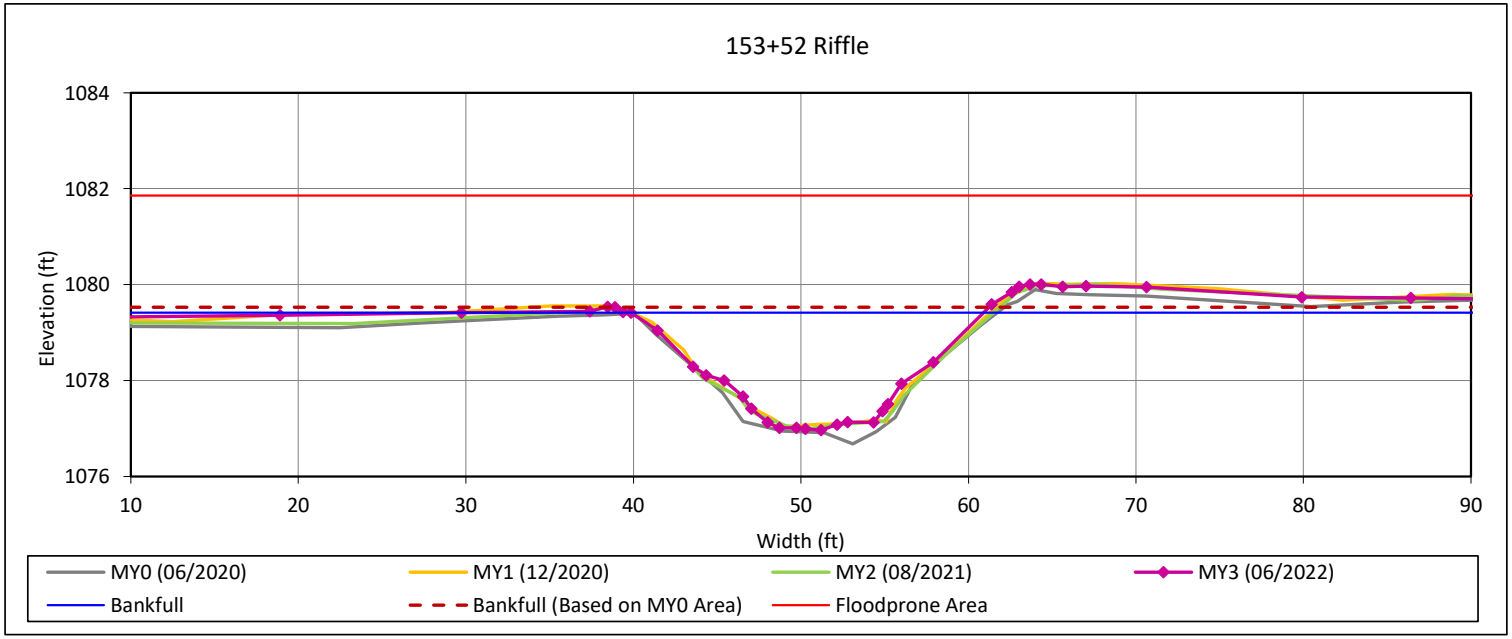
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 6-Bull Creek Reach 3



Bankfull Dimensions	
31.1	x-section area (ft.sq.)
21.0	width (ft)
1.5	mean depth (ft)
2.4	max depth (ft)
21.8	wetted perimeter (ft)
1.4	hydraulic radius (ft)
14.2	width-depth ratio
98.6	W flood prone area (ft)
4.7	entrenchment ratio
1.0	low bank height ratio

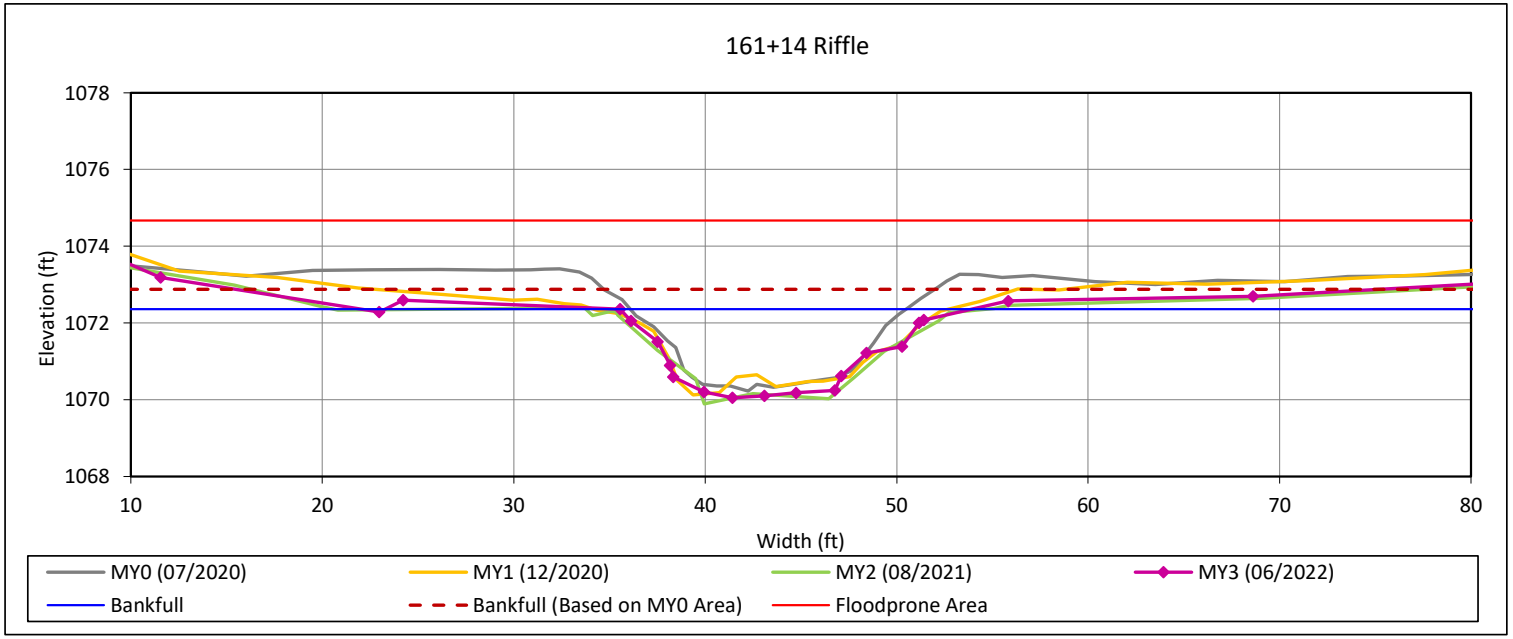
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 7-Bull Creek Reach 3



Bankfull Dimensions	
25.8	x-section area (ft.sq.)
18.4	width (ft)
1.4	mean depth (ft)
2.3	max depth (ft)
19.6	wetted perimeter (ft)
1.3	hydraulic radius (ft)
13.1	width-depth ratio
83.9	W flood prone area (ft)
4.6	entrenchment ratio
0.8	low bank height ratio

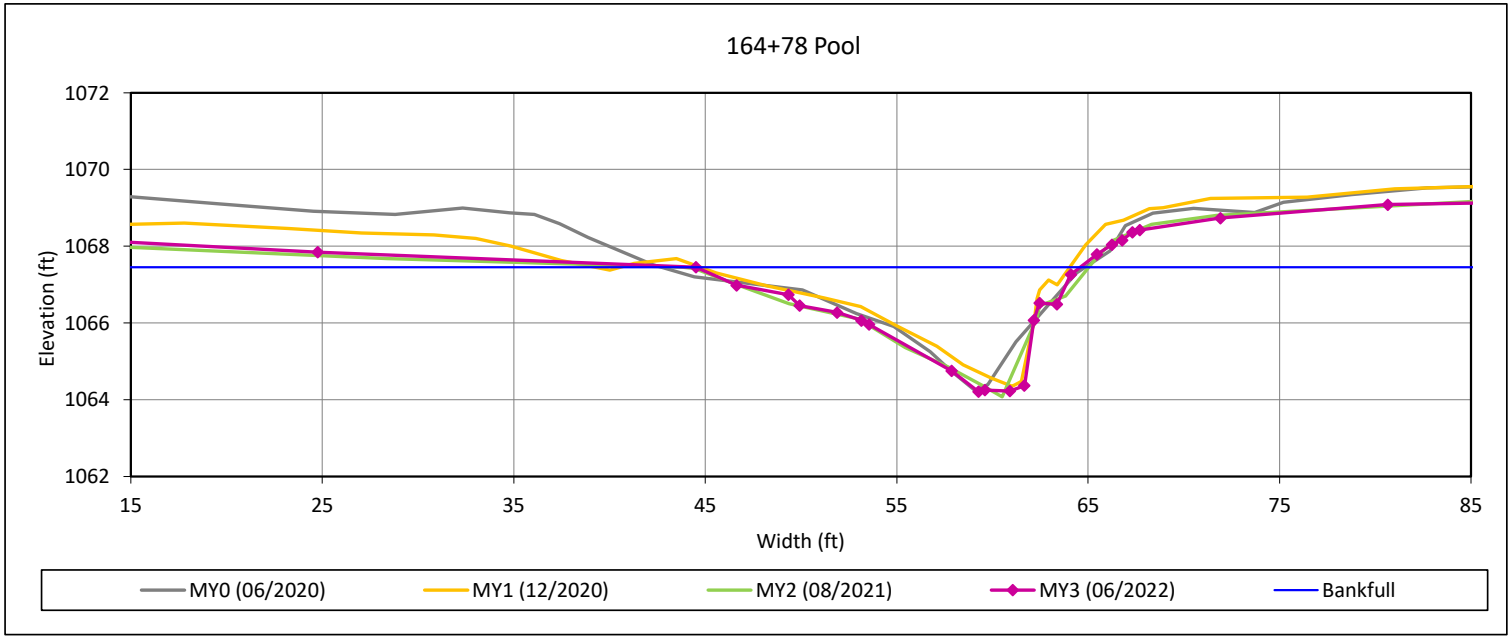
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 8-Bull Creek Reach 3



