

MONITORING YEAR 4 ANNUAL REPORT

Final

ALEXANDER FARM MITIGATION SITE
Alexander County, NC
DEQ Contract No. 7416
DMS Project No. 100048
USACE Action ID No. SAW-2018-00451
NCDEQ DWR Certification No. 18-0665
RFP #: 16-007277

Catawba River Basin
HUC 03050101

Data Collection Period: January 2023 – November 2023
Final Submission Date: January 2024

PREPARED FOR:

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

January 30, 2024

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

Subject: Final Year 4 Monitoring Report Review
Alexander Farm Mitigation Site, Alexander County
Yadkin River CU 03040101
DMS Project ID No. 100022 / DEQ Contract #007186

Dear Mr. Tsomides:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services, (DMS) comments from the Draft Year 4 Monitoring Report for the Alexander Farm 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: DMS appreciates the thorough follow up from the DMS site visit and boundary inspection (Appendix F). Overall the site boundary and fencing/signage looked great during DMS's site visit in September 2023.

Wildlands' response: Thank you!

DMS' comment: Figure 1A should denote the location of the concrete debris / dismantled chicken house foundation that is slated for removal. Since this part of the easement is with a new (since project acquisition) landowner, as requested following that site visit, please provide DMS with the new landowner contact information (name, address, email, telephone). This is needed for the landowner contact database that will eventually be needed for DEQ-stewardship. If other landowners have changed, please also provide their information. Please work with the landowner and/or contractor to remove the debris with as little impact to the existing canopy/vegetation as possible.

Wildlands' response: Figure 1A now denotes the location of the debris on UT1 Reach 1A. Wildlands checked Alexander County's GIS website for the current landowner information. It shows that the original landowners still own the property that contains the easement, so there is no new landowner information. The parcel that was sold and has a new landowner does not contain any of the conservation easement. Wildlands is currently working with the landowner to see if they can and will remove the debris inside of the easement. If the landowner cannot remove the debris from the easement, then Wildlands construction will do it.

DMS' comment: The subsurface stream flow repair area location (s) should be shown on Figure 1A; has the length of the affected area changed since 2022? Should this reach be reflected in the visual assessment table for reach 1A?

Wildlands' response: The subsurface stream flow area has now been added to Figure 1A. The polyline on the CCPV map shows the location of the subsurface flow that only occurs during very dry Site conditions, and its length is variable depending on the weather. Since the subsurface flow is not caused by a structural issue or stream bed aggradation or degradation, including the area on the visual assessment

table (Table 4a) is unnecessary. Wildlands will continue to monitor this section for any other problems and will deal with them as they occur.

DMS' comment: Thank you for providing winter photos (3/9/23) as requested last year.

Wildlands' response: Thank you!

Digital Support File Comments:

DMS' comment: Looks good, no edits.

Wildlands' response: Noted.

As requested, Wildlands has included two hard copies of the Final Alexander Farm Mitigation Site's Year 4 Monitoring Report with a copy of our response letter inserted after the report's cover page. In addition, a USB drive with the full final digital submittal has been included. Please let me know if you have any questions.

Sincerely,

Kristi Suggs
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EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) implemented a full-delivery stream mitigation project at the Alexander Farm 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 6,722 linear feet (LF) of perennial stream in Alexander County, NC. The Site is located within the DMS targeted local watershed (TWL) for the Catawba River Basin HUC 03050101 and the NC Division of Water Resources (DWR) Subbasin 03-08-32. The project is providing 4,258.100 stream mitigation units (SMUs) for the Catawba River Basin Hydrologic Unit Code (HUC) 03050101130010 (Catawba 01).

The Site's immediate drainage area as well as the surrounding watershed has a long history of agricultural activity. Stream and wetland functional stressors for the Site were related to both historic and current land use practices. Major stream stressors for the Site included channel incision and widening, a lack of stabilizing riparian vegetation, a lack of bedform diversity and aquatic habitat, and agricultural related impacts such as channel manipulation or straightening and concentrated run-off inputs from agricultural fields. The effects of these stressors resulted in channel instability, loss of floodplain connection, degraded water quality, and the loss of both aquatic and riparian habitat throughout the Site's watershed 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 Catawba River Basin Restoration Priorities (RBRP) goals and objectives to address stressors identified in the watershed through the implementation of stream restoration and enhancement activities and wetland re-establishment and rehabilitation activities, as well as riparian buffer re-vegetation. The established project goals include:

- Improve stream channel stability,
- Reconnect channels with historic floodplains,
- Improve in-stream habitat,
- Reduce sediment and nutrient inputs from adjacent farm fields,
- Restore and enhance native floodplain and wetland vegetation,
- Exclude livestock, and
- Permanently protect the project site from harmful uses.

The Site construction and as-built surveys were completed April - May 2020. Planting and baseline vegetation data collection occurred in April 2020. Fencing installation was completed in July 2020. MY4 assessments and Site visits were completed between January and November 2023 to assess the conditions of the project.

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. Per the request from DMS we have added data into Appendix B (Vegetation Plot Data) and Appendix C (Stream Geomorphological Data) from the MY3 report into the omitted appendices of the MY4 report.

Assessments and site visits were completed between February and November 2023 to assess the condition of the project. 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. In MY4, the two

Crest Gages (CG) on site, CG1 on UT1 Reach 1A and at CG2 on UT1 Reach 4A, each documented one bankfull event. Herbaceous vegetation has become well established throughout the Site, and the MY4 visual assessment did not identify any areas of low stem density or bare ground. Areas of invasive species have been treated throughout the Site and will continue to be monitored and treated as necessary. During the MY3 visual assessments, approximately 200 LF of stream on UT1 Reach 1A was noted as lacking sufficient streamflow from May - October 2022. Within this section of the reach, two piping log sills were repaired, and filter fabric was added in late 2022. Sufficient streamflow returned to the area in the fall of 2022 and continues to flow throughout the entire reach. During the MY4 visual assessments and with the use of a game camera, Wildlands believes that this same area of subsurface flow along UT1 Reach 1A continued to flow from late 2022 into 2023 all the way up to November when it started to go subsurface again. However, during the months when the water was flowing throughout the channel all the repairs conducted in MY3 continue to function as designed. Wildlands contributes the repeat of this subsurface flow to less than normal rainfall and drought type conditions that have been received this year. All areas, throughout the project, are doing well and trending towards success. Wildlands will continue to monitor these areas throughout the seven-year monitoring period to benefit the ecological health of the Site.

ALEXANDER FARM MITIGATION SITE

Monitoring Year 4 Annual Report

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APPENDICES

*Data added from Monitoring year 3, No content required for Monitoring Year 4

LIST OF ACRONYMS

Current Condition Plan View (CCPV)
Department of Environmental Quality (DEQ)
Division of Mitigation Services (DMS)
Division of Water Resources (DWR)
Hydrologic Unit Code (HUC)
Interagency Review Team (IRT)
Monitoring Year (MY)
National Resource Conservation Service (NRCS)
Stream Mitigation Unit (SMU)
Targeted Local Watershed (TLW)
United States Army Corps of Engineers (USACE)
Unnamed Tributary (UT)
Catawba River Basin Restoration Priorities (RBRP)

Section 1: PROJECT OVERVIEW

1.1 Project Quantities and Credits

The Alexander Farm Mitigation Site (Site) is located in Alexander County approximately 6 miles west of Statesville and 15 miles northeast of Hickory (Figure 1). The Site is located within the Elk Shoals Creek targeted local watershed (TLW) Hydrologic Unit Code (HUC) 03050101130010 and is being submitted for mitigation credit in the Upper Catawba River Basin 03050101. Located in the Northern Inner Piedmont belt within the Piedmont physiographic province (NCGS, 1985), the project watershed is dominated by agricultural and forested land.

The Site contains two unnamed tributaries, UT1 and UT1A, and eighteen riparian wetlands; however, no credit is being sought for project wetlands. For this project UT1 was broken into six reaches (Reach 1A, Reach 1B, Reach 2, Reach 3, Reach 4A, and Reach 4B). The project Site is bisected by Elk Shoals Church Loop Road between Reach 2 and Reach 3.

The final mitigation plan was submitted and accepted by DMS in June of 2019 and the IRT in October of 2019. Construction activities were completed in April 2020 by Baker Grading & Landscaping Inc. Turner Mapping and Surveying completed the as-built survey in May 2020. Planting was completed following construction in April 2020 by Bruton Natural Systems, Inc. A conservation easement has been recorded and is in place on 21.7 acres. The project is providing 4,258.100 stream mitigation units (SMUs) for the Catawba River Basin Hydrologic Unit Code (HUC) 03050101130010 (Catawba 01). Please refer to Table 1 and Table 1.1 for project credits by stream and the credit summary table respectively. 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 Components						
Project Area	**Mitigation Plan Footage**	**As-Built Footage**	**Restoration Level**	**Mitigation Ratio (X:1)[1]**	**Project Credit**	**Notes/Comments**
UT1 Reach 1A	770	770.000	R	2.000	385.000	Full channel restoration with planted buffer. Livestock excluded, and invasive species treated.
UT1 Reach 1B	969	957.000	R	2.000	478.500	Full channel restoration with planted buffer. Livestock excluded, and invasive species treated.
UT1 Reach 2	1260	1,253.000	EII	2.000	626.500	Channel stabilization with planted buffer. Livestock excluded, and invasive species treated.
UT1 Reach 3	718	701.000	P	10.000	70.100	Invasive species treated.

Table 1: Project Quantities and Credits

Project Components						
Project Area	**Mitigation Plan Footage**	**As-Built Footage**	**Restoration Level**	**Mitigation Ratio (X:1)[1]**	**Project Credit**	**Notes/Comments**
UT1 Reach 4A	252	252.000	R	2.500	100.800	Channel stablized. Floodplain bench cut to reconnect channel with floodplain and transition preservation reach to Priority 1 restoration. Planted buffer, livestock exclusion, and invasive species treated.
UT1 Reach 4A	920	920.000	R	1.000	920.000	Full channel restoration with planted buffer. Livestock excluded, and invasive species treated.
UT1 Reach 4B	1666	1,666.000	R	1.000	1,666.000	Full channel restoration with planted buffer. Livestock excluded, and invasive species treated.
UT1A	203	203.000	EII	-	0.000	Channel reconnected with floodplain. Livestock excluded, invasive species treated, and planted buffer.
BMP	262	262.000	N/A	-	N/A	Step-pool conveyance system implemented to treat pasture stormwater run-off. Livestock excluded, and invasive species treated.

Notes:
1. No direct credit for BMP or UT1A.
2. Internal culvert crossing and external break excluded from stationing listed.

Table 1.1: Credit Summary Table

Project Credits							
Restoration Level	**Stream**			**Riparian Wetland**		**Non-Riparian Wetland**	**Coastal Marsh**
	Warm	**Cool**	**Cold**	**Riverine**	**Non-Riv**		
Restoration	3,556.300	N/A	N/A	N/A	N/A	N/A	N/A
Re-establishment				N/A	N/A	N/A	N/A
Rehabilitation				N/A	N/A	N/A	N/A
Enhancement				N/A	N/A	N/A	N/A
Enhancement I	-	N/A	N/A				
Enhancement II	630.000	N/A	N/A				
Preservation	71.800	N/A	N/A	N/A	N/A	N/A	
Totals	**4,258.100**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

1.2 Project Goals and Objectives

The Site is providing numerous ecological benefits within the Upper Catawba Basin. The project goals were established with careful consideration to address stressors that were identified in the 2009 Upper Catawba River Basin Restoration Priorities (RBRP) report. The project has improved stream functions through stream restoration and the conversion of maintained agricultural fields into riparian buffer within the Upper Catawba 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 remain below 1.2 over the monitoring period with visual assessments showing progression towards stability.	14 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.	2 automated crest gages were installed on restoration reaches. The automated gages will record flow elevations and durations.	In MY4, one bankfull event was recorded at both CG1 on UT1 Reach 1A and CG2 on UT1 Reach 4A.

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, streambank, and wetland 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.	Nine (9) permanent and nine (9) mobile one hundred square meter vegetation plots are monitored during MY1, MY2, MY3, MY5, and MY7.	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.
Improve instream habitat.	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
Reduce sediment and fecal coliform and nutrient input from adjacent farm fields.	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

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
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.	No cattle observed in easement.

1.3 Project Attributes

Prior to construction activities, the streams throughout the Site were in various stages of impairment related to the current and historical agricultural uses. UT1 Reaches 1 and 2 were severely impacted by cattle. On both reaches bedform diversity and habitat was very poor, primarily due to sedimentation and incision. UT1 Reach 3 was wooded and the majority of the reach consisted of low, stable stream banks with a few scour pockets located near ATV crossings. UT1 Reach 4 was extensively eroded, incised, and disconnected from its historic floodplain.