Bankfull Dimensions	
30.6	x-section area (ft.sq.)
20.1	width (ft)
1.5	mean depth (ft)
3.2	max depth (ft)
22.4	wetted perimeter (ft)
1.4	hydraulic radius (ft)
13.2	width-depth ratio

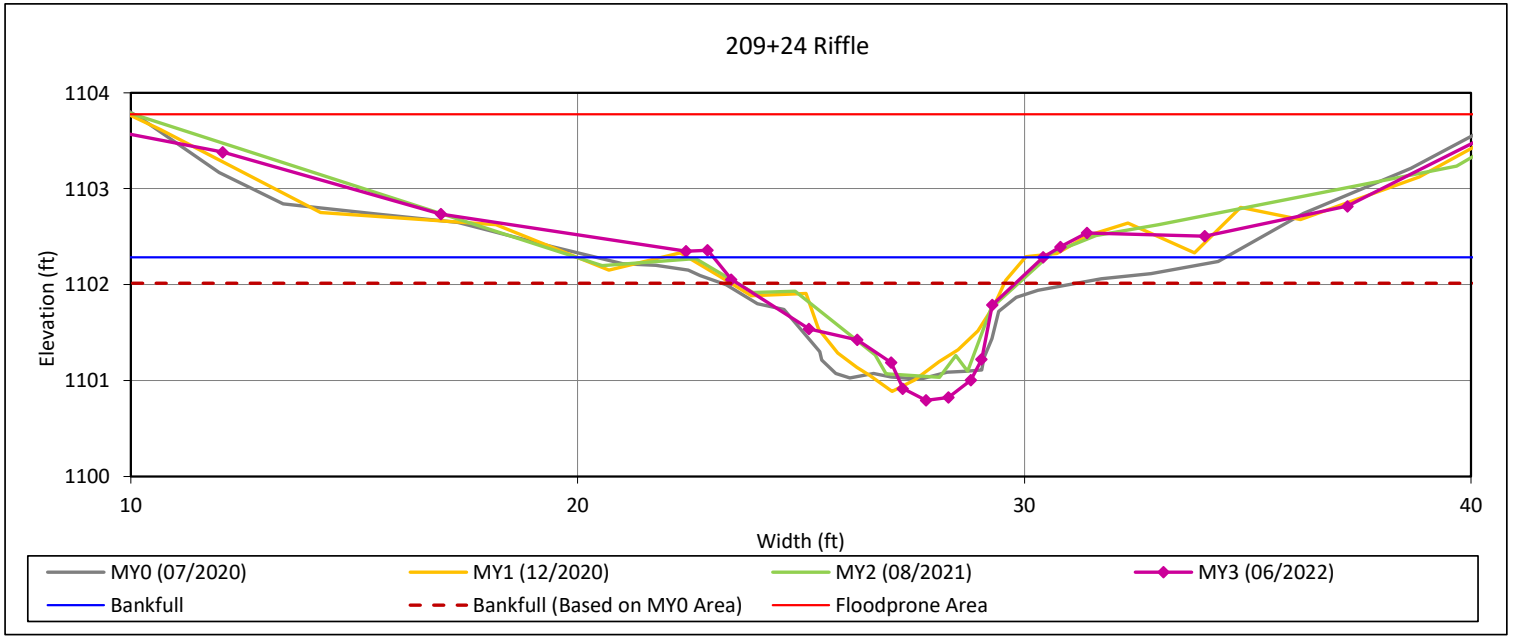
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 9-UT1B



Bankfull Dimensions	
5.8	x-section area (ft.sq.)
7.4	width (ft)
0.8	mean depth (ft)
1.5	max depth (ft)
8.3	wetted perimeter (ft)
0.7	hydraulic radius (ft)
9.5	width-depth ratio
33.7	W flood prone area (ft)
4.6	entrenchment ratio
1.2	low bank height ratio

Survey Date: 06/2022
Field Crew: Wildlands Engineering

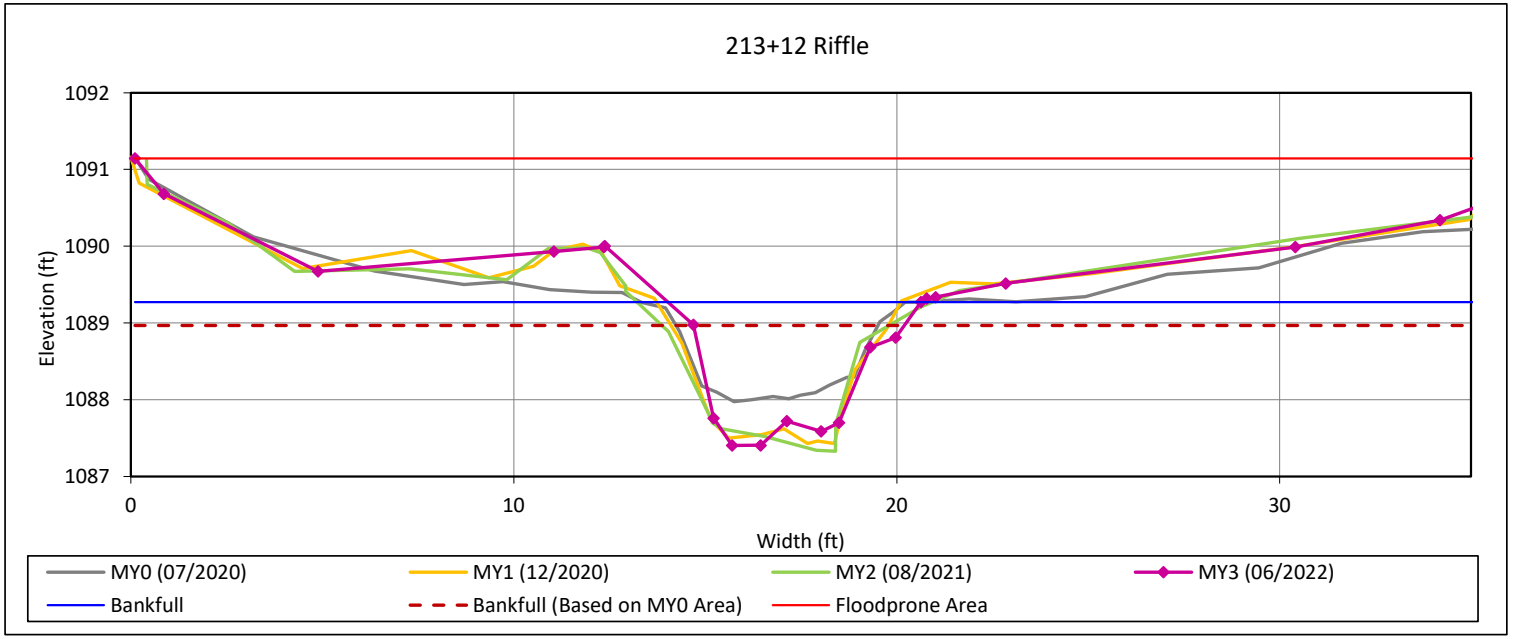
*The station number for XS9 was incorrectly reported on the MY0 cross-section plot, it should have been reported as Station 209+24 as shown in the above plot.

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 10-UT1C



Bankfull Dimensions	
7.5	x-section area (ft.sq.)
6.6	width (ft)
1.1	mean depth (ft)
1.9	max depth (ft)
8.3	wetted perimeter (ft)
0.9	hydraulic radius (ft)
5.8	width-depth ratio
35.2	W flood prone area (ft)
5.3	entrenchment ratio
1.2	low bank height ratio

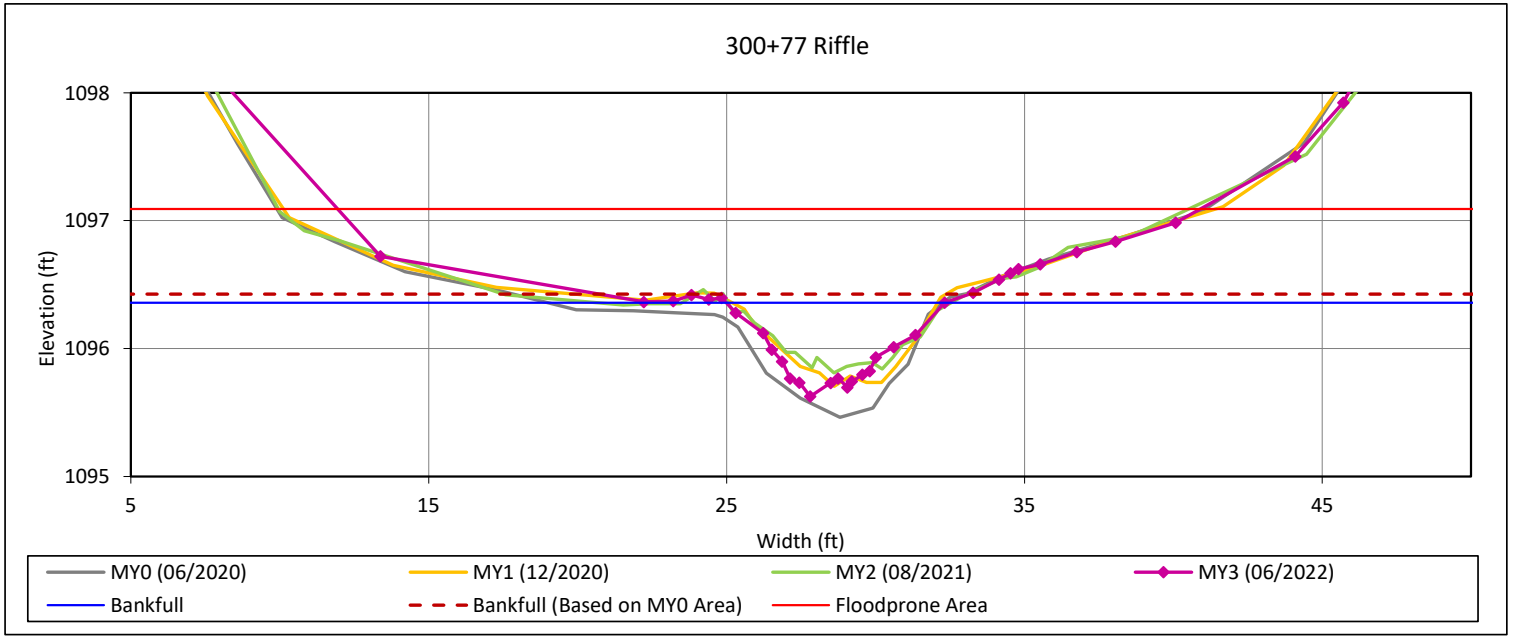
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 11-UT2A



Bankfull Dimensions	
2.9	x-section area (ft.sq.)
7.3	width (ft)
0.4	mean depth (ft)
0.7	max depth (ft)
7.5	wetted perimeter (ft)
0.4	hydraulic radius (ft)
18.6	width-depth ratio
29.0	W flood prone area (ft)
4.0	entrenchment ratio
0.9	low bank height ratio

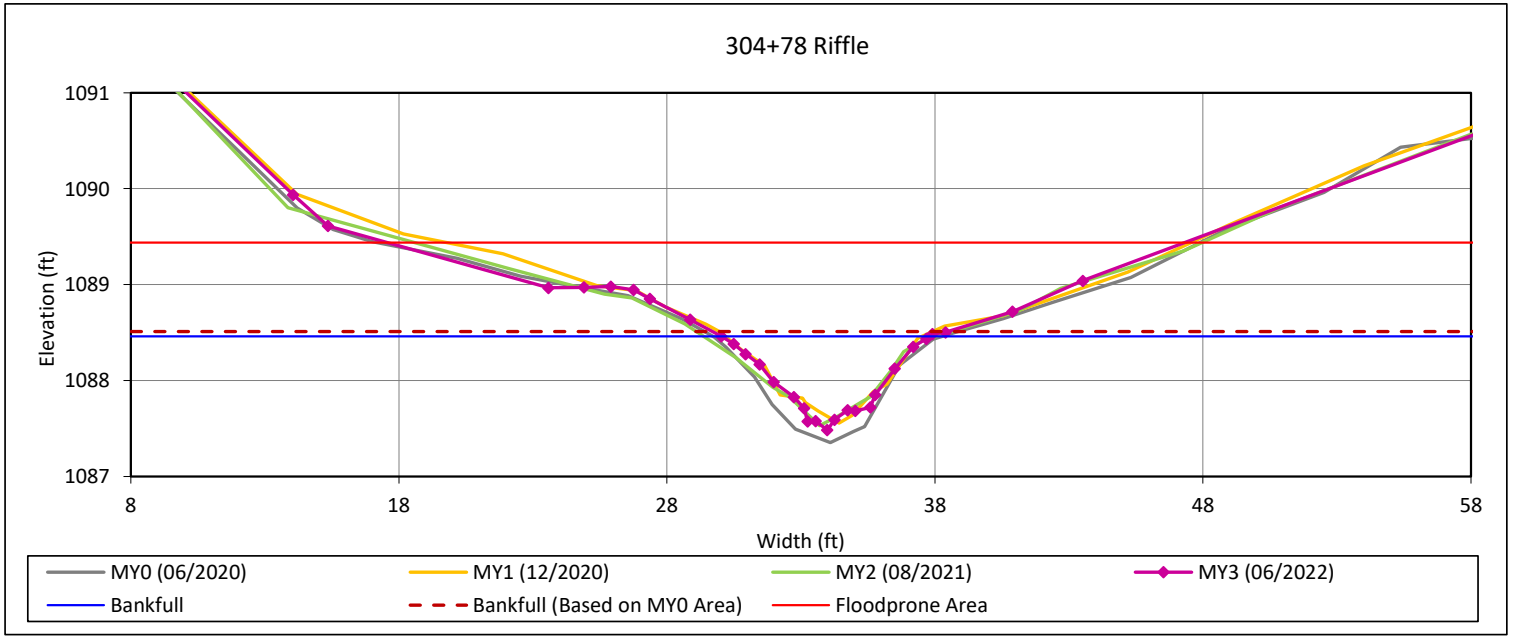
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 12-UT2B



Bankfull Dimensions	
3.8	x-section area (ft.sq.)
7.8	width (ft)
0.5	mean depth (ft)
1.0	max depth (ft)
8.1	wetted perimeter (ft)
0.5	hydraulic radius (ft)
15.8	width-depth ratio
29.8	W flood prone area (ft)
3.8	entrenchment ratio
1.0	low bank height ratio

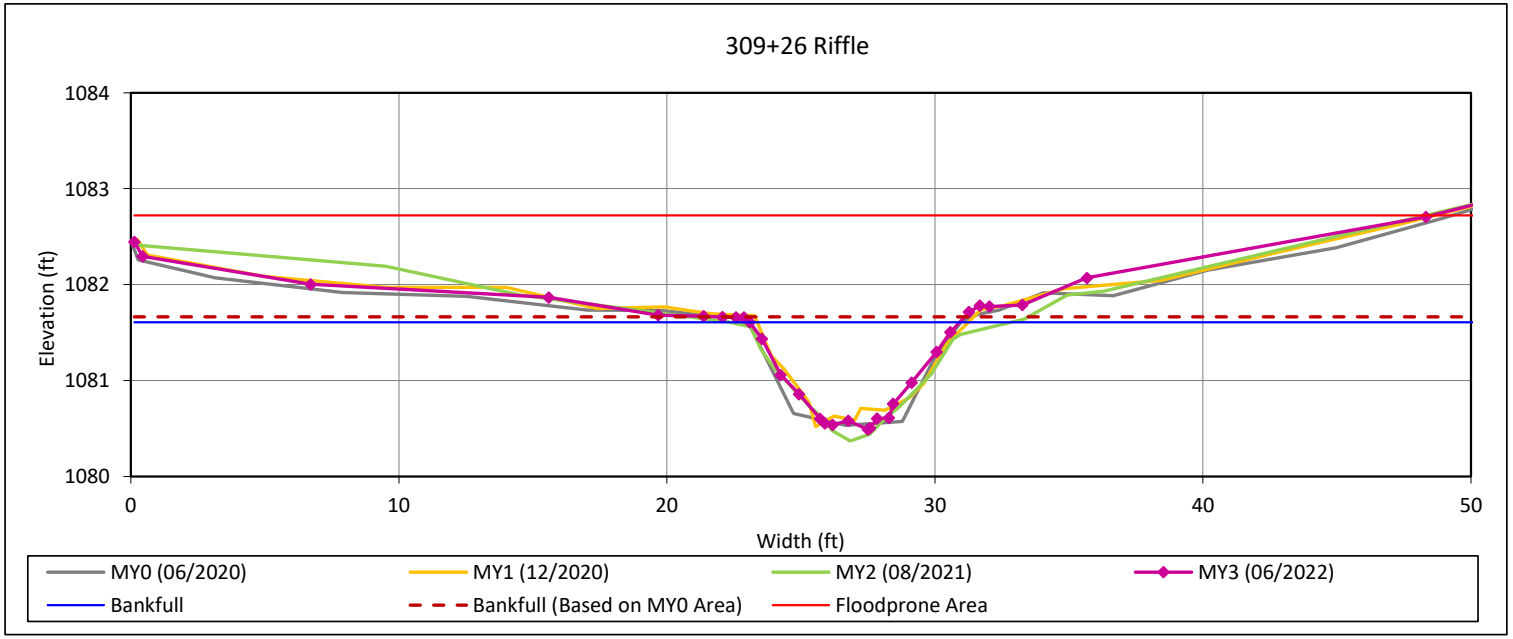
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 13-UT2C