The overall Site topography consists of a gradually sloped valley running through the center of the project. Upstream of Elk Shoals Church Loop Road, the Site is characterized by a moderate slope. UT1 Reach 1 originates within the Site limits at a spring head and flows downslope through a moderately confined valley surrounded by open pasture. Approximately 600 feet downstream of the headwaters, the valley widens and continues downstream as a broad gently sloping floodplain to Elk Shoals Church Loop Road. Downstream of the road crossing, UT1 continues flowing south within a broad gently sloping floodplain to its confluence with UT1A from the left floodplain, where it originates as a wetland seep. At the confluence, UT1A joins UT1 and continues south to its confluence with to Elk Shoals Creek within a broad alluvial floodplain. The site drains approximately 256 acres of rural land.

A map of the Site with project components illustrated is provided in Figures 1 – 1c.

Table 3: Project Attributes

Project Information			
Project Name	Alexander Farm Mitigation Site	**County**	Alexander County
Project Area (acres)	21.7	**Project Coordinates**	35° 48' 42.36"N 81° 7' 14.46"W
Planted Acreage	17.5		
Project Watershed Summary Information			
Physiographic Province	Piedmont	**River Basin**	Catawba River

Table 3: Project Attributes

USGS Hydrologic Unit 8-digit	3050101	**USGS Hydrologic Unit 14-digit**	3050101130010
Project Watershed Summary Information			
DWR Sub-basin	03-08-32	**2011 NLCD Land Use Classification**	Forest (20%), Cultivated (73%), Grassland (1%), Shrubland (1%), Urban (5%), Open Water (0%)
Project Drainage Area (acres)	UT1 - 256, UT1A - 7.4	**Project Drainage Area Percentage of Impervious Area**	1.00%

Reach Summary Information					
Parameters	**UT1 Reach 1A and 1B**	**UT1 Reach 2**	**UT1 Reach 3**	**UT1 Reach 4A and 4B**	**UT1A**
Length of reach (linear feet) - Post-Restoration	1,727	1,253	701	2,838	203
Valley confinement (Confined, moderately confined, unconfined)	Confined	Unconfined	Moderately Confined	Unconfined	Unconfined
Drainage area (acres)	71	117	141	256	7
Perennial (P), Intermittent (I), Ephemeral (E)	P	P	P	P	I
NCDWR Water Quality Classification	WS-IV				
Morphological Description (stream type) - Pre-Restoration	B4	B4	N/A	C4c/G4c	N/A
Morphological Description (stream type) - Post-Restoration	B4	B4	N/A	C4	N/A
Evolutionary trend (Simon's Model) - Pre- Restoration	III	V	I/II	IV	III
FEMA classification	N/A	N/A	N/A	Zone AE	N/A

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	Yes	Yes	USACE Action ID #SAW-2018-00451
Waters of the United States - Section 401	Yes	Yes	DWR# 18-0665
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	Yes	Alexander County Floodplain Development Permit #01-2019
Essential Fisheries Habitat	No	N/A	N/A

1.4 Monitoring Year 4 Data Assessment

Annual monitoring for MY4 was conducted between January and November 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 Alexander Farm Mitigation Plan (Wildlands, 2019).

1.4.1 Vegetation Assessment

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

1.4.2 Vegetation Areas of Concern

In general, the Site has responded well to supplemental planting and vegetation is establishing throughout the easement. Currently there are no vegetative areas of concern in MY4.

Vegetative Cover

Overall, herbaceous ground cover is well established throughout the Site and the planted stems are thriving. Most of the live stakes planted along UT1 in December of 2022 are doing well. Wildlands will keep an eye on this area of live stakes and will add more in the future as needed.

Invasive Species

Starting in April 2023, Wildlands conducted multiple treatments on invasive species in areas previously treated by Ecoforesters in 2022, with a focus on Chinese privet (*Ligustrum sinese*) and multiflora rose (*Rosa multiflora*). These treatments took place across the project and were spread out between the months of April - October. In addition, during June 2023, Wildlands internally completed an instream treatment of marsh dewflower (*Murdannia keisak*) in a small distinct area located at the top portion of UT1 Reach 1A. This in-stream vegetation was treated with glyphosate at 3%. As the project grows and tree height continues to provide more shade in this area, we expect that the instream vegetation will die back and not become established.

Areas of princess tree (*Paulownia tomentosa*) and tree of heaven (*Ailanthus altissima*) that were treated in the fall of MY2 have not shown signs of regrowth as of October 2023. As of the MY4 visual assessment walk, the areas of Chinese privet (*Ligustrum sinese)* and multiflora rose (*Rosa multiflora)* that had been treated have not yet shown signs of regrowth. Wildlands did not conduct any ring sprays this year as the fescue areas within the easement were not affecting the survival of the bare roots. Wildlands will continue to monitor these areas for resprouts throughout the seven-year monitoring period.

Conservation Easement

DMS conducted a conservation easement inspection on February 27, 2023. During the site walk, DMS observed four action items that needed to be completed. They are as follows:

- Fallen trees/limbs should be removed from the fence, all sections of damaged wire and the leaning corner post should be repaired.
- Remove metal and trash debris from the easement.
- Although five stamped aluminum monument caps were found, most of the caps were buried and not visible. Recommend field verification that the stamped caps are installed at each corner.
- Maintenance should be conducted within the internal crossing to stabilize the heavily impacted ground surface (see photos). Recommend cattle gates to reduce future impact.

Wildlands has addressed these action items, as follows:

- Wildlands removed the fallen trees/limbs from the fence on March 6th, 2023. After the tree/ limbs were removed the damaged fence wire was repaired along with any areas noted by DMS. Wildlands plans to brace the leaning corner post in January 2024.
- Wildlands staff has observed the pile of metal debris and associated trash and determined that it is too large to be removed by hand and will require heavy machinery. Therefore, Wildlands is

working with our construction crew and the tenant farmer on a plan to remove it as soon as possible.

- During MY4, Wildlands field verified 50 out of the 55 aluminum monument caps. All located monuments were stamped with the correct number as shown on the plat. Wildlands will try to locate the missing monuments with total station survey in early 2024. If they are not found, we will contact the surveyor.
- On April 6, 2023, the internal crossing was re-seeded.

In October 2023, Wildlands reassessed the easement perimeter across the project site and concluded that the fence and signage were in good shape, the fencing was still free of any fallen trees or limbs, and no easement violations were observed. Wildlands also assessed the condition of the internal crossing and found it to be well vegetated and in good condition. A photo of the crossing is located in Appendix F along with a copy of the DMS Inspection Report and our responses to the action items.

1.4.3 Stream Assessment

MY4 is a reduced monitoring year and detailed geomorphologic surveys are not required. However, based on field observations during site assessments, site maintenance, and the implementation of land stewardship activities, the majority of the project reaches within the Site continue to remain stable and are functioning as designed.

1.4.4 Stream Hydrology Assessment

Two automated pressure transducers were installed to document stream hydrology throughout the seven-year monitoring period. Henceforth, these devices are referred to as "crest gages (CG)" for those recording bankfull events. At the end of the seven-year monitoring period, four or more bankfull flow events must have occurred in separate years. In MY4, one bankfull event was documented at CG1 on UT1 Reach 1A and at CG2 on UT1 Reach 4A.

For the first 3 monitoring years, the Site used the daily precipitation data from the closest United States Geological Survey (USGS) rainfall gage 354616081085145, located at Oxford RS NR in Claremont, NC (USGS, 2022). When retrieving the rainfall data in early November 2022, it was noted that the station did not include any precipitation data after the end of September 2022. As directed on the USGS website (USGS, 2022), Wildlands emailed the National Groundwater Networks Coordinator, Jason Fine, about the status of the rainfall station. Mr. Fine responded noting that this station has been decommissioned due to the lack of funding and there are no plans to reinstate it (Fine, 2022). Wildlands chose to use data from another nearby rainfall gage station for the MY4 and subsequent monitoring reports. It is the Taylorsville Tower and the Station (TAYL) from the NC State Climate Office (2023). This rain gage is approximately 10 miles from the project Site. Please refer to Appendix D for hydrology summary data, gage plots, and monthly rainfall totals for 2023.

1.4.5 Stream Areas of Concern and Management Activity

All streams on the Site are remaining stable. Streambank vegetation has become established and is thriving.

In May of 2023, one beaver dam was noted towards the bottom of UT1 Reach 4B at station 165+58. Wildlands contacted USDA APHIS to remove the beavers. The beavers were trapped in June 2023, and the dam was released by Wildlands in August 2023. Damage caused by the beaver dam and inundation was minimal and likely temporary. It consisted of only minor vegetation damage and sediment deposition along the banks. As of October 2023, no other beaver activity has been noted on the Site.

Wildlands will continue to visually monitor the Site and manage the beaver activity as needed. Please refer to Appendix A for photographs of the intact and breached beaver dam.

During our site walk in October 2023, it was noticed that the lunker log at photo point 21 is no longer tied into the bank. However, the bank is stable and well vegetated with multiple willows and herbaceous vegetation. Since the bank is stable and the detached log isn't causing any other stability issues to the channel, Wildlands is planning to leave the log in its current location to continue to provide aquatic habitat; however, we will continue to monitor this section of the stream for signs of instability.

In early May 2022, prior to the IRT Credit Release Site Walk, Wildlands documented a lack of sufficient baseflow on approximately 200 LF of UT1 Reach 1A. Wildlands decided to visually monitor the section of stream to determine the cause of the lack of baseflow. Shallow baseflow returned to the area of the reach in early September of 2022. Wildlands believed that structure piping, noted in MY2, was allowing stream flow to move subsurface. Two piping log sills were repaired, and filter fabric was added in late 2022. Sufficient streamflow returned to the area in the fall of 2022 and continued throughout the remainder of MY3. During the MY4 visual assessments and with the use of a game camera, Wildlands documented that this same area continued to flow from its reemergence in late 2022 to November 2023 when it lost surface hydrology again. However, during the months when the water was flowing throughout the channel, all the repairs conducted in MY3 continued to function as designed. Wildlands contributes the repeat of this subsurface flow to less than normal rainfall over the previous few years along with the drought type conditions that began in the fall of this year. Rainfall data collected from the Taylorsville Tower (TYL) Station and the severe (D2) drought conditions documented for Alexander County by the National Drought Mitigation Center (2023) seem to corroborate this rationale. Rainfall fell well below the 70th percentile in September and has remained below normal through the remainder of the fall of 2023. Wildlands believes that baseflow in this area will return with winter rainfall. We will continue to monitor this area and report our findings in MY5.

Please refer to CCPV Figures 1 – 1c and Appendix A for stream stability tables and reference photos. Wildlands will continue to monitor these areas and remedial actions will be implemented if these areas threaten the stability of the project.

1.4.6 Wetland Assessment

During baseline monitoring, two In-situ Level TROLL® 100 pressure transducers, hereby referenced as ground water monitoring gages (GWGs), were installed within existing wetlands where Priority 1 restoration was conducted. This was done solely to verify the continuation of hydrologic wetland functions during the growing season, since no wetland credits are being sought for this project and no performance criteria have been established.

All GWGs are downloaded on a quarterly basis and maintained as needed. Calibration was completed by manually measuring water levels on all gages which confirmed the downloaded data. The NRCS Climate Analysis for Wetlands Tables (WETS) does not list a defined growing season for Alexander County due to insufficient data; therefore, the nearest WETS Station is Statesville 2 NNE (USDA, 2020) in Iredell County which is approximately 13.5 miles from the project site was used. The growing season based on data compiled from this WETS Station (1980 – 2020) is from April 4 through November 2 under typical precipitation conditions. The Site does not contain a rainfall gage; therefore, previously the daily precipitation data was collected from the closest USGS gage, 354616081085145, located at Oxford RS NR in Claremont, NC. However, due to the decommissioning of this rain gage (Fine, 2022), as previously discussed in Section 1.4.4, rainfall data was only available through the end of September 2022. Current rainfall data will be obtained from the Cardinal Data Retrieval System on the NC State Climate Office's (SCO) website's Taylorsville Tower Station ID (TAYL).

Results from both GWGs, during MY4, show that riparian wetlands maintained free groundwater within 12 inches of the ground surface for 48 consecutive days or 22.5% of the growing season for GWG1 and the entire growing season, 213 consecutive days, for GWG2.

Please refer to Figures 1 – 1c for the groundwater gage locations and to Appendix D for the groundwater gage photographs, groundwater hydrology data, and plots.

1.5 Monitoring Year 4 Summary

Overall, the Site is performing well. The planted stems on Site are thriving and the Site is still on track to meet the MY5 requirement of 260 stems per acre. As of the MY4 visual assessment walk, all of the areas of Chinese privet, multiflora rose, princess tree, and tree of heaven that had been treated this year along with the areas that were treated last year have not yet shown signs of regrowth. These treated areas are trending toward success; however, Wildlands will continue to monitor them and spot treat where necessary. Since the beavers have been removed and the dam was released, no current beaver activity has been seen on the Site. During the easement assessment in October 2023, no easement violations were documented. All easement fencing and signage was found to be in good condition.