Bankfull Dimensions	
5.3	x-section area (ft.sq.)
7.8	width (ft)
0.7	mean depth (ft)
1.1	max depth (ft)
8.3	wetted perimeter (ft)
0.6	hydraulic radius (ft)
11.5	width-depth ratio
48.4	W flood prone area (ft)
6.2	entrenchment ratio
1.0	low bank height ratio

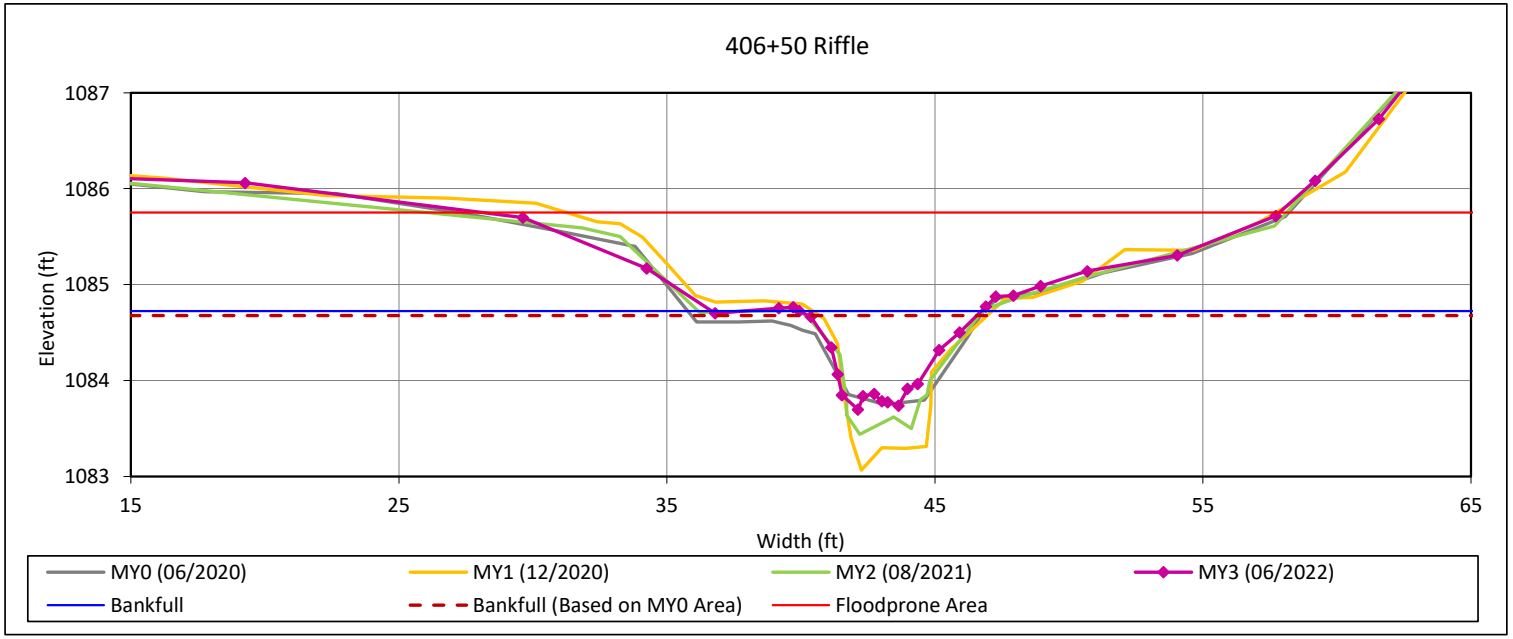
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 14-UT3B



Bankfull Dimensions	
3.8	x-section area (ft.sq.)
6.8	width (ft)
0.6	mean depth (ft)
1.0	max depth (ft)
7.3	wetted perimeter (ft)
0.5	hydraulic radius (ft)
12.1	width-depth ratio
29.7	W flood prone area (ft)
4.4	entrenchment ratio
1.0	low bank height ratio

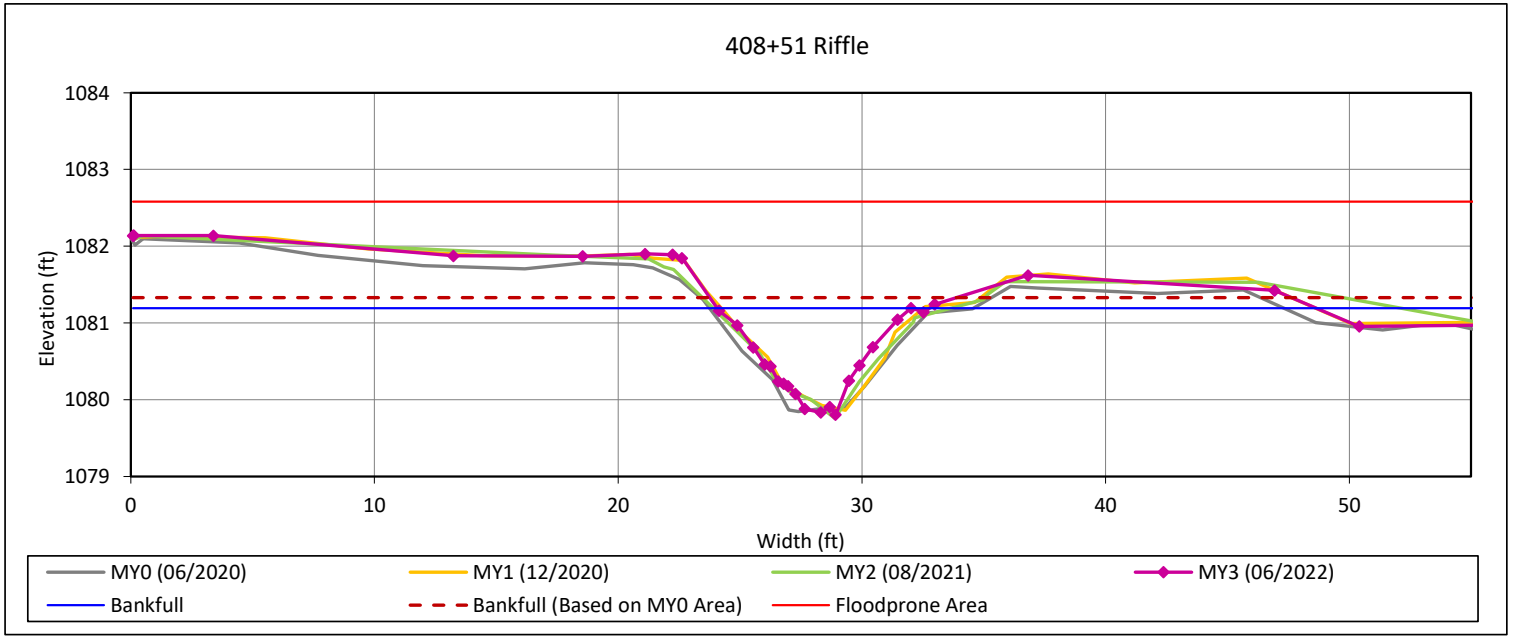
Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 3 - 2022

Cross-Section 15-UT3C



Bankfull Dimensions	
5.7	x-section area (ft.sq.)
8.0	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
8.6	wetted perimeter (ft)
0.7	hydraulic radius (ft)
11.1	width-depth ratio
55.6	W flood prone area (ft)
7.0	entrenchment ratio
0.9	low bank height ratio

Survey Date: 06/2022
Field Crew: Wildlands Engineering

View Downstream

APPENDIX D. Hydrology Data

Table 12. Verification of Bankfull Events

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Reach	Monitoring Year	Date of Occurrence	Method
Bull Creek Reach 2 (Crest Gage #1)	MY1	5/28/2020	Automated Crest Gage
		8/5/2020	
		11/12/2020	
		12/26-27/2020	
	MY2	---	---
	MY3	7/9/2022	Automated Crest Gage
	MY4	6/19/2023	Automated Crest Gage
		9/9/2023	
UT1C (Crest Gage #2)	MY1	8/5/2020	Automated Crest Gage
		8/15/2020	
		10/29/2020	
		11/11-12/2020	
		12/3/2020	
		12/19/2020	
		12/25-27/2020	
	MY2	9/21-22/2021	Automated Crest Gage
	MY3	6/19/2022	Automated Crest Gage
	MY4	3/3/2023	Automated Crest Gage
		6/19/2023	
UT2C (Crest Gage #3)	MY1	8/15/2020	Automated Crest Gage
		10/29/2020	
		11/12/2020	
		12/30/2020	
	MY2	9/21-22/2021	Automated Crest Gage
	MY3	1/16/2022	Automated Crest Gage
		2/5/2022	
		2/7/2022	
	MY4	6/19/2023	Automated Crest Gage
UT3C (Crest Gage #4)	MY1	8/5/2020	Automated Crest Gage
		8/15/2020	
		8/21/2020	
		10/29/2020	
		12/25-26/2020	
	MY2	9/21-22/2021	Automated Crest Gage
	MY3	7/9/2022	Automated Crest Gage
	MY4	---	---
Bull Creek Reach 3 (Crest Gage #5)	MY1	5/28/2020	Automated Crest Gage
		8/5/2020	
		8/15/2020	
		11/12/2020	
	MY2	---	---
	MY3	---	---
	MY4	6/19/2023	Automated Crest Gage
Bull Creek Reach 3 (Manual Crest Gage #1)*	MY3	5/25/2022 - 9/19/2022	Manual Crest Gage
	MY4	Observed on 7/31/2023	Manual Crest Gage
Bull Creek Reach 1B (Crest Gage #6)**	MY3	7/9/2022	Automated Crest Gage
	MY4	4/28/2023	Automated Crest Gage
		6/19/2023	
		9/9/2023	

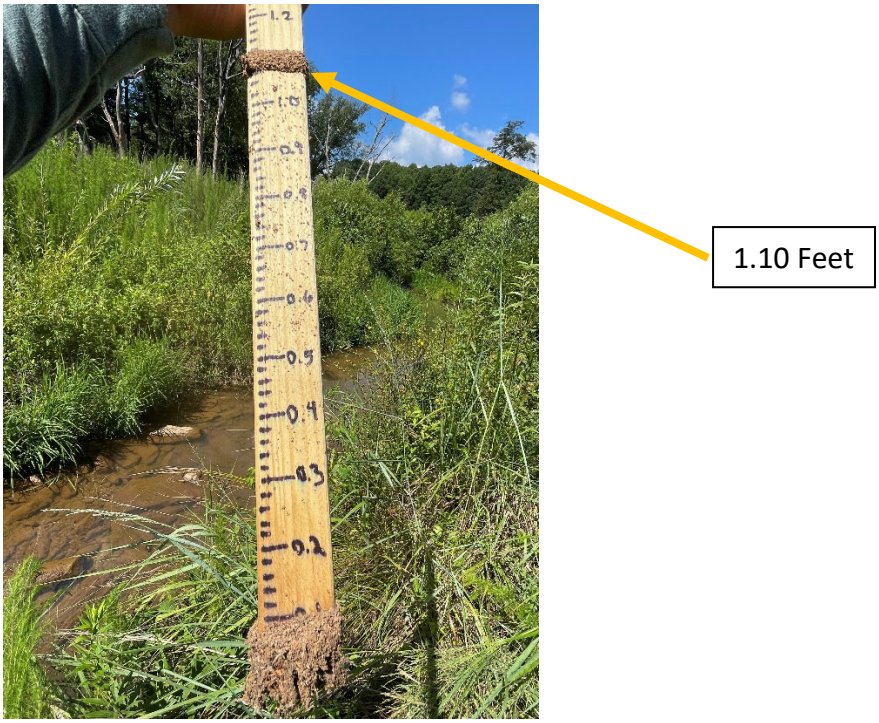
*Manual Crest Gage #1 was installed in MY3 on 5/25/2022.
**Crest Gage #6 was installed in MY3 on 4/14/2022

Table 13. Verification of 30 Days Consecutive Flow

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Summary of In-Stream Gage Results for Monitoring Years 1 through 7							
Gage	Success Criteria Achieved/Max Consecutive Days (Percentage)						
	MY1	MY2	MY3	MY4*	MY5	MY6	MY7
UT2 SG#1	Yes/256 days (100%)	Yes/351 days (100%)	Yes/261 days (100%)	Yes/283 days (100%)			

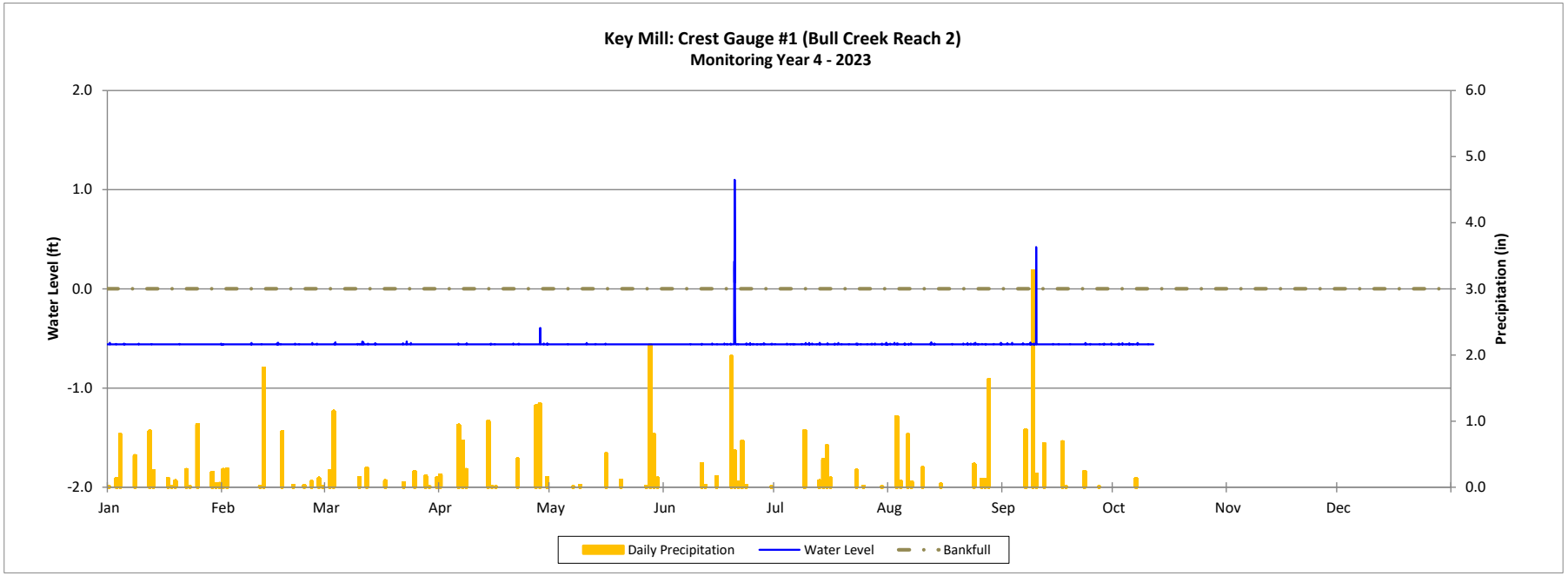
*End of Data Collection: 10/11/2023



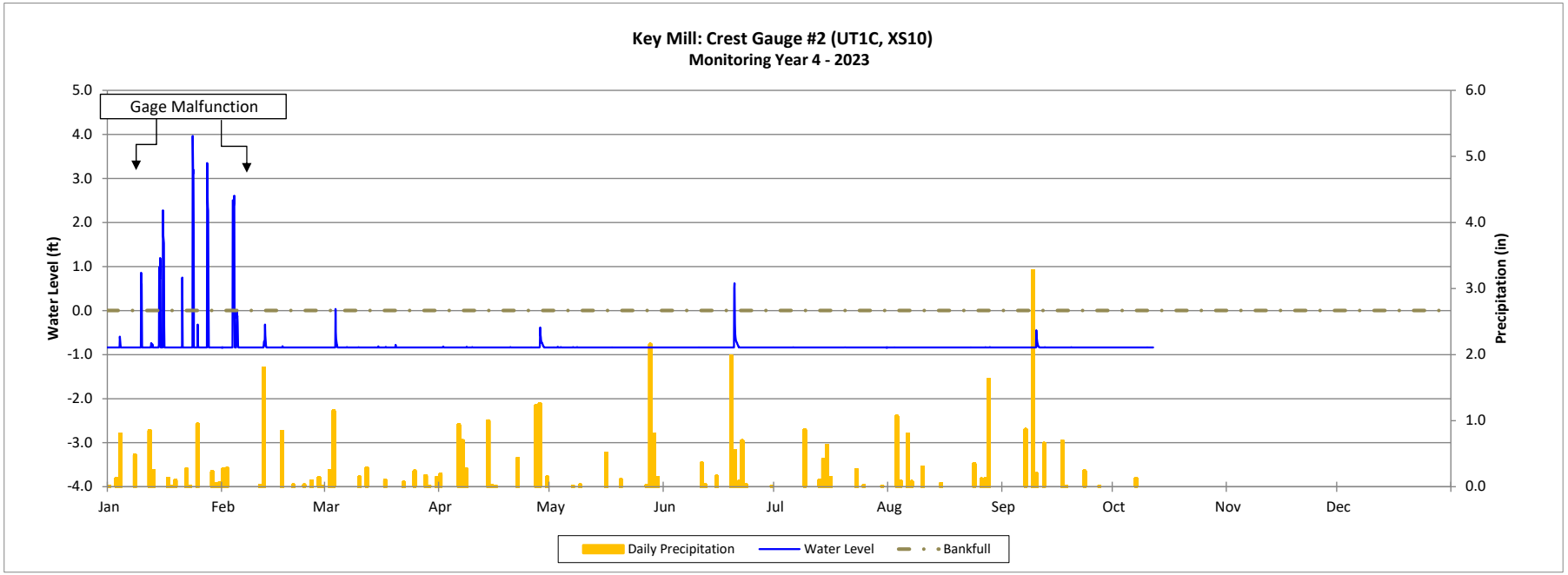
Bull Creek Reach 3: Manual Crest Gage #1 Bankfull Documentation observed on 7/31/2023