In early May 2022 approximately 200 LF of stream along UT1 Reach 1A was lacking baseflow. Within this section of the reach, two piping log sills were repaired, and filter fabric was added. A game camera was installed in MY4 and it, as well as visual assessments, documented that sufficient streamflow returned in the fall of 2022 and continued to flow throughout the entire reach until November 2023 when drought conditions returned after months of below normal rainfall. As of the MY4 visual assessment, all of the repaired structures are functioning as designed. Wildlands will continue to monitor the Site, and additional adaptive maintenance will be implemented, as necessary, throughout the seven-year monitoring period to benefit the ecological health of the Site.

Section 2: METHODOLOGY

Geomorphic data were 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 Pathfinder and ArcGIS. Crest gages and groundwater gages are monitored quarterly. Hydrologic instrument installations are in accordance with the United States Army Corps of Engineers (USACE, 2005) standards and monitoring with the IRT's Stream and Wetland Mitigation Update (2016). Vegetation monitoring protocols followed the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008).

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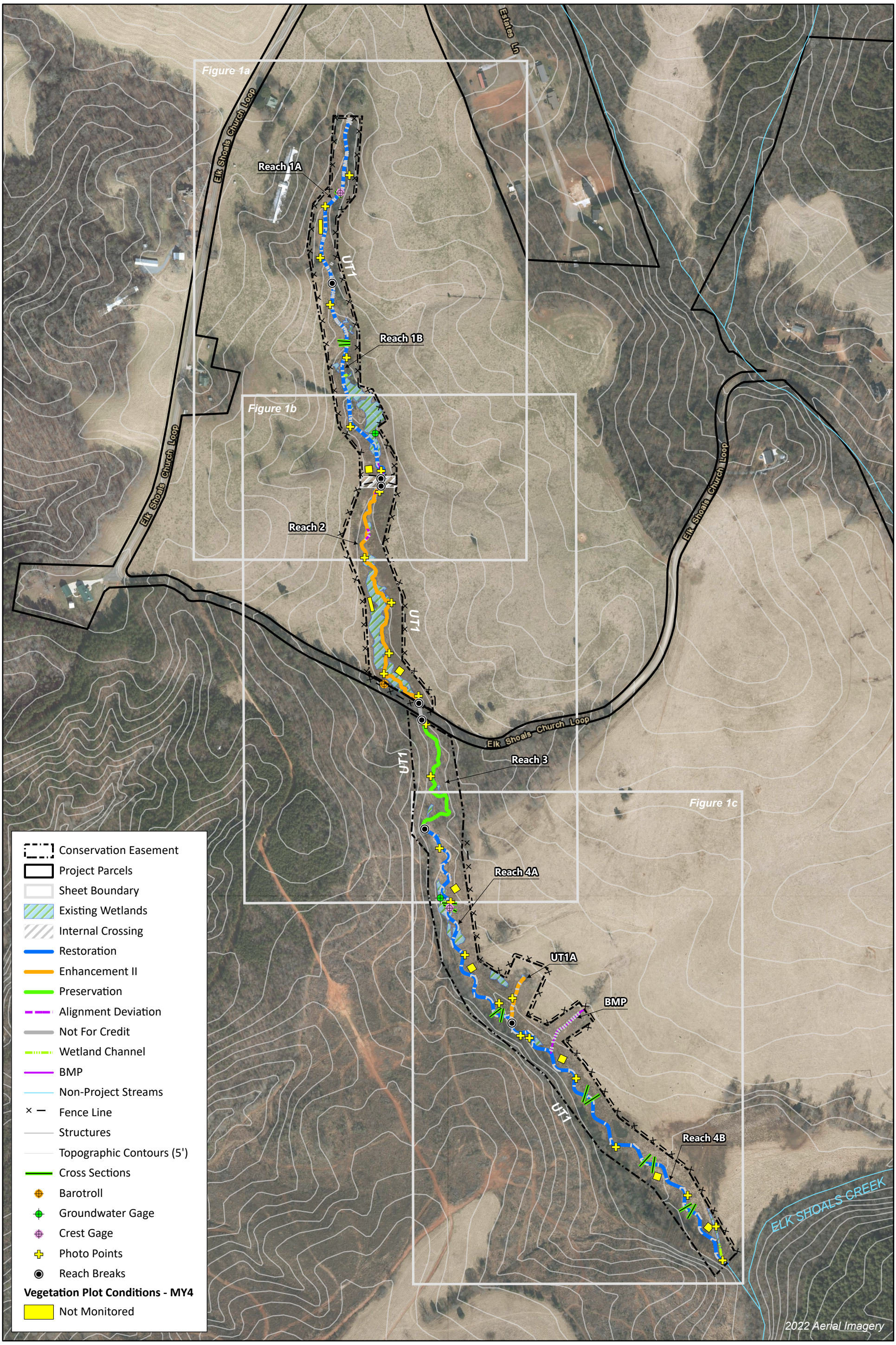
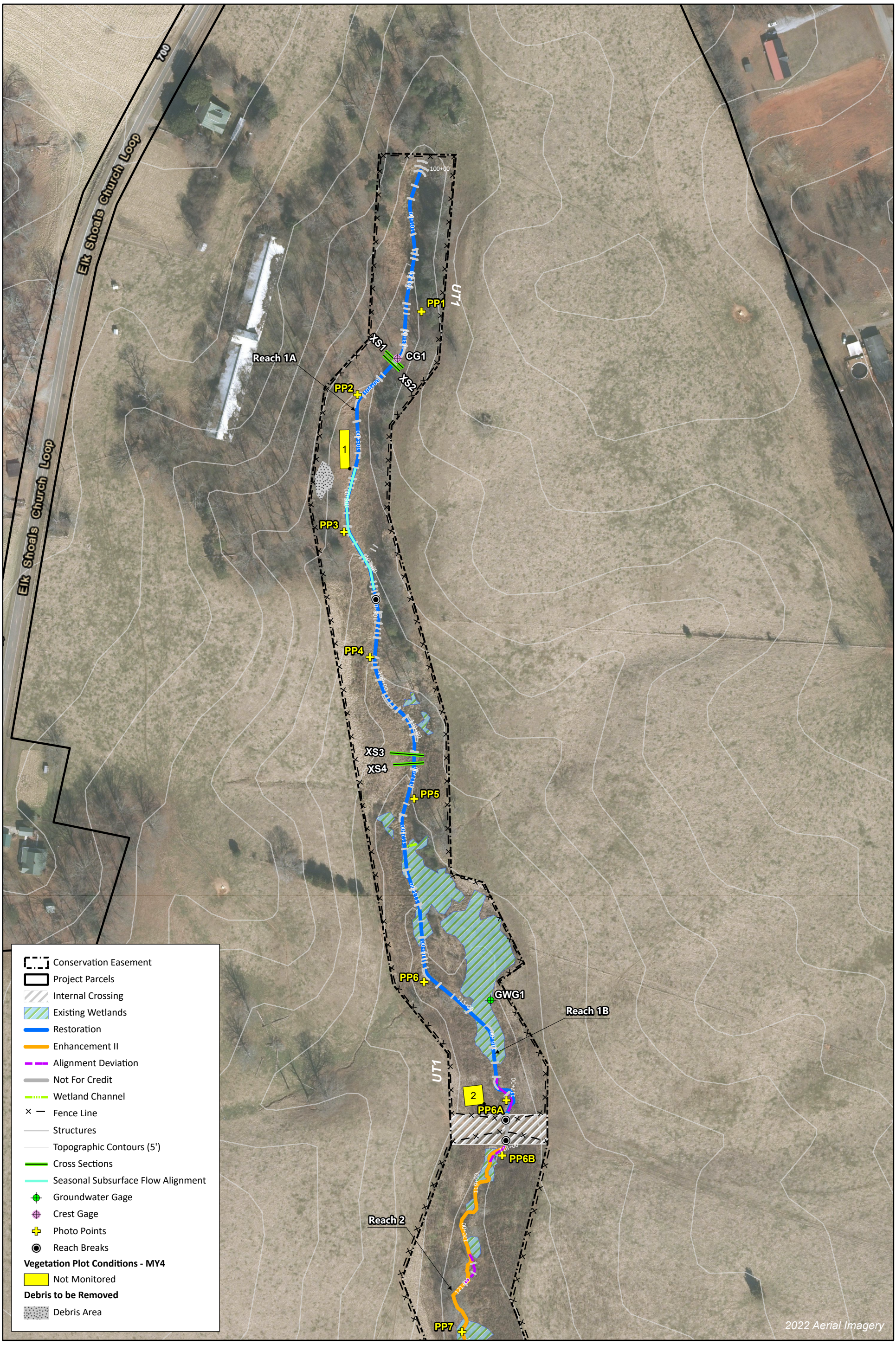
FIGURES



WILDLANDS ENGINEERING

Environmental Quality

Figure 1. Current Condition Plan View (Key)
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023
Alexander County, NC