Recorded Bankfull Events Plot

Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023

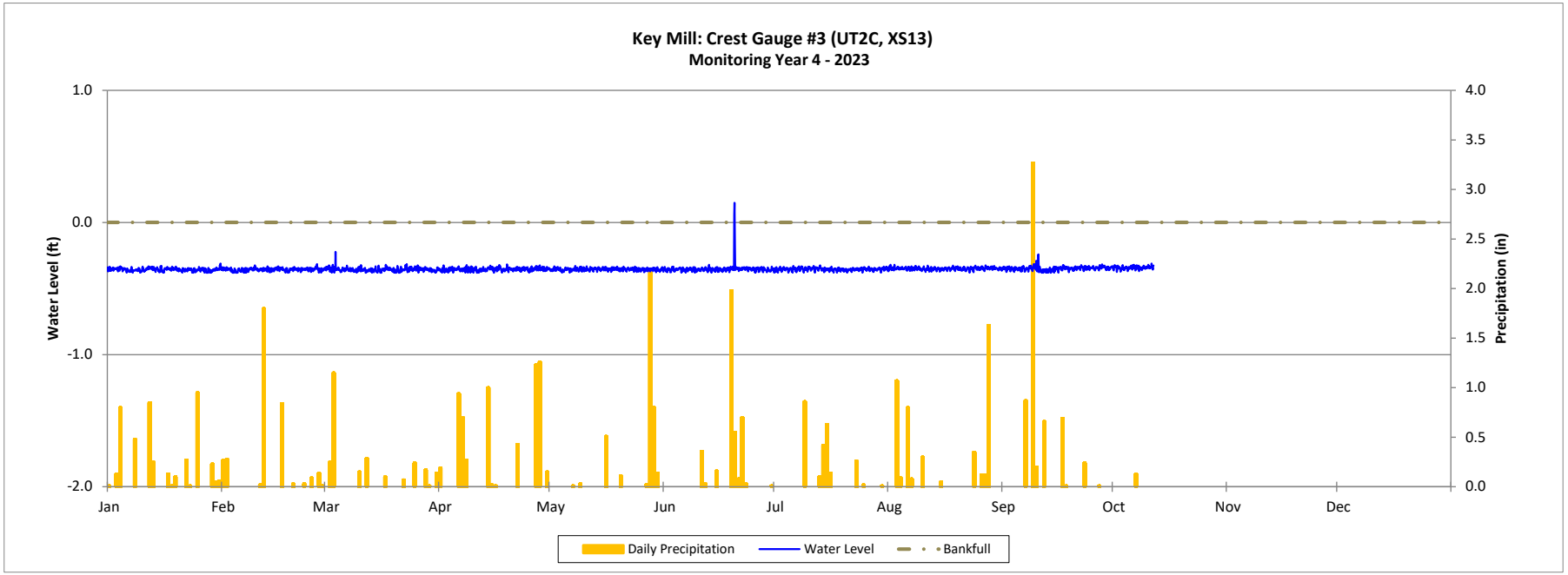


Recorded Bankfull Events Plot
Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023