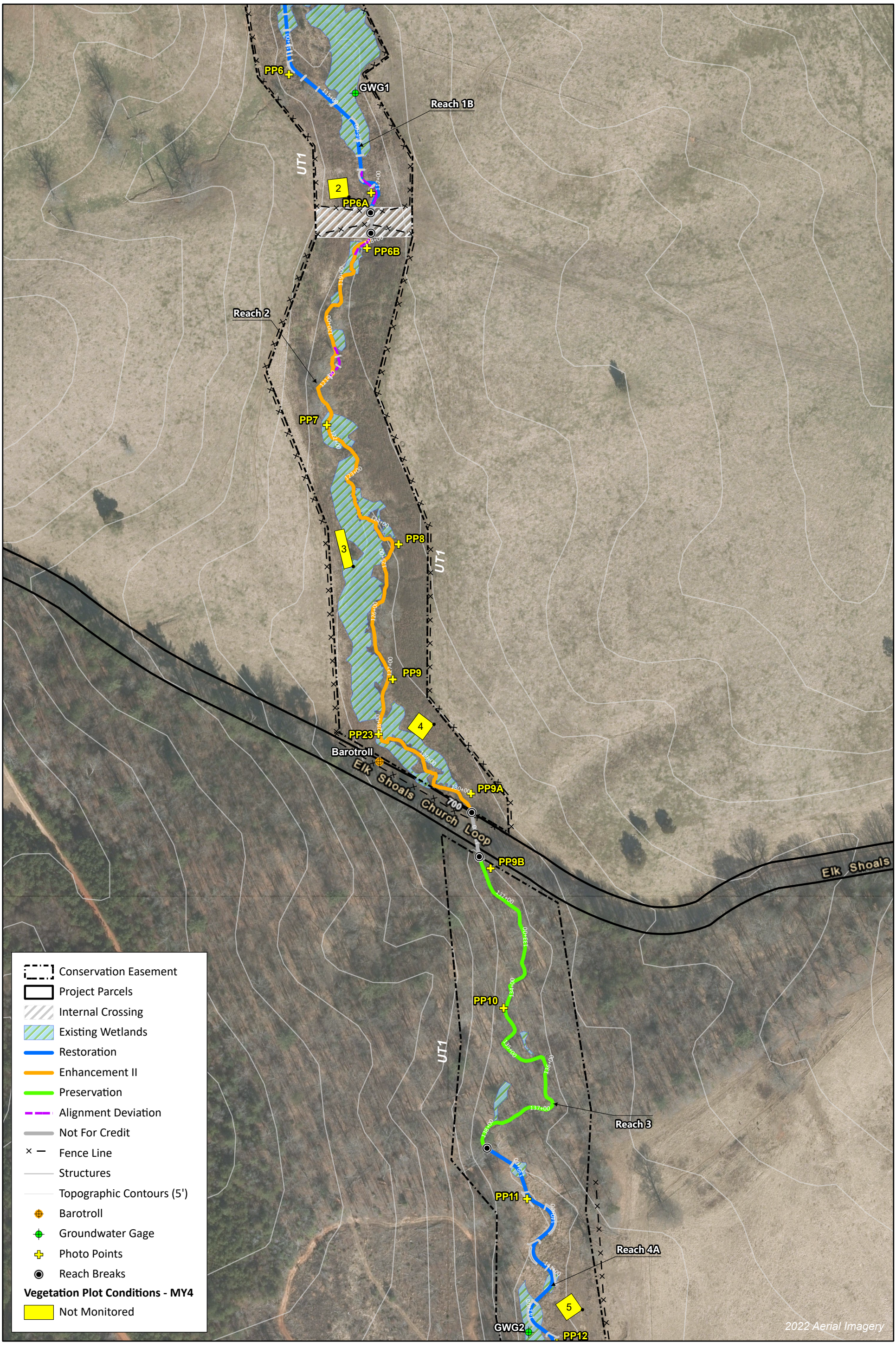
WILDLANDS ENGINEERING

Environmental Quality

0 150 300 Feet

N

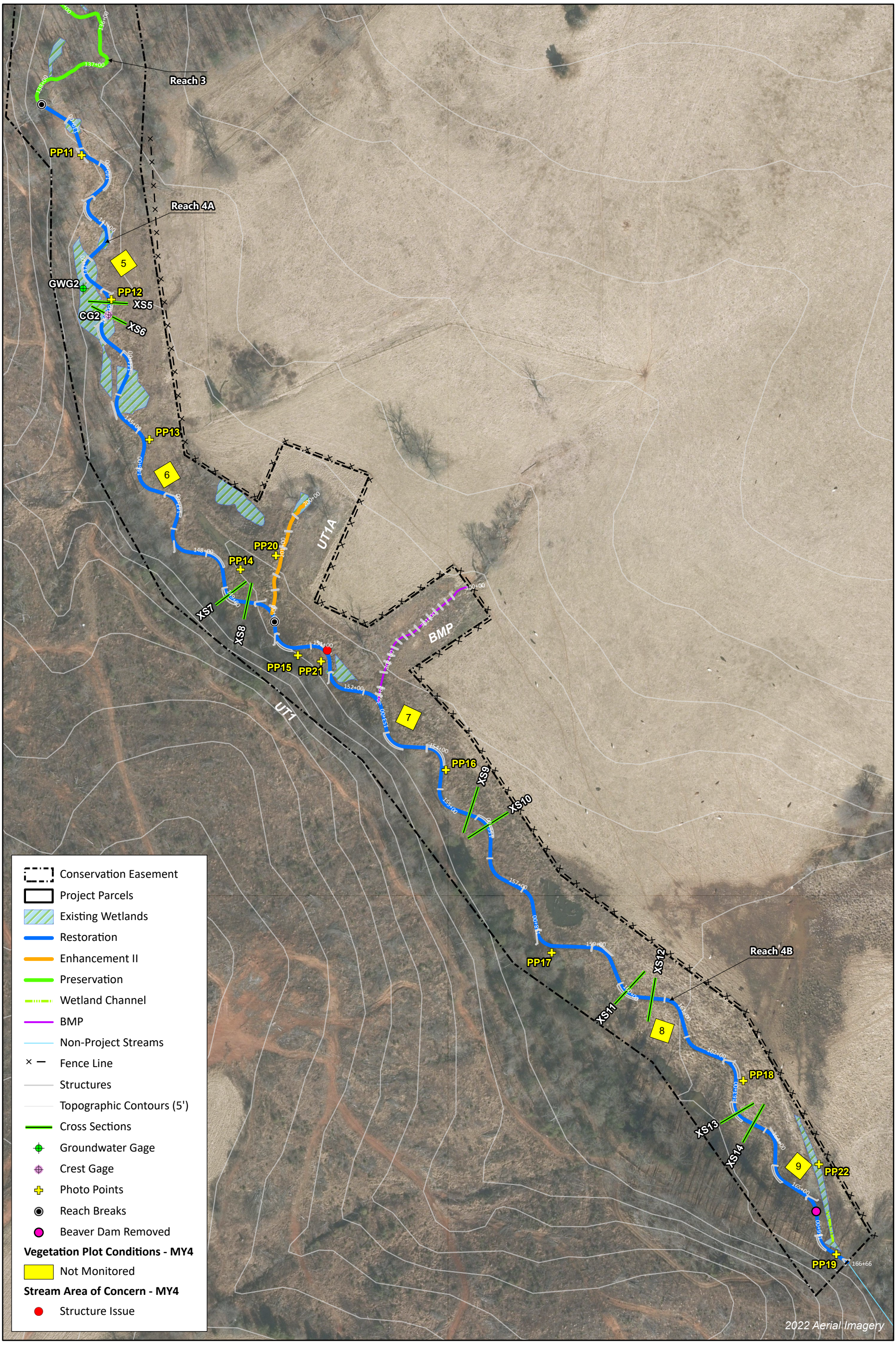
Figure 1a. Current Condition Plan View
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023
Alexander County, NC



WILDLANDS ENGINEERING

Environmental Quality

Figure 1b. Current Condition Plan View
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023
Alexander County, NC



WILDLANDS ENGINEERING

Environmental Quality

0 150 300 Feet

N

Figure 1c. Current Condition Plan View
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023
Alexander County, NC

APPENDIX A. Visual Assessment Data

Table 4a. Visual Stream Morphology Stability Assessment Table

Alexander Farm Mitigation Site

DMS Project No. 100048

Monitoring Year 4 - 2023

Date of visual assessment: October 4, 2023

Reach: UT1 Reach 1A

Assessed Length: 770

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	37	37			100%			
	3. Pool Condition[1]	Depth Sufficient	37	37			100%			
		Length Appropriate	37	37			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	6	6			100%			
		Thalweg centering at downstream of meander bend (Glide)	6	6			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. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	47	47			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	39	39			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	39	39			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	47	47			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	47	47			100%			

[1]Pool condition includes both types of pools: step pools and meander pools

Table 4b. Visual Stream Morphology Stability Assessment Table

Alexander Farm Mitigation Site

DMS Project No. 100048

Monitoring Year 4 - 2023

Date of visual assessment: October 4, 2023

Reach: UT1 Reach 1B

Assessed Length: 957

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	43	43			100%			
	3. Pool Condition[1]	Depth Sufficient	40	40			100%			
		Length Appropriate	40	40			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	6	6			100%			
		Thalweg centering at downstream of meander bend (Glide)	6	6			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. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	52	52			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	42	42			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	42	42			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	52	52			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	52	52			100%			

[1]Pool condition includes both types of pools: step pools and meander pools

Table 4c. Visual Stream Morphology Stability Assessment Table

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023

Date of visual assessment: October 4, 2023
Reach: UT1 Reach 4A
Assessed Length: 1,172

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	17	17			100%			
	3. Meander Pool Condition	Depth Sufficient	17	17			100%			
		Length Appropriate	17	17			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	16	16			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. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	30	30			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	18	18			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	18	18			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	30	30			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	30	30			100%			

Table 4d. Visual Stream Morphology Stability Assessment Table

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023

Date of visual assessment: October 4, 2023
Reach: UT1 Reach 4B
Assessed Length: 1,666

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	22	22			100%			
	3. Meander Pool Condition	Depth Sufficient	21	21			100%			
		Length Appropriate	21	21			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	21	21			100%			
		Thalweg centering at downstream of meander bend (Glide)	21	21			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. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	33	34			97%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	22	22			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	22	22			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	34	34			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	34	34			100%			

Table 5. Vegetation Condition Assessment Table

Alexander Farm Mitigation Site

DMS Project No. 100048

Monitoring Year 4 - 2023

Date of visual assessment: October 4, 2023

Planted Acreage **17.5**

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 **21.7**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000	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%

Stream Photographs
Monitoring Year 4

	
PP1 – view upstream—UT1 Reach 1A (03/09/2023)	**PP1** – view downstream—UT1 Reach 1A (03/09/2023)
	
PP2 – view upstream—UT1 Reach 1A (03/09/2023)	**PP2** – view downstream—UT1 Reach 1A (03/09/2023)
	
PP3 – view upstream—UT1 Reach 1A (03/09/2023)	**PP3** – view downstream—UT1 Reach 1A (03/09/2023)

	
PP4 – view upstream- UT1 Reach 1B (03/09/2023)	**PP4** – view downstream— UT1 Reach 1B (03/09/2023)
	
PP5 – view upstream- UT1 Reach 1B (03/09/2023)	**PP5** – view downstream—UT1 Reach 1B (03/09/2023)
	
PP6- view upstream—UT1 Reach 1B (03/09/2023)	**PP6** – view downstream—UT1 Reach 1B (03/09/2023)

	
PP6A- view upstream—UT1 Reach 1B (03/09/2023)	**PP6A** – view downstream—UT1 Reach 1B (03/09/2023)
	
PP6B- view upstream—UT1 Reach 2 (03/09/2023)	**PP6B** – view downstream—UT1 Reach 2 (03/09/2023)
	
PP7 – view upstream—UT1 Reach 2 (03/09/2023)	**PP7** – view downstream-UT1 Reach 2 (03/09/2023)

	
PP8 – view upstream—UT1 Reach 2 (03/09/2023)	**PP8** – view downstream—UT1 Reach 2 (03/09/2023)
	
PP9 – view upstream—UT1 Reach 2 (03/09/2023)	**PP9** – view downstream—UT1 Reach 2 (03/09/2023)
	
PP9A – view upstream—UT1 Reach 2 (03/09/2023)	**PP9A** – view downstream—UT1 Reach 2 (03/09/2023)

	
PP9B – view upstream—UT1 Reach 3 (03/09/2023)	**PP9B** – view downstream—UT1 Reach 3 (03/09/2023)
	
PP10 – view upstream—UT1 Reach 3 (03/09/2023)	**PP10** – view downstream—UT1 Reach 3 (03/09/2023)
	
PP11 – view upstream—UT1 Reach 4A (03/09/2023)	**PP11** – view downstream—UT1 Reach 4A (03/09/2023)

	
PP12 – view upstream— UT1 Reach 4A (03/09/2023)	**PP12** – view downstream—UT1 Reach 4A (03/09/2023)
	
PP13 – view upstream—UT1 Reach 4A (03/09/2023)	**PP13** – view downstream— UT1 Reach 4A (03/09/2023)
	
PP14 – view upstream— UT1 Reach 4A (03/09/2023)	**PP14** – view downstream— UT1 Reach 4A (03/09/2023)

	
PP15 – view upstream— UT1 Reach 4B (03/09/2023)	**PP15** – view downstream— UT1 Reach 4B (03/09/2023)
	
PP16 – view upstream— UT1 Reach 4B (03/09/2023)	**PP16** – view downstream— UT1 Reach 4B (03/09/2023)
	
PP17 – view upstream— UT1 Reach 4B (03/09/2023)	**PP17** – view downstream— UT1 Reach 4B (03/09/2023)

	
PP18 – view upstream— UT1 Reach 4B (03/09/2023)	**PP18** – view downstream— UT1 Reach 4B (03/09/2023)
	
PP19 – view upstream— UT1 Reach 4B (03/09/2023)	**PP19** – view downstream— UT1 Reach 4B (03/09/2023)
	
PP20 – view upstream— UT1A (03/09/2023)	**PP20** – view downstream— UT1A (03/09/2023)

PP21 – view upstream— UT1 Reach 4B (03/09/2023)

PP22 – view NW – Linear Wetland (03/09/2023)

PP22 – view SE – Linear Wetland (03/09/2023)

PP23 – view upstream— UT1 Reach 2 (03/09/2023)

PP23 – view downstream— UT1 Reach 2 (03/09/2023)

UT1 Reach 1A Subsurface Flow Photographs

Monitoring Year 4

UT1 Reach 1A – Water in Channel (01/25/2023)

UT1 Reach 1A – Water in Channel (02/25/2023)

UT1 Reach 1A – Water in Channel (03/10/2023)

UT1 Reach 1A – Water in Channel (08/11/2023)

UT1 Reach 1A – Lack of Water in Channel (11/28/2023)

UT1 Reach 1A Post-repaired MY2 Areas of Concern Photographs

Monitoring Year 4

UT1 R1A Structure Repaired (STA 104+00) – view upstream (11/10/2022)

UT1 R1A Structure Repaired (STA 104+05) – view upstream (11/10/2022)

UT1 R1A Structure Repaired (STA 104+00 – 104+05) – view upstream (03/09/2023)

Beaver Dam Removal Photographs
Monitoring Year 4

	
Beaver Dam – view upstream – UT1 R4B at STA 165+58 (05/10/2023)	**Removed Beaver Dam** – view upstream – UT1 R4B at STA 165+58 (08/15/2023)

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

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Permanent Vegetation Plot	MY3 Success Criteria Met (Y/N)	Tract Mean (MY3 - 2022)	
1	Y	78%	83%
2	Y		
3	Y		
4	Y		
5	Y		
6	Y		
7	N		
8	Y		
9	N		
Mobile Vegetation Plot	**MY3 Success Criteria Met (Y/N)**		
1	Y	89%	
2	Y		
3	Y		
4	Y		
5	Y		
6	Y		
7	N		
8	Y		
9	Y		

Table 7. CVS Permanent Vegetation Plot Metadata

Alexander Farm Mitigation Site

DMS Project No. 100048

Monitoring Year 3 - 2022

Report Prepared By	Freddy Ortega
Date Prepared	8/19/2022 9:15
Database Name	cvs-eep-entrytool-v2.5.0_AlexanderFarms_MY2.mdb
Database Location	\\192.168.3.7\projects\ActiveProjects\005-02169 Alexander Farm\Monitoring\Monitoring Year 3 (2022)\Vegetation Assessment
Computer Name	FREDDY
File Size	75628544
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 supplemental planting from 2021.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes supplemental planting from 2021, 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	100048
Project Name	Alexander Farm Mitigation Site
Description	The Alexander Farm Mitigation Site (Site) is in Alexander County approximately 6 miles west of Statesville and 15 miles northeast of Hickory.
Sampled Plots	18

Table 8a. Planted and Total Stem Counts
Alexander Farm Mitigation Site
DMS Project No. 100048
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**			**Permanent Plot 5**			**Permanent Plot 6**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	Box elder	Tree	3	3	3										5	5	13			
Acer rubrum	Red maple	Tree						4			15									13
Alnus serrulata [5]	Smooth alder	Tree																		
Betula nigra	River birch	Tree	1	1	1				5	5	5	3	3	3	1	1	1	4	4	4
Carpinus caroliniana [2]	American hornbeam	Shrub Tree																		
Cornus amomum [4]	Silky Dogwood	Tree																		
Diospyros virginiana	Persimmon	Tree							1	1	1			1	1	1	3	2	2	2
Gleditsia triacanthos	Honey locust	Tree																		
Juglans nigra	Black Walnut	Tree																		
Platanus occidentalis	Sycamore	Tree	1	1	2	2	2	2	1	1	1			1	5	5	9			1
Populus deltoides	Cottonwood	Tree																		2
Quercus sp. (unknown)	Oak species (unknown)	Tree																		
Quercus alba [1]	White oak	Tree										1	1	1						
Quercus pagoda	Cherrybark oak	Tree	4	4	4	6	6	6	3	3	6	1	1	1	2	2	2	1	1	1
Quercus phellos	Willow oak	Tree			1	1	1	1	2	2	2	3	3	3						
Quercus rubra	Northern Red oak	Tree				1	1	1	1	1	1									
Robinia pseudoacacia	Black Locust	Tree																		
Salix nigra [3]	Black willow	Tree																		
Salix sericea	Silky Willow	Shrub Tree																		
Ulmus alata	Winged elm	Tree																		
Ulmus americana [2]	American Elm	Tree																1	1	1
		Stem count	9	9	11	10	10	14	13	13	31	8	8	10	14	14	28	8	8	24
		size (ares)		1			1			1			1			1			1	
		size (ACRES)		0.0247			0.0247			0.0247			0.0247			0.0247			0.0247	
		Species count	4	4	5	4	4	5	6	6	7	4	4	6	5	5	5	4	4	7
		Stems per ACRE	364	364	445	405	405	567	526	526	1255	324	324	405	567	567	1133	324	324	971

Current Permanent Vegetation Plot Data (MY3 2022)										Annual Mean												
Scientific Name	**Common Name**	**Species Type**	**Permanent Plot 7**			**Permanent Plot 8**			**Permanent Plot 9**			**MY3 (2022)**			**MY2 (2021)**			**MY1 (2020)**			**MY0 (2020)**		
			PnoLS	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer negundo	Box elder	Tree	1	1	1	2	2	2				11	11	19	11	11	12	6	6	7	15	15	15
Acer rubrum	Red maple	Tree												32			37			35			
Alnus serrulata [5]	Smooth alder	Tree								1	1		1	1									
Betula nigra	River birch	Tree	2	2	2	3	3	3		1	1	19	20	20	20	20	20	15	15	15	17	17	17
Carpinus caroliniana [2]	American hornbeam	Shrub Tree													1	1	1						
Cornus amomum [4]	Silky Dogwood	Tree		3	3								3	3									
Diospyros virginiana	Persimmon	Tree										4	4	7	5	5	7			1			
Gleditsia triacanthos	Honey locust	Tree																		1			
Juglans nigra	Black Walnut	Tree															1						
Platanus occidentalis	Sycamore	Tree							3	3	3	12	12	19	12	12	16	8	8	10	9	9	9
Populus deltoides	Cottonwood	Tree												2			1						
Quercus sp. (unknown)	Oak species (unknown)	Tree																			7	7	7
Quercus alba [1]	White oak	Tree										1	1	1	1	1	1	3	3	3			
Quercus pagoda	Cherrybark oak	Tree				1	1	1	1	3	3	19	21	24	18	18	18	22	22	22	33	33	33
Quercus phellos	Willow oak	Tree				5	5	5	2	3	3	13	14	15	13	13	13	17	17	17	28	28	28
Quercus rubra	Northern Red oak	Tree										2	2	2	2	2	2	2	2	2	2	2	2
Robinia pseudoacacia	Black Locust	Tree															1						
Salix nigra	Black willow	Tree	3	8	8						1	3	8	9						20			
Salix sericea	Silky Willow	Shrub Tree															10						
Ulmus alata	Winged elm	Tree															1			1			
Ulmus americana [2]	American Elm	Tree		2	2				1	1	1	2	4	4									
		Stem count	6	16	16	11	11	11	7	12	13	86	101	158	83	83	141	73	73	134	111	111	111
		size (ares)		1			1			1			9			9			9		9	
		size (ACRES)		0.0247			0.0247			0.0247			0.2224			0.2224			0.2224		0.2224	
		Species count	3	5	5	4	4	4	4	6	7	10	12	14	9	9	15	7	7	12	7	7	7
		Stems per ACRE	243	647	647	445	445	445	283	486	526	387	454	710	373	373	634	328	328	603	499	499	499

[1] Prior to leaf out in MY0, the species were identified as *Quercus sp.* (unknown).
[2] *Ulmus americana* was incorrectly identified as *Carpinus caroliniana* in MY2.
[3] *Salix nigra* was added to the list due to supplemental planting in MY2.
[4] *Cornus amomum* was added to the list due to supplemental planting in MY2.
[5] *Alnus serrulata* was added to the list due to supplemental planting in MY2.

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
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Current Mobile Vegetation Plot (MP) Data (MY3 2022)												Annual Mean			
Scientific Name	**Common Name**	**Species Type**	**MP1**	**MP2**	**MP3**	**MP4**	**MP5**	**MP6**	**MP7**	**MP8**	**MP9**	**MY3 (2022)**	**MY2 (2021)**	**MY1 (2020)**	**MY0 (2020)**
			T	**T**	**T**	**T**	**T**	**T**	**T**	**T**	**T**	**T**	**T**	**T**	**T**
Acer negundo	Box elder	Tree	1	1				1		2		5	11	2	6
Acer rubrum	Red maple	Tree											3		
Acer saccharinum	Silver maple	Tree						1			2	3			
Alnus serrulata [5]	Smooth alder	Tree											7		
Betula nigra	River birch	Tree	1	4	3	3	4	2	2	4	1	24	23	4	12
Carpinus caroliniana	American hornbeam	Shrub Tree											1		
Cornus amomum [2]	Silky Dogwood	Tree			1							1			
Diospyros virginiana	Persimmon	Tree		1		1						2	9		
Ilex opaca	American Holly	Tree											3		
Juniperus virginiana	Eastern red cedar	Tree											3		
Liriodendron tulipifera	Tulip Poplar	Tree	2									2			
Platanus occidentalis	Sycamore	Tree	4	1	1	1	2	6	2	4	3	24	15	3	4
Populus deltoides	Eastern Cottonwood	Tree			1							1	1		
Quercus sp. (unknown) [1]	Oak species (unknown)	Tree													4
Quercus alba [1]	White oak	Tree				1	1					2	1		
Quercus pagoda	Cherrybark oak	Tree	1	2	2	3	1	1		1	3	14	6	7	8
Quercus phellos	Willow oak	Tree		1			1	1			1	4	1	1	3
Quercus rubra	Northern Red oak	Tree											11		2
Salix nigra [4]	Black Willow	Tree			1				1		2	4			
Ulmus americana [3]	American Elm	Tree		1		1						2			
		Stem count	9	11	9	10	9	12	5	11	12	88	79	17	39
		size (ares)	1	1	1	1	1	1	1	1	1	9	8	3	3
		size (ACRES)	0.0247	0.0247	0.0247	0.0247	0.0247	0.0247	0.0247	0.0247	0.0247	0.1977	0.1977	0.0741	0.0741
		Species count	5	7	6	6	5	6	3	4	6	13	14	5	7
		Stems per ACRE	364	445	364	405	364	486	202	445	486	445	400	229	526

Overall Site Annual Mean						
Scientific Name	**Common Name**	**Species Type**	**MY3 (2022)**	**MY2 (2021)**	**MY1 (2020)**	**MY0 (2020)**
			PnoLS	**PnoLS**	**PnoLS**	**PnoLS**
Acer negundo	Box elder	Tree	16	22	8	21
Acer saccharinum	Silver maple	Tree	3			
Alnus serrulata [5]	Smooth alder	Tree				
Betula nigra	River birch	Tree	43	43	19	29
Carpinus caroliniana	American hornbeam	Shrub Tree		2		
Cornus amomum [2]	Silky Dogwood	Tree	1			
Diospyros virginiana	Persimmon	Tree	6	14		
Ilex opaca	American Holly	Tree				
Juniperus virginiana	Eastern red cedar	Tree		3		
Liriodendron tulipifera	Tulip Poplar	Tree	2			
Platanus occidentalis	Sycamore	Tree	36	27	11	13
Populus deltoides	Eastern Cottonwood	Tree	1	1		
Quercus sp. (unknown) [1]	Oak species (unknown)	Tree				11
Quercus alba [1]	White oak	Tree	3	2	3	
Quercus pagoda	Cherrybark oak	Tree	33	24	29	41
Quercus phellos	Willow oak	Tree	17	14	18	31
Quercus rubra	Northern Red oak	Tree	2	13	2	4
Salix nigra [4]	Black Willow	Tree	7			
Ulmus americana [3]	American Elm	Tree	4			
		Stem count	174	165	90	150
		size (ares)	18	17	12	12
		size (ACRES)	0.4448	0.4201	0.2965	0.2965
		Species count	14	11	7	7
		Stems per ACRE	391	393	304	506

[1] Prior to leaf out in MY0, the species were identified as *Quercus sp* . (unknown).
[2] *Cornus amomum* was added to the list due to supplemental planting in MY2.
[3] *Ulmus americana* was added to the list due to supplemental planting in MY2.
[4] *Salix nigra* was added to the list due to supplemental planting in MY2.
[5] *Alnus serrulata* was added to the list due to supplemental planting in MY2.

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
T: Total stems

APPENDIX C. Stream Geomorphology Data

Stream Assessment and Analysis Not Required in Monitoring Year 4

Data Included from Monitoring Year 3

Table 9. Baseline Stream Data Summary
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

		Pre-Restoration Condition								Design								As-Built/Baseline							
Parameter	**Gage**	**UT1 R1A**		**UT1 R1B**		**UT1 R4A**		**UT1 R4B**		**UT1 R1A**		**UT1 R1B**		**UT1 R4A**		**UT1 R4B**		**UT1 R1A**		**UT1 R1B**		**UT1 R4A**		**UT1 R4B**	
		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)	N/A	5.8	7.2	5.8	7.2	6.0	9.1	8.2	8.6	6.5		8.0		11.5		12.0		6.6		7.9		11.6	12.9	11.4	12.5
Floodprone Width (ft)		7	9	7	9	24	54	8	10	9	14	11	18	25	58	26	60	23		25		64	68	75	83
Bankfull Mean Depth (ft)		0.6	0.7	0.6	0.7	1.0	1.4	1.2		0.5		0.5		0.9		0.9		0.4		0.7		0.8	1.0	1.0	1.1
Bankfull Max Depth (ft)		0.8	0.9	0.8	0.9	1.9	2.0	2.0	2.1	0.6	0.7	0.6	0.8	1.1	1.3	1.1	1.4	0.9		0.9		1.3	1.4	1.3	1.6
Bankfull Cross-sectional Area (ft^2)[1]		4.0	4.4	4.0	4.4	8.6	8.8	10.1	10.3	3.0		4.3		10.1		11.3		2.7		5.5		10.6	12.0	11.9	12.6
Width/Depth Ratio		8.5	12.0	8.5	12.0	8.0	14.1	6.6	7.2	14.0		15.0		13.0		13.0		16.3		11.4		11.3	15.8	10.3	13.1
Entrenchment Ratio[3]		1.2		1.2		3.0	9.1	1.0	1.1	1.4	2.2	1.4	2.2	2.2	5.0	2.2	5.0	3.5		3.2		5.3	5.5	6.0	6.6
Bank Height Ratio		5.9	6.4	5.9	6.4	1.0	2.1	2.0	2.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.0		1.0		1.0		1.0	
D_{50} (mm)		13.6	22.6	13.6	22.6	17.7	22.6	17.7	22.6	---		---		---		---		49.6		65.3		59.4	71.0	55.6	69.1
Profile																									
Riffle Length (ft)	N/A																								
Riffle Slope (ft/ft)		---		---		---		---		0.009	0.052	0.018	0.049	0.002	0.024	0.002	0.026	0.006	0.052	0.002	0.063	0.001	0.037	0.004	0.021
Pool Length (ft)																									
Pool Max Depth (ft)		1.0		1.0		2.1		N/A		0.9	1.4	1.1	1.6	1.8	2.6	1.9	2.8	0.9	2.1	1.2	2.4	1.9	2.8	1.8	3.9
Pool Spacing (ft)		8	24	8	24	11	19	N/A		7.0	33.0	8.0	40.0	26.0	81.0	28.0	84.0	7.8	49.9	7.8	49.7	28.0	97.5	47.2	115.3
Pool Volume (ft^3)																									
Pattern																									
Channel Beltwidth (ft)	N/A	N/A		N/A		9.0	99.0	9.0	99.0	N/A		N/A		23.0	92.0	24.0	96.0	N/A		N/A		23.0	92.0	24.0	96.0
Radius of Curvature (ft)		N/A		N/A		27.0	65.0	27.0	65.0	N/A		N/A		23.0	35.0	24.0	36.0	N/A		N/A		23.0	35.0	24.0	36.0
Rc/Bankfull Width		N/A		N/A		4.5	7.1	3.3	7.6	N/A		N/A		2.0	3.0	2.0	3.0	N/A		N/A		2.0	3.0	2.0	3.0
Meander Length (ft)		N/A		N/A		58.0	201.0	58.0	201.0	N/A		N/A		58.0	161.0	60.0	168.0	N/A		N/A		58.0	161.0	60.0	168.0
Meander Width Ratio		N/A		N/A		1.5	10.9	1.1	11.5	N/A		N/A		2.0	8.0	2.0	8.0	N/A		N/A		2.0	8.0	2.0	8.0
Substrate, Bed and Transport Parameters																									
Ri%/Ru%/P%/G%/S%	N/A																								
SC%/Sa%/G%/C%/B%/Be%																									
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}$/dip/disp		0.4/0.7/1.3/23.6/42.0/90.0				0.3/0.5/0.9/33.7/45.0/90.0				---		---		---		---		0.2/0.8/7.7/102.0/156.8/256.0		SC/0.2/2.0/86.5/128.0/512.0		SC/0.3/1.7/76.7/128.0/256.0		SC/SC/0.7/75.9/128.0/256.0	
Reach Shear Stress (Competency) lb/ft^1		---		---		---		---		---		---		---		---		---		---		---		---		---	
Max part size (mm) mobilized at bankfull		---		---		---		---		---		---		---		---		---		---		---		---	
Stream Power (Capacity) W/m^1																									
Additional Reach Parameters																									
Drainage Area (SM)	N/A	0.05		0.11		0.29		0.40		0.05		0.11		0.29		0.40		0.05		0.11		0.29		0.40	
Watershed Impervious Cover Estimate (%)		1%								1%								1%							
Rosgen Classification		B4		B4		C4c		G4c		B4		B4		C4		C4		B4		B4		C4		C4	
Bankfull Velocity (fps)		5.5	5.8	5.5	5.8	3.4	3.8	3.9	4.0	4.1		4.5		3.50		3.9		---		---		---		---	
Bankfull Discharge (cfs)		---		23.0		31.0	54.6	40.1		12		20		32		40		---		---		---		---	
Q-NFF regression (2-yr)																									
Q-USGS extrapolation (1.2-yr)		---		---		---		---		---		---		---		---		---		---		---		---	
Max Q-Mannings		---		---		---		---		---		---		---		---		---		---		---		---	
Valley Slope (ft/ft)		0.0370		0.0370		0.0130		0.0130		0.0370		0.0370		0.0130		0.0130		0.0370		0.0370		0.0130		0.0130	
Channel Thalweg Length (ft)		1,901				2,825				770		969		1,172		1,666		770		957		1,172		1,666	
Sinuosity		1.14		1.14		1.13		1.13		1.03		1.03		1.11		1.11		1.02		0.96		1.23		1.15	
Bankfull/Channel Slope (ft/ft)		0.0340		0.0340		0.0080		0.0080		0.0362		0.0362		0.0093		0.0093		0.0370		0.0375		0.0088		0.0085	