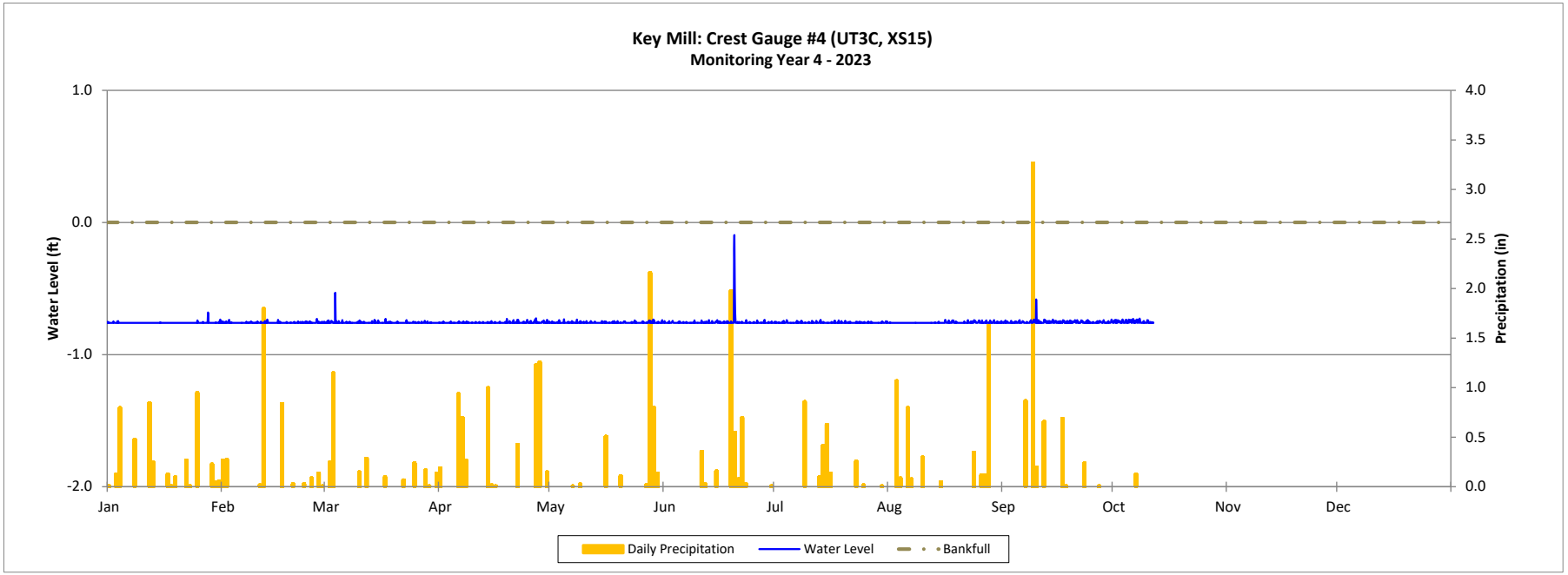
Recorded Bankfull Events Plot

Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023



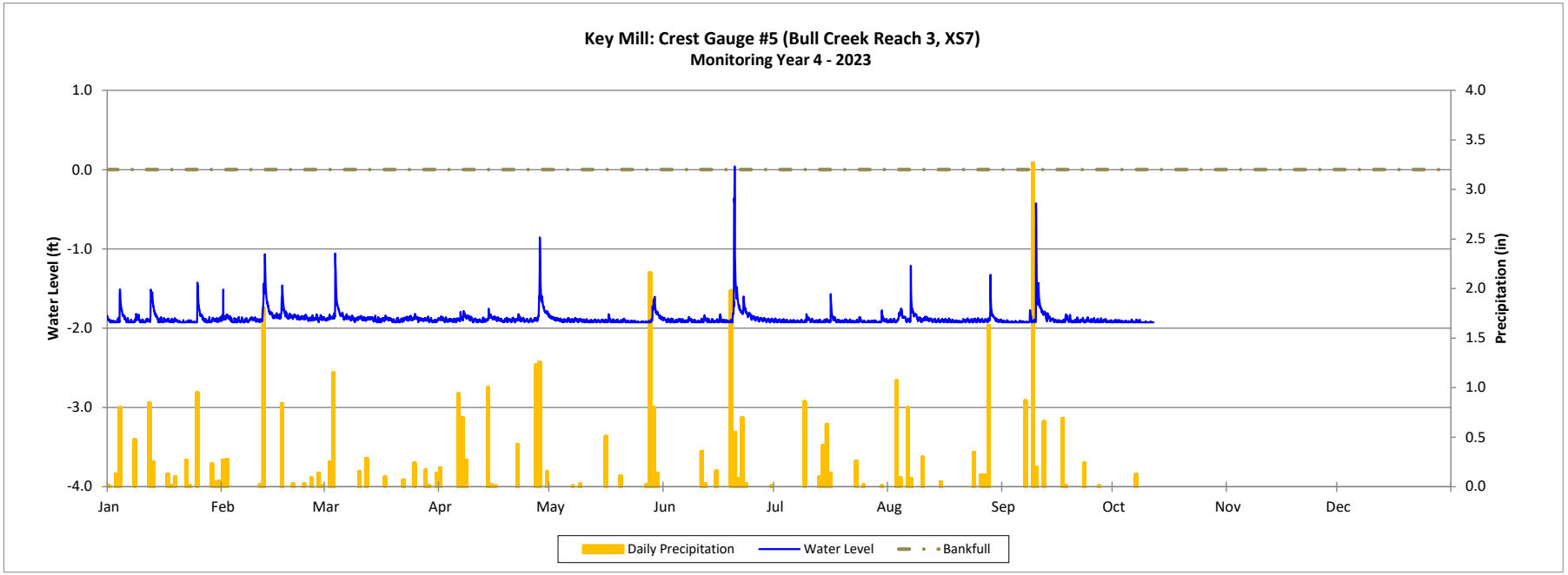
Recorded Bankfull Events Plot

Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023



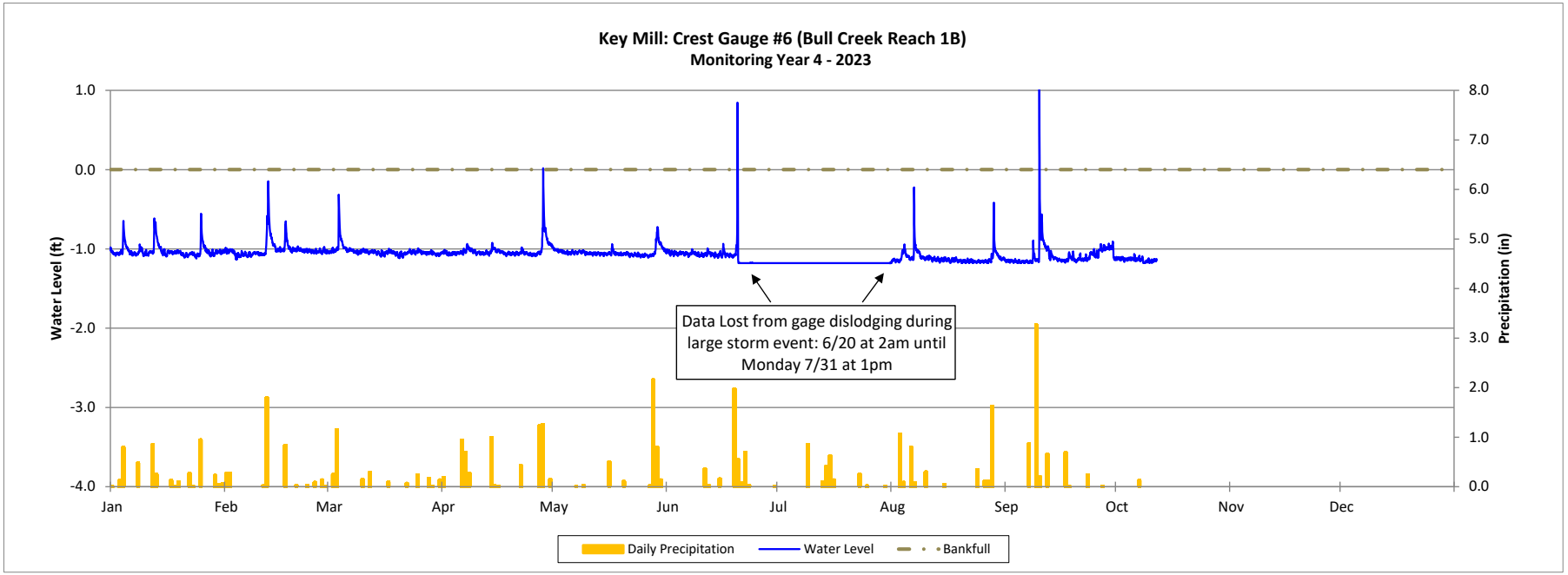
Recorded Bankfull Events Plot

Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023

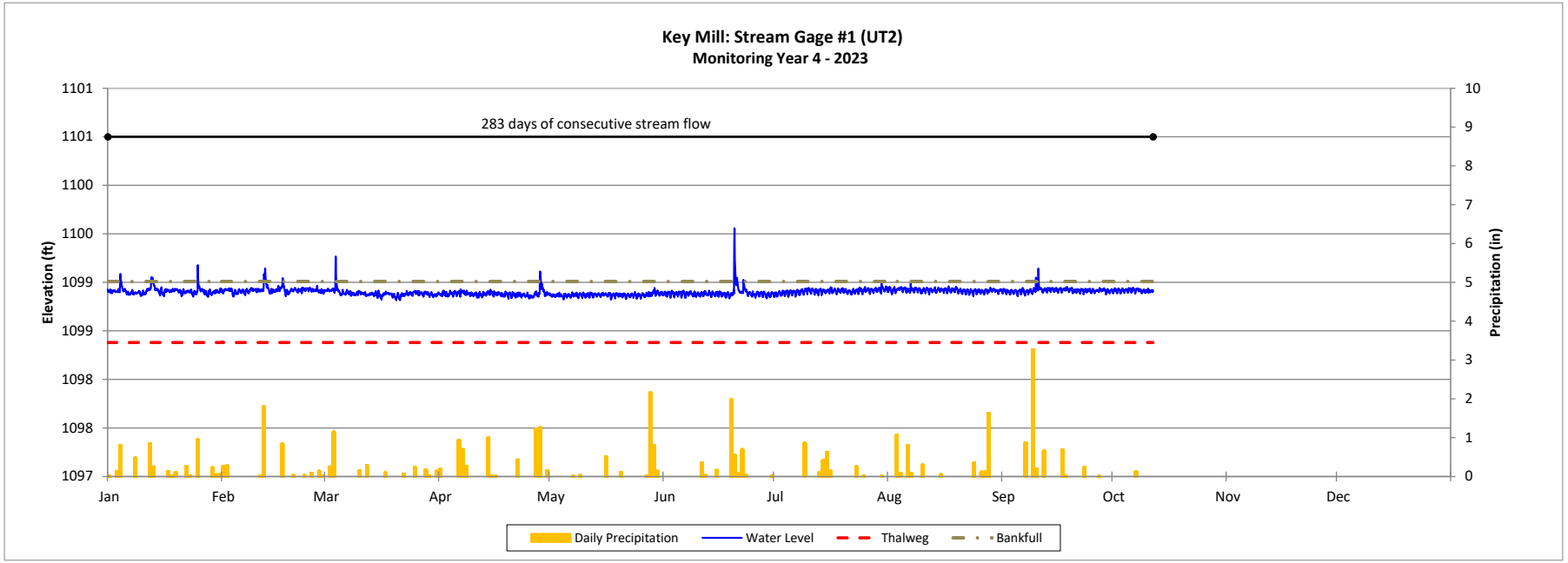


Recorded Bankfull Events Plot

Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023

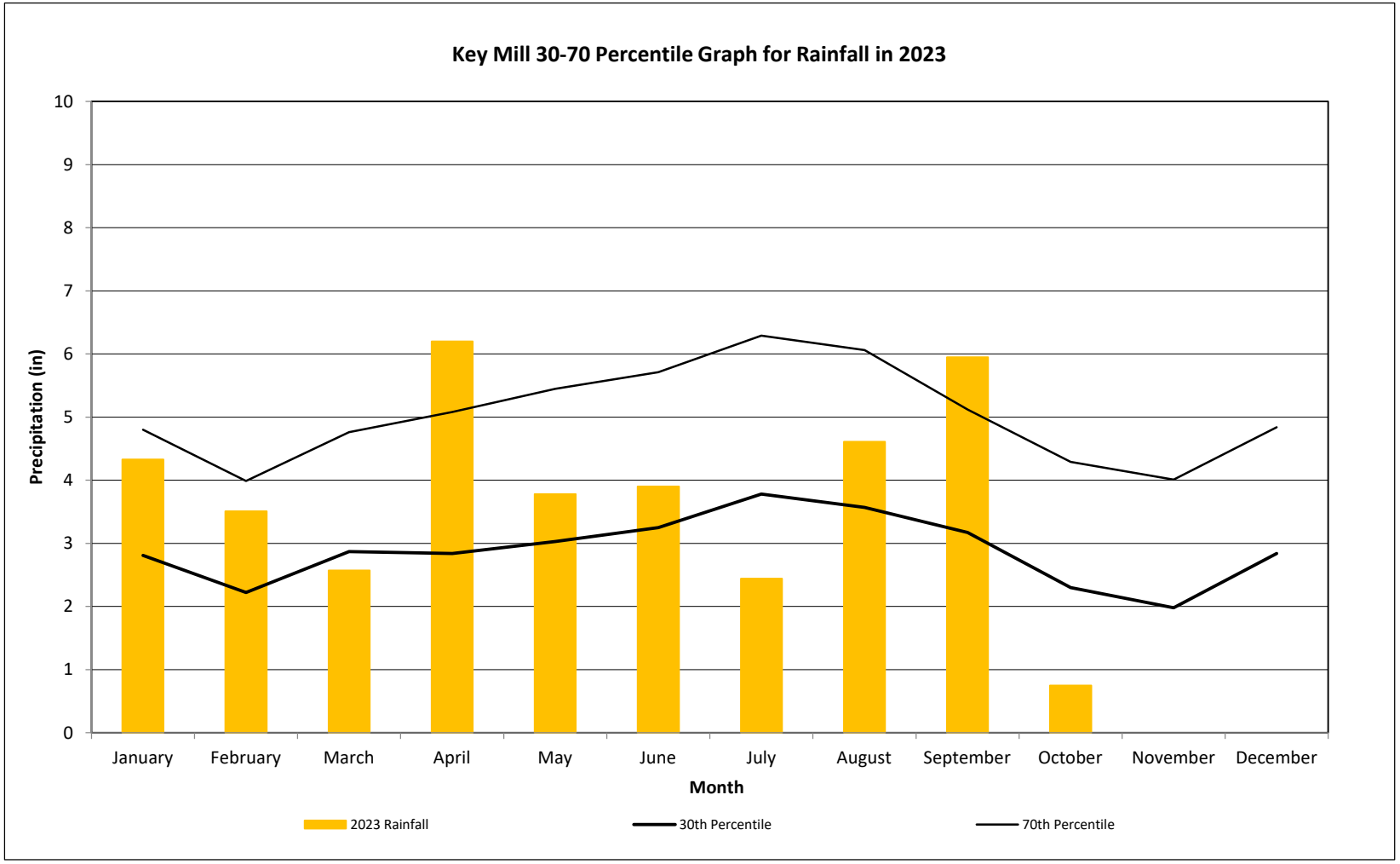


Recorded In-stream Flow Events Plot
Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023



Monthly Rainfall Data

Key Mill Mitigation Bank
DMS Project No. 100025
Monitoring Year 4 - 2023



Annual Rainfall collected from: USGS 362416080334345 RAINGAGE AT ARARAT RIVER AT ARARAT, NC

30th and 70th percentile rainfall data collected from WETS Station: MOUNT AIRY 2 W, NC (315890); percentiles based on 30-yr climate normal (1993-2023)

APPENDIX E. Project Timeline and Contact Information

Table 14. Project Activity and Reporting History

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Activity or Report		Data Collection Complete	Completion or Delivery
404 Permit		May 2019	May 2019
Mitigation Plan		January 2017 - January 2019	January 2019
Final Design - Construction Plans		May 2019	May 2019
Construction		June 2019 - April 2020	April 2020
Temporary S&E mix applied to entire project area[1]		June 2019 - April 2020	April 2020
Permanent seed mix applied to reach/segments[1]		April 2020	April 2020
Bare root and live stake plantings for reach/segments		April 2020	April 2020
Baseline Monitoring Document (Year 0)		July 2020	October 2020
Year 1 Monitoring	Invasive Treatment	August 2020	August 2020
	Stream Repairs (West Side)	November 2020	November 2020
	Stream Survey	December 2020	February 2021
	Vegetation Survey	October 2020	
Year 2 Monitoring	Seeding (Sitewide)	February 2021	February 2021
	Soil Amendments	March 2021	March 2021
	Stream Repairs (East Side)		
	Supplemental Plantings		
	Live Stake Install		
	Invasive Treatments (Sitewide)	June 2021	November 2021
	Implementation of the IRT Credit Release Site Action Plan	July 2021	August 2021
	Stream Survey	August 2021	November 2021
	Vegetation Survey		
Year 3 Monitoring	Soil Amendments (Restoration portions: Bull Creek R3 & UT3)	June 2022	June 2022
	Stream Survey		
	Invasive Treatments (Sitewide)	July 2022 - October 2022	October 2022
	Vegetation Survey	August 2022	August 2022
	Supplemental Plantings	November 2022	November 2022
Year 4 Monitoring	Stream Survey	N/A	N/A
	Fence Repairs	March 2023	March 2023
	Structure Repairs	April 2023 & August 2023	August 2023
	In-Stream Invasive Treatment	August 2023	August 2023
	Invasive Treatment	May 2023 & November 2023	November 2023
	Vegetation Survey (SVP1 Only)	September 2023	September 2023
Year 5 Monitoring	Stream Survey		
	Vegetation Survey		
Year 6 Monitoring	Stream Survey		
	Vegetation Survey		
Year 7 Monitoring	Stream Survey		
	Vegetation Survey		

[1]Seed and mulch is added as each section of construction is completed.