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)
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

	UT1 R1A Cross-Section 1 (Riffle)								UT1 R1A Cross-Section 2 (Pool)								UT1 R1B Cross-Section 3 (Pool)								UT1 R1B 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]	976.6	976.6	976.6	976.6					976.2	976.3	976.3	976.2					945.7	945.5	945.5	945.5					945.3	945.6	945.6	945.6				
Low Bank Elevation	976.6	976.6	976.6	976.6					976.2	976.3	976.3	976.2					945.7	945.5	945.5	945.5					945.3	945.2	945.3	945.6				
Bankfull Width (ft)	6.6	6.6	5.6	6.7					7.0	8.0	7.8	7.5					8.3	7.1	7.7	6.7					7.9	6.4	6.3	9.2				
Floodprone Width (ft)[2]	23.3	21.5	22.2	19.9					-	-	-	-					-	-	-	-					25.2	18.8	21.3	25.5				
Bankfull Mean Depth (ft)	0.4	0.4	0.5	0.4					1.2	1.1	1.0	0.9					1.4	1.2	1.0	0.9					0.7	0.4	0.5	0.6				
Bankfull Max Depth (ft)	0.9	0.9	0.9	0.8					1.9	2.0	1.9	1.5					2.1	1.9	1.7	1.7					0.9	0.8	0.8	1.1				
Bankfull Cross-Sectional Area (ft^2)	2.7	2.8	2.7	2.5					8.2	8.5	8.1	6.8					11.7	8.4	7.7	6.2					5.5	2.8	3.0	5.4				
Bankfull Width/Depth Ratio	16.3	15.6	11.9	17.5					6.0	7.6	7.5	8.4					5.9	6.1	7.7	7.3					11.4	14.6	13.5	15.6				
Bankfull Entrenchment Ratio[3]	3.5	3.2	3.9	3.0					-	-	-	-					-	-	-	-					3.2	2.9	3.4	2.8				
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0					-	-	-	-					-	-	-	-					1.0	0.7	0.7	1.0				
	UT1 R4A Cross-Section 5 (Pool)								**UT1 R4A Cross-Section 6 (Riffle)**								**UT1 R4A Cross-Section 7 (Pool)**								**UT1 R4A Cross-Section 8 (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]	891.5	891.6	891.7	891.7					891.8	892.0	892.0	892.0					885.5	885.6	885.4	885.4					885.1	885.4	885.4	885.4				
Low Bank Elevation	891.5	891.6	891.7	891.7					891.8	891.9	891.9	891.9					885.5	885.6	885.4	885.4					885.1	885.4	885.4	885.4				
Bankfull Width (ft)	8.9	7.8	8.1	8.6					12.9	13.5	13.0	13.2					16.2	16.2	13.5	12.1					11.6	12.7	14.1	12.9				
Floodprone Width (ft)[2]	-	-	-	-					68.0	66.5	66.3	66.4					-	-	-	-					64.2	62.6	62.6	62.6				
Bankfull Mean Depth (ft)	1.4	1.1	1.1	1.1					0.8	0.6	0.7	0.7					1.0	0.9	0.8	0.9					1.0	0.9	0.9	1.0				
Bankfull Max Depth (ft)	2.1	2.0	2.0	1.9					1.3	1.2	1.4	1.4					2.3	2.3	2.2	2.1					1.4	1.5	1.6	1.6				
Bankfull Cross-Sectional Area (ft^2)	12.9	8.6	8.9	9.5					10.6	8.4	9.4	9.4					15.7	14.2	10.8	11.1					12.0	11.6	12.3	12.4				
Bankfull Width/Depth Ratio	6.2	7.1	7.4	7.9					15.8	21.5	18.1	18.7					16.7	18.5	16.8	13.1					11.3	13.9	16.3	13.5				
Bankfull Entrenchment Ratio[3]	-	-	-	-					5.3	4.9	5.1	5.0					-	-	-	-					5.5	4.9	4.4	4.8				
Bankfull Bank Height Ratio	-	-	-	-					1.0	0.9	0.9	0.9					-	-	-	-					1.0	1.0	1.0	1.0				
	UT1 R4B Cross Section 9 (Riffle)								**UT1 R4B Cross Section 10 (Pool)**								**UT1 R4B Cross-Section 11 (Pool)**								**UT1 R4B 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]	879.8	880.2	880.1	880.1					879.5	879.7	879.9	880.0					875.5	875.4	875.4	875.4					875.1	875.4	875.3	875.3				
Low Bank Elevation	879.8	880.0	880.1	880.1					879.5	879.7	879.9	880.0					875.5	875.4	875.4	875.4					875.1	875.3	875.2	875.3				
Bankfull Width (ft)	12.5	12.8	14.9	14.4					13.3	15.0	18.3	18.9					13.2	10.9	11.4	10.6					12.5	12.3	12.8	12.5				
Floodprone Width (ft)[2]	82.5	80.9	80.8	80.9					-	-	-	-					-	-	-	-					74.7	74.6	74.5	74.6				
Bankfull Mean Depth (ft)	1.0	0.7	0.8	0.8					2.5	1.8	1.5	1.5					1.6	1.6	1.5	1.7					1.0	0.8	0.9	0.9				
Bankfull Max Depth (ft)	1.3	1.3	1.4	1.5					3.7	3.5	3.7	3.6					3.0	2.7	2.8	2.9					1.6	1.5	1.5	1.6				
Bankfull Cross-Sectional Area (ft^2)	11.9	9.0	11.3	11.9					32.7	26.5	28.1	28.1					21.0	17.7	17.6	17.9					12.5	10.2	11.2	11.7				
Bankfull Width/Depth Ratio	13.1	18.2	19.6	17.3					5.4	8.5	12.0	12.7					8.3	6.8	7.4	6.2					12.5	14.8	14.6	13.3				
Bankfull Entrenchment Ratio[3]	6.6	6.3	5.4	5.6					-	-	-	-					-	-	-	-					6.0	6.1	5.8	6.0				
Bankfull Bank Height Ratio	1.0	0.9	1.0	1.0					-	-	-	-					-	-	-	-					1.0	0.9	0.9	1.0				
	UT1 R4B Cross Section 13 (Pool)								**UT1 R4B Cross Section 14 (Riffle)**																							
Dimension and Substrate	**Base[4]**	**MY1[4]**	**MY2[4]**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**																
Bankfull Elevation[1]	873.5	873.7	873.7	873.7					873.2	873.6	873.4	873.4																				
Low Bank Elevation	873.5	873.7	873.7	873.7					873.2	873.5	873.2	873.4																				
Bankfull Width (ft)	17.5	16.8	19.7	18.0					11.4	12.6	11.2	13.2																				
Floodprone Width (ft)[2]	-	-	-	-					75.2	74.0	73.7	73.9																				
Bankfull Mean Depth (ft)	1.3	1.1	1.1	1.1					1.1	0.9	0.9	0.9																				
Bankfull Max Depth (ft)	2.9	2.7	3.1	3.1					1.5	1.6	1.6	1.7																				
Bankfull Cross-Sectional Area (ft^2)	23.4	18.5	22.3	20.0					12.6	11.3	10.0	12.2																				
Bankfull Width/Depth Ratio	13.1	15.2	17.3	16.2					10.3	13.9	12.4	14.2																				
Bankfull Entrenchment Ratio[3]	-	-	-	-					6.6	5.9	6.6	5.6																				
Bankfull Bank Height Ratio	-	-	-	-					1.0	1.0	0.9	1.0																				

[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]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]An error was made when processing cross-section 13's data on all parameters for Baseline, all parameters except mean and max depth for MY1, and all parameters except max depth for MY2. The correction was made in MY3, and the data listed has been revised to reflect that correction.

Table 11a. Monitoring Data - Stream Reach Data Summary
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

UT1 R1A

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)	6.6		6.6		5.6		6.7									
Floodprone Width (ft)	23		22		22		20									
Bankfull Mean Depth (ft)	0.4		0.4		0.5		0.4									
Bankfull Max Depth (ft)	0.9		0.9		0.9		0.8									
Bankfull Cross-sectional Area (ft^2)	2.7		2.8		2.7		2.5									
Width/Depth Ratio	16.3		15.6		11.9		17.5									
Entrenchment Ratio	3.5		3.2		3.9		3.0									
Bank Height Ratio	1.0		1.0		1.0		1.0									
D_{50} (mm)	49.6															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.006	0.052														
Pool Length (ft)																
Pool Max Depth (ft)	0.9	2.1														
Pool Spacing (ft)	7.8	49.9														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	N/A[1]															
Radius of Curvature (ft)	N/A[1]															
Rc/Bankfull Width (ft/ft)	N/A[1]															
Meander Length (ft)	N/A[1]															
Meander Width Ratio	N/A[1]															
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	0.2/0.8/7.7/102.0/156.8/256.0		0.2/0.9/19.6/77.0/119.7/256.0		1.5/10.3/16.8/103.6/151.8/180.0		---		---		---		---		---	
Reach Shear Stress (Competency) lb/ft^2	---															
Max part size (mm) mobilized at bankfull	---															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.05															
Watershed Impervious Cover Estimate (%)	1%															
Rosgen Classification	B4															
Bankfull Velocity (fps)	---															
Bankfull Discharge (cfs)	---															
Valley Slope (ft/ft)	0.0370															
Channel Thalweg Length (ft)	770															
Sinuosity	1.02															
Bankfull/Channel Slope (ft/ft)	0.0370															

[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 11b. Monitoring Data - Stream Reach Data Summary
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

UT1 R1B

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)	7.9		6.4		6.3		9.2									
Floodprone Width (ft)	25		19		21		26									
Bankfull Mean Depth (ft)	0.7		0.4		0.5		0.6									
Bankfull Max Depth (ft)	0.9		0.8		0.8		1.1									
Bankfull Cross-sectional Area (ft^2)	5.5		2.8		3.0		5.4									
Width/Depth Ratio	11.4		14.6		13.5		15.6									
Entrenchment Ratio	3.2		2.9		3.4		2.8									
Bank Height Ratio	1.0		0.7		0.7		1.0									
D_{50} (mm)	65.3															
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.002	0.063														
Pool Length (ft)																
Pool Max Depth (ft)	1.2	2.4														
Pool Spacing (ft)	7.8	49.7														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	N/A															
Radius of Curvature (ft)	N/A															
Rc/Bankfull Width (ft/ft)	N/A															
Meander Length (ft)	N/A															
Meander Width Ratio	N/A															
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/0.2/2.0/86.5/128.0/512.0		0.5/0.9/18.6/57.2/105.0/128.0		0.1/4.7/13.3/95.4/135.5/180.0		---		---		---		---		---	
Reach Shear Stress (Competency) lb/ft^2	---															
Max part size (mm) mobilized at bankfull	---															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.11															
Watershed Impervious Cover Estimate (%)	0															
Rosgen Classification	B4															
Bankfull Velocity (fps)	---															
Bankfull Discharge (cfs)	---															
Valley Slope (ft/ft)	0.0370															
Channel Thalweg Length (ft)	957															
Sinuosity	0.96															
Bankfull/Channel Slope (ft/ft)	0.0375															

[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 11c. Monitoring Data - Stream Reach Data Summary
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

UT1 R4A

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)	11.6	12.9	12.7	13.5	13.0	14.1	12.9	13.2								
Floodprone Width (ft)	64	68	63	67	63	66	63	66								
Bankfull Mean Depth (ft)	0.8	1.0	0.6	0.9	0.7	0.9	0.7	1.0								
Bankfull Max Depth (ft)	1.3	1.4	1.2	1.5	1.4	1.6	1.4	1.6								
Bankfull Cross-sectional Area (ft^2)	10.6	12.0	8.4	11.6	9.4	12.3	9.4	12.4								
Width/Depth Ratio	11.3	15.8	13.9	21.5	16.3	18.1	13.5	18.7								
Entrenchment Ratio	5.3	5.5	4.9		4.4	5.1	4.8	5.0								
Bank Height Ratio	1.0		0.9	1.0	0.9	1.0	0.9	1.0								
D_{50} (mm)	59.4	71.0														
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.001	0.037														
Pool Length (ft)																
Pool Max Depth (ft)	1.9	2.8														
Pool Spacing (ft)	28.0	97.5														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	23.0	92.0														
Radius of Curvature (ft)	23.0	35.0														
Rc/Bankfull Width (ft/ft)	2.0	3.0														
Meander Length (ft)	58.0	161.0														
Meander Width Ratio	2.0	8.0														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	SC/0.3/1.7/76.7/128.0/256.0		SC/0.3/1.0/93.2/146.7/256.0		0.1/8.0/13.3/100.0/155.5/256.0		---		---		---		---		---	
Reach Shear Stress (Competency) lb/ft^2	---															
Max part size (mm) mobilized at bankfull	---															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.29															
Watershed Impervious Cover Estimate (%)	1%															
Rosgen Classification	C4															
Bankfull Velocity (fps)	---															
Bankfull Discharge (cfs)	---															
Valley Slope (ft/ft)	0.0130															
Channel Thalweg Length (ft)	1,172															
Sinuosity	1.23															
Bankfull/Channel Slope (ft/ft)	0.0088															

[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
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

UT1 R4B

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)	11.4	12.5	12.3	12.8	11.2	14.9	12.5	14.4								
Floodprone Width (ft)	75	83	74	81	74	81	74	81								
Bankfull Mean Depth (ft)	1.0	1.1	0.7	0.9	0.8	0.9	0.8	0.9								
Bankfull Max Depth (ft)	1.3	1.6	1.3	1.6	1.4	1.6	1.5	1.7								
Bankfull Cross-sectional Area (ft^2)	11.9	12.6	9.0	11.3	10.0	11.3	11.7	12.2								
Width/Depth Ratio	10.3	13.1	13.9	18.2	12.4	19.6	13.3	17.3								
Entrenchment Ratio	6.0	6.6	5.9	6.3	5.4	6.6	5.6	6.0								
Bank Height Ratio	1.0		0.9	1.0	0.9	1.0	1.0									
D_{50} (mm)	55.6	69.1														
Profile																
Riffle Length (ft)																
Riffle Slope (ft/ft)	0.004	0.021														
Pool Length (ft)																
Pool Max Depth (ft)	1.8	3.9														
Pool Spacing (ft)	47.2	115.3														
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	24.0	96.0														
Radius of Curvature (ft)	24.0	36.0														
Rc/Bankfull Width (ft/ft)	2.0	3.0														
Meander Length (ft)	60.0	168.0														
Meander Width Ratio	2.0	8.0														
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
$D_{16}/D_{35}/D_{50}/D_{84}/D_{95}/D_{100}$	SC/SC/0.7/75.9/128.0/256.0		SC/0.2/0.9/67.5/87.9/256.0		SC/0.7/5.6/90.0/139.4/256.0		---		---		---		---		---	
Reach Shear Stress (Competency) lb/ft^2	---															
Max part size (mm) mobilized at bankfull	---															
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	0.40															
Watershed Impervious Cover Estimate (%)	1%															
Rosgen Classification	C4															
Bankfull Velocity (fps)	---															
Bankfull Discharge (cfs)	---															
Valley Slope (ft/ft)	0.0130															
Channel Thalweg Length (ft)	1,666															
Sinuosity	1.15															
Bankfull/Channel Slope (ft/ft)	0.0085															

[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

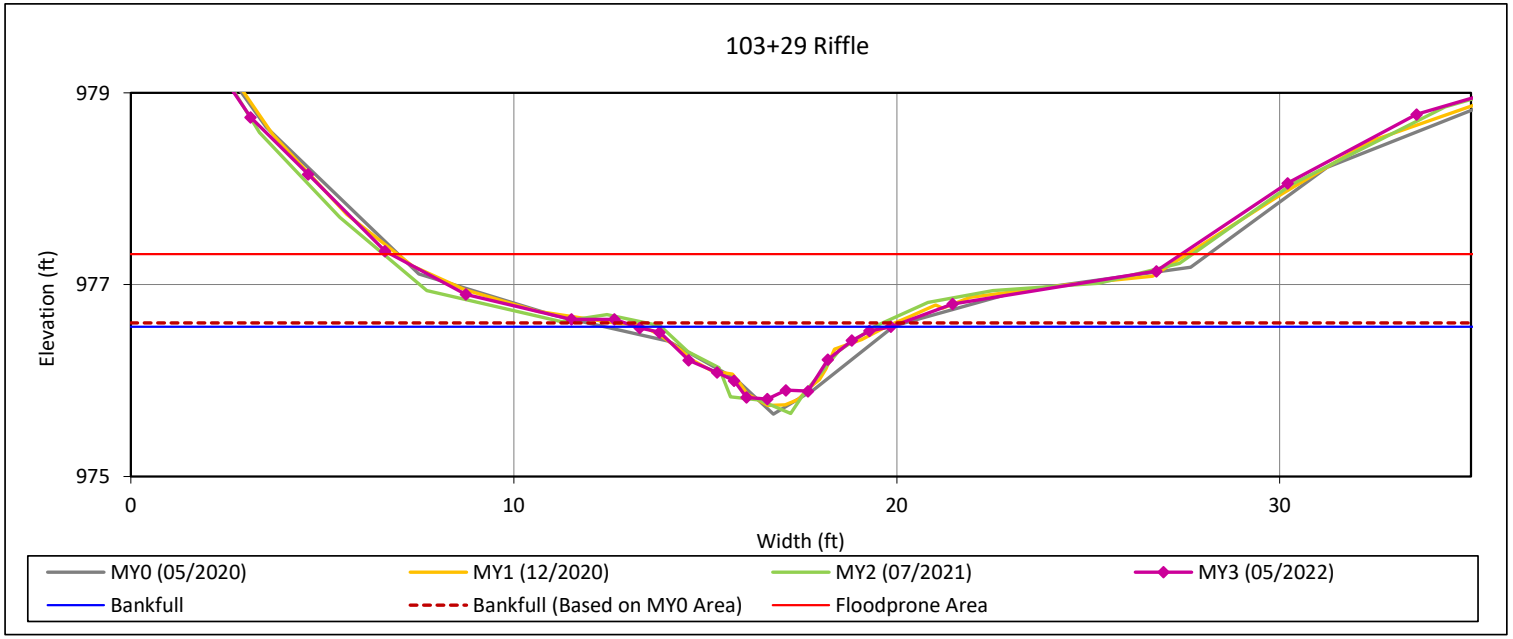
(---): Data was not provided

N/A: Not Applicable

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 1-UT1 Reach 1A



Bankfull Dimensions	
2.5	x-section area (ft.sq.)
6.7	width (ft)
0.4	mean depth (ft)
0.8	max depth (ft)
6.9	wetted perimeter (ft)
0.4	hydraulic radius (ft)
17.5	width-depth ratio
19.9	W flood prone area (ft)
3.0	entrenchment ratio
1.0	low bank height ratio

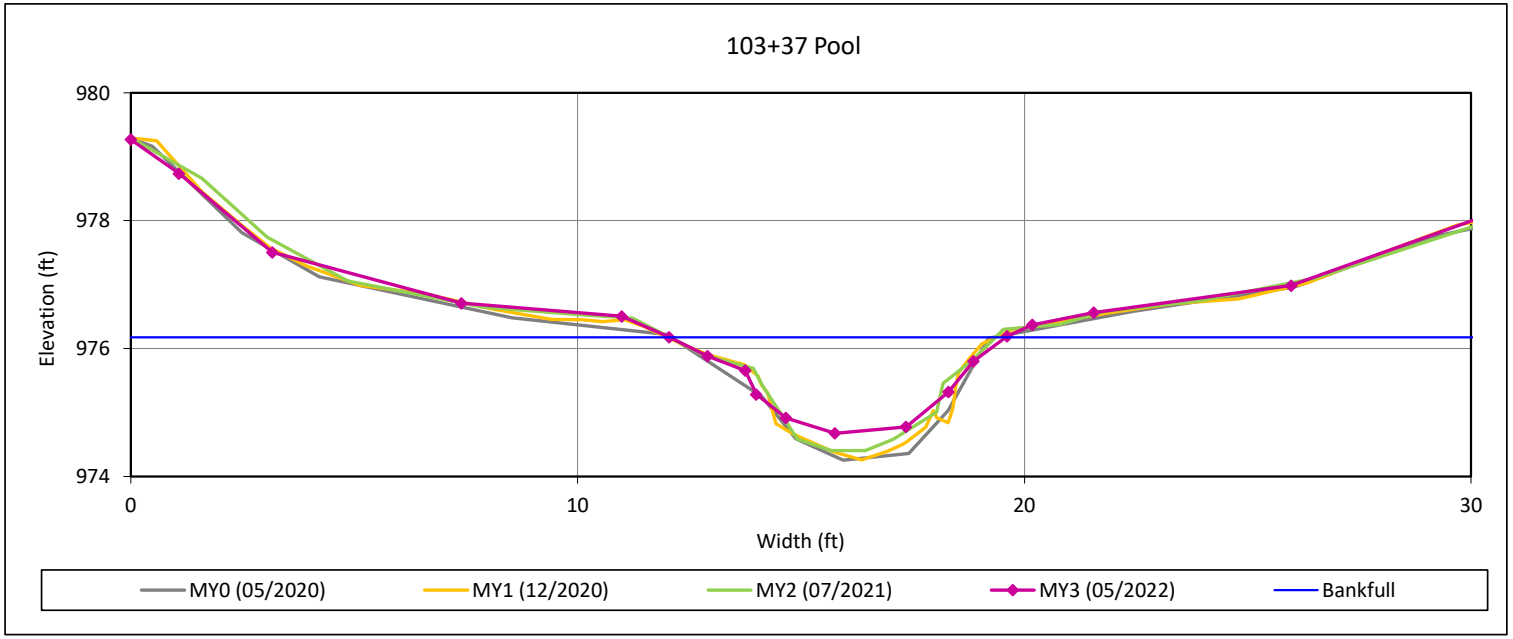
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 2-UT1 Reach 1A



Bankfull Dimensions	
6.8	x-section area (ft.sq.)
7.5	width (ft)
0.9	mean depth (ft)
1.5	max depth (ft)
8.4	wetted perimeter (ft)
0.8	hydraulic radius (ft)
8.4	width-depth ratio