Table 15. Project Contact Table

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Designers Aaron Earley, PE, CFM	**Wildlands Engineering, Inc.** 1430 South Mint Street, Suite 104 Charlotte, NC 28203 704.332.7754
Construction Contractors	**Carolina Environmental Contracting, Inc.** 150 Pine Ridge Rd Mt Airy, NC 27030
Planting Contractor	**Bruton Natural Systems, Inc.** PO Box 1197 Fremont, NC 27830
Seeding Contractor	**Carolina Environmental Contracting, Inc.** 150 Pine Ridge Rd Mt Airy, NC 27030
Seed Mix Sources	**Carolina Environmental Contracting, Inc.**
Nursery Stock Suppliers Bare Roots Live Stakes	**Bruton Natural Systems, Inc.**
Herbaceous Plugs	**Wetland Plants, Inc.**
Monitoring Performers	**Wildlands Engineering, Inc.**
Monitoring, POC	Kristi Suggs (704) 332.7754 x.110

APPENDIX F. Additional Documentation

SUPPLEMENTAL VEGETATION PLOT 1 DATA

Monitoring Year 4

Table 16. Supplemental Planting Vegetation Plot Planted Stem Counts

Key Mill Mitigation Site
DMS Project No. 100025
Monitoring Year 4 - 2023

Supplemental Planting Vegetation Plot (SVP1) Data (MY4 2023)			
Scientific Name	**Common Name**	**Species Type**	**SVP1**
			PnoLS
Acer negundo	Boxelder	Tree	1
Acer rubrum	Red Maple	Tree	
Acer saccharinum	Silver Maple, Soft Maple	Tree	
Alnus serrulata	Tag Alder, Smooth Alder, Hazel Alder	Shrub Tree	1
Asimina triloba	Common Pawpaw, Indian-banana	Shrub Tree	
Betula nigra	River Birch, Red Birch	Tree	3
Carpinus caroliniana	Ironwood	Shrub Tree	
Diospyros virginiana	American Persimmon	Tree	
Fagus grandifolia	American Beech	Tree	1
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	
Hamamelis virginiana	Witch-hazel	Shrub Tree	
Ilex opaca	American Holly, Christmas Holly	Shrub Tree	
Liriodendron tulipifera	Tulip Poplar	Tree	
Morus rubra	Red Mulberry	Tree	1
Nyssa sylvatica	Sour Gum, Black Gum, Pepperidge	Tree	1
Platanus occidentalis	Sycamore, Plane-tree	Tree	6
Quercus falcata	Spanish Oak, Southern Red Oak	Tree	1
Quercus rubra	Northern Red Oak	Tree	1
Salix nigra	Black Willow	Tree	
Viburnum dentatum	Arrow-wood	Shrub Tree	
		Stem count	16
		size (ares)	1
		size (ACRES)	0.0247
		Species count	9
		Stems per ACRE	647

PnoLS: Number of planted stems excluding live stakes and the planted stems over the 50% rule.
P-all: Number of planted stems including live stakes and the planted stems over the 50% rule.
T: Total stems (All planted stems, live stakes, and volunteers)

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%
Volunteer species included in total

Mobile Vegetation Plot Data Sheet

Date:	Origin Coordinates (lat, long):	
9/13/23	36.396038, -80.606395	
Site: Key Mill MY4	Mobile Plot #: SVP1	
Evaluator: KT / ST	Notes: Requested by IRT during the MY3 Credit Release Meeting	
Species Name	Height (cm)	DBH (cm)
Pl. Occ.	98	–
Pl. Occ.	86	–
Be. ni.	110	–
Pl. Occ.	42	–
Ac. ne.	38	–
Pl. Occ.	45	–
Al. Se.	55	–
Pl. Occ.	67	–
Ny. Sy.	25	–
Be. ni.	40	–
Be. ni.	57	–
Pl. Occ.	76	–
Qu. fa.	11	–
Fa. gr.	45	–
Ma. ru.	101	–
Qu. ru.	162	0

SUPPLEMENTAL VEGETATION PLOT PHOTO

Monitoring Year 4

Supplemental Vegetation Plot 1 (09/13/2023)