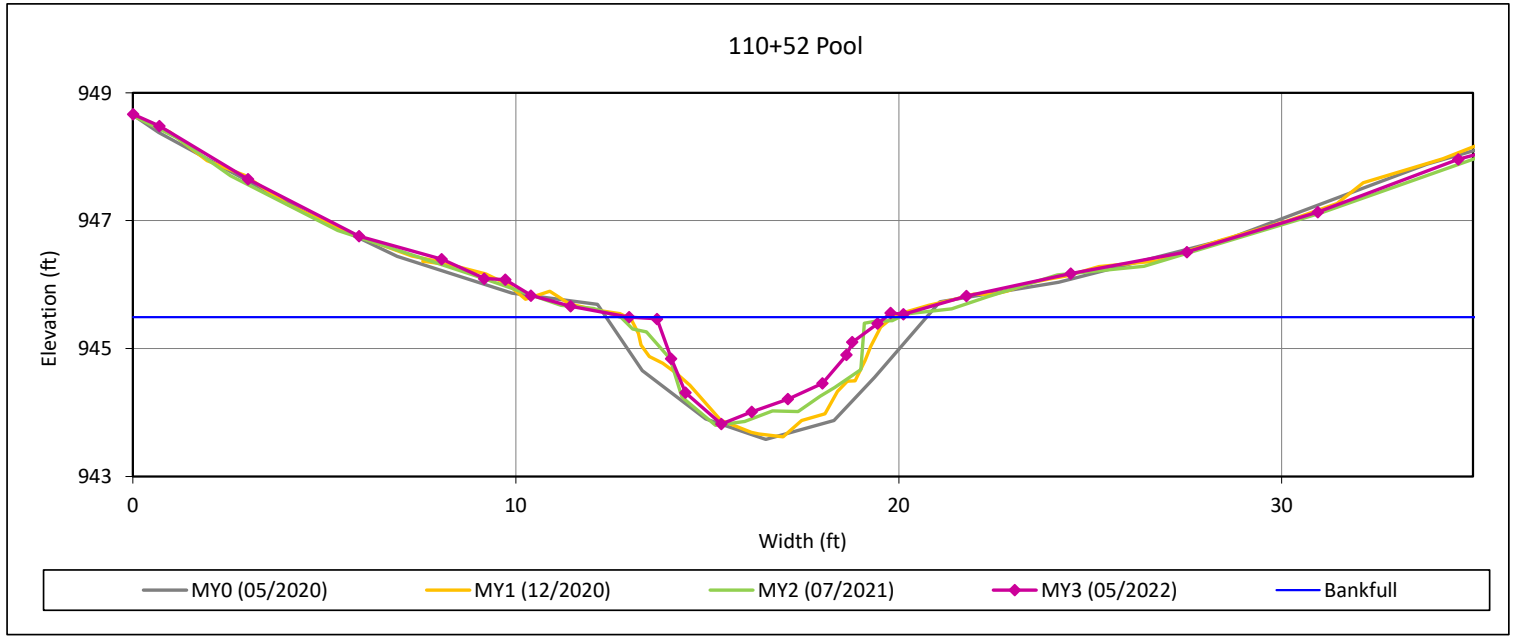
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 3-UT1 Reach 1B



Bankfull Dimensions	
6.2	x-section area (ft.sq.)
6.7	width (ft)
0.9	mean depth (ft)
1.7	max depth (ft)
7.8	wetted perimeter (ft)
0.8	hydraulic radius (ft)
7.3	width-depth ratio

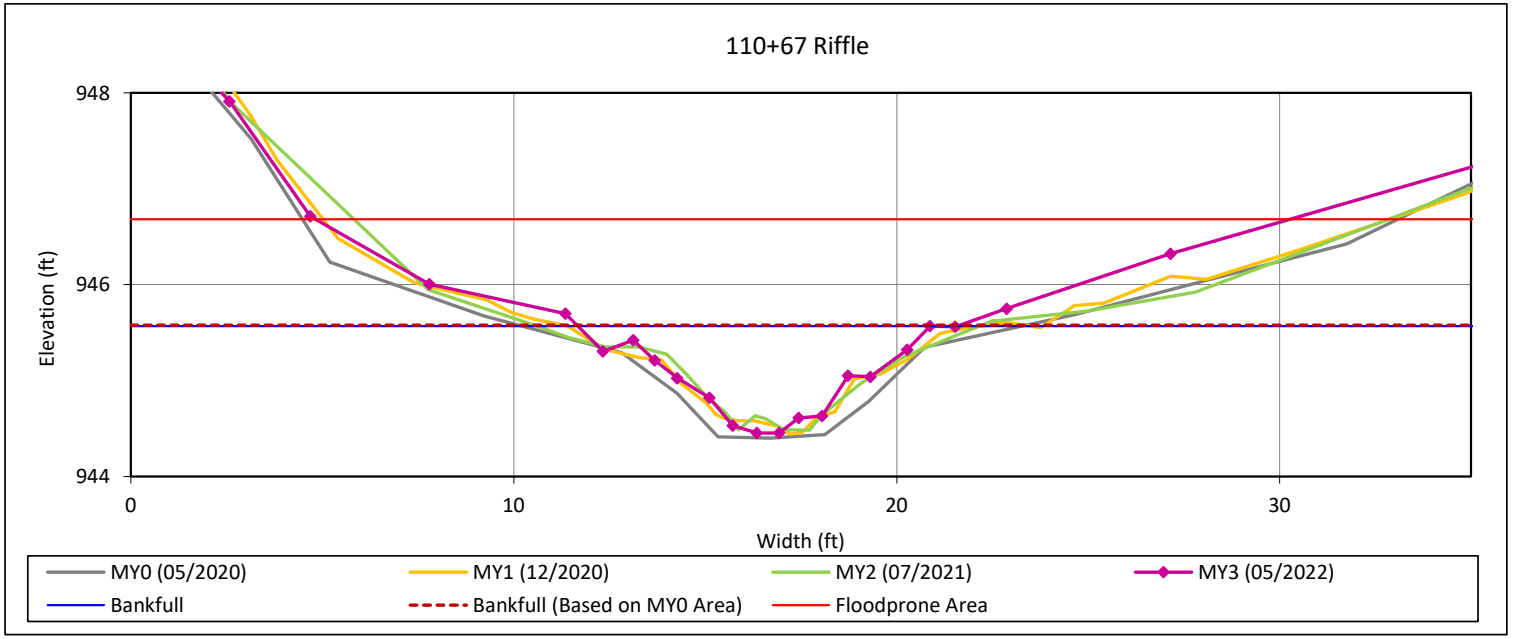
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 4-UT1 Reach 1B



Bankfull Dimensions	
5.4	x-section area (ft.sq.)
9.2	width (ft)
0.6	mean depth (ft)
1.1	max depth (ft)
9.7	wetted perimeter (ft)
0.6	hydraulic radius (ft)
15.6	width-depth ratio
25.5	W flood prone area (ft)
2.8	entrenchment ratio
1.0	low bank height ratio

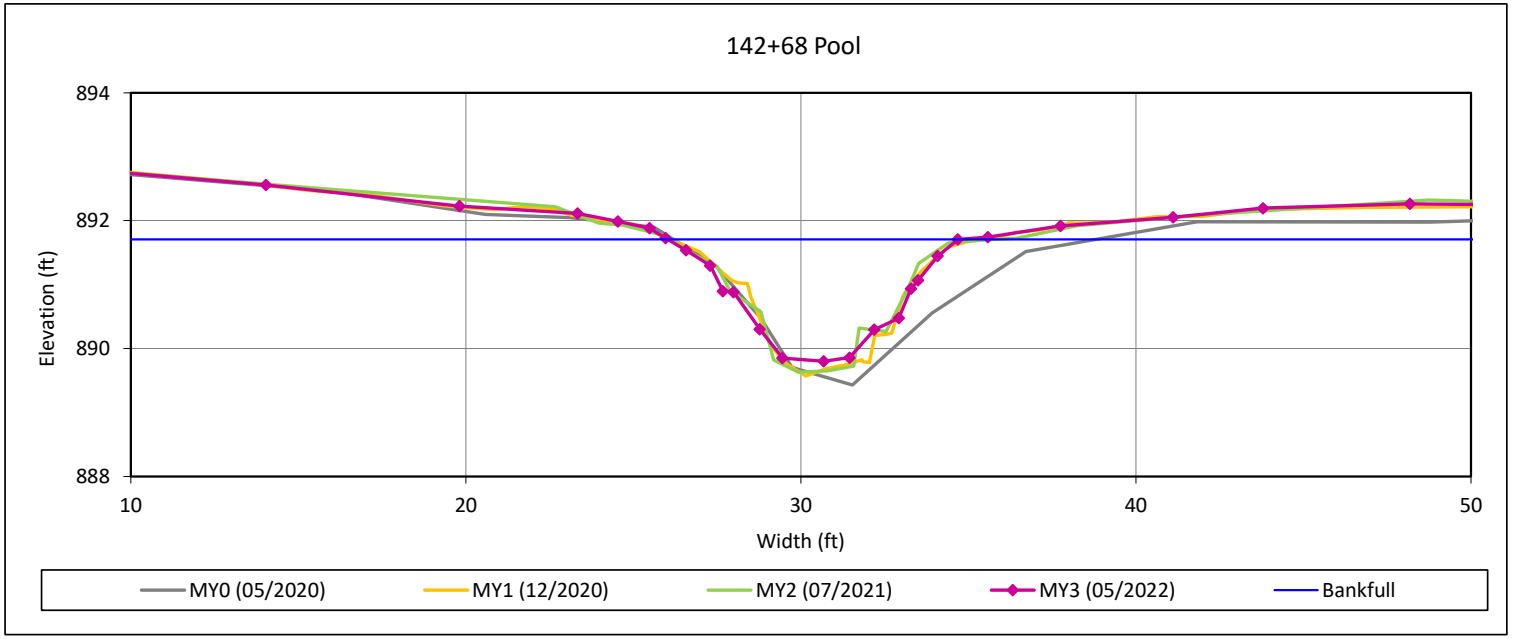
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 5-UT1 Reach 4A



Bankfull Dimensions	
9.5	x-section area (ft.sq.)
8.6	width (ft)
1.1	mean depth (ft)
1.9	max depth (ft)
9.8	wetted perimeter (ft)
1.0	hydraulic radius (ft)
7.9	width-depth ratio

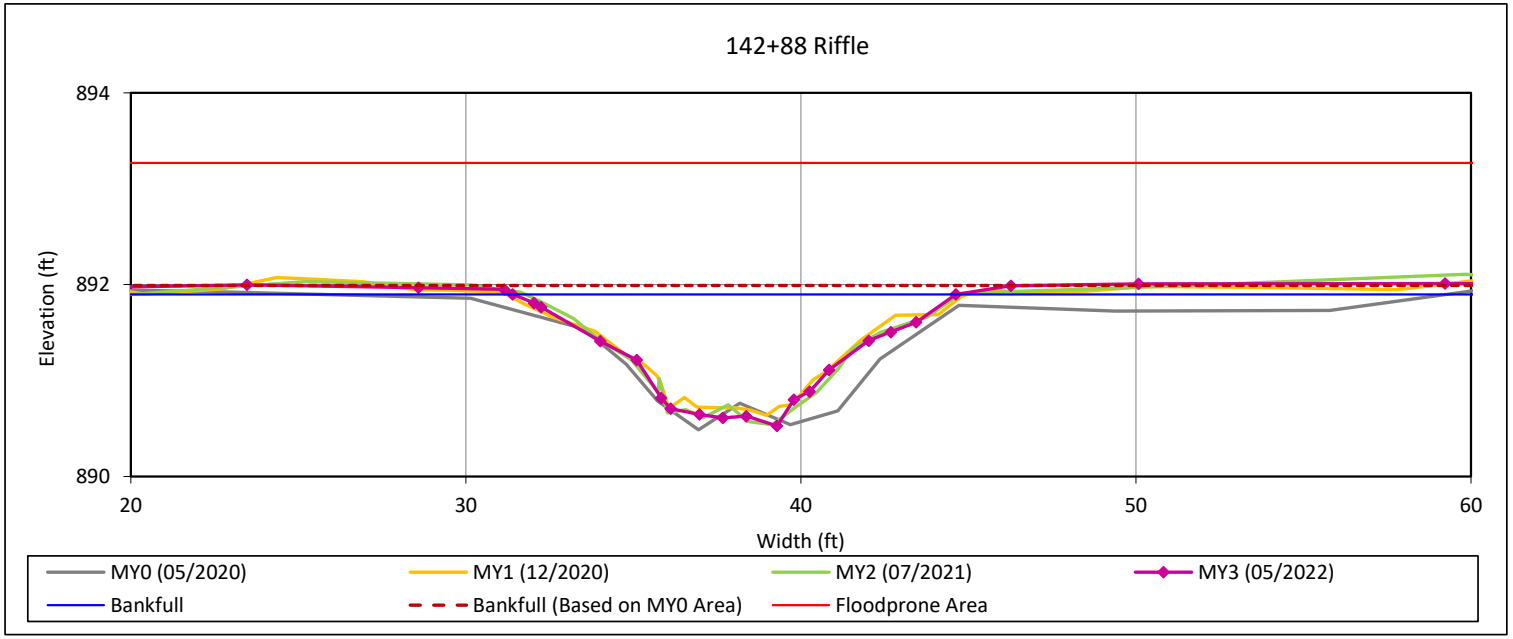
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 6-UT1 Reach 4A



Bankfull Dimensions	
9.4	x-section area (ft.sq.)
13.2	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
13.6	wetted perimeter (ft)
0.7	hydraulic radius (ft)
18.7	width-depth ratio
66.4	W flood prone area (ft)
5.0	entrenchment ratio
0.9	low bank height ratio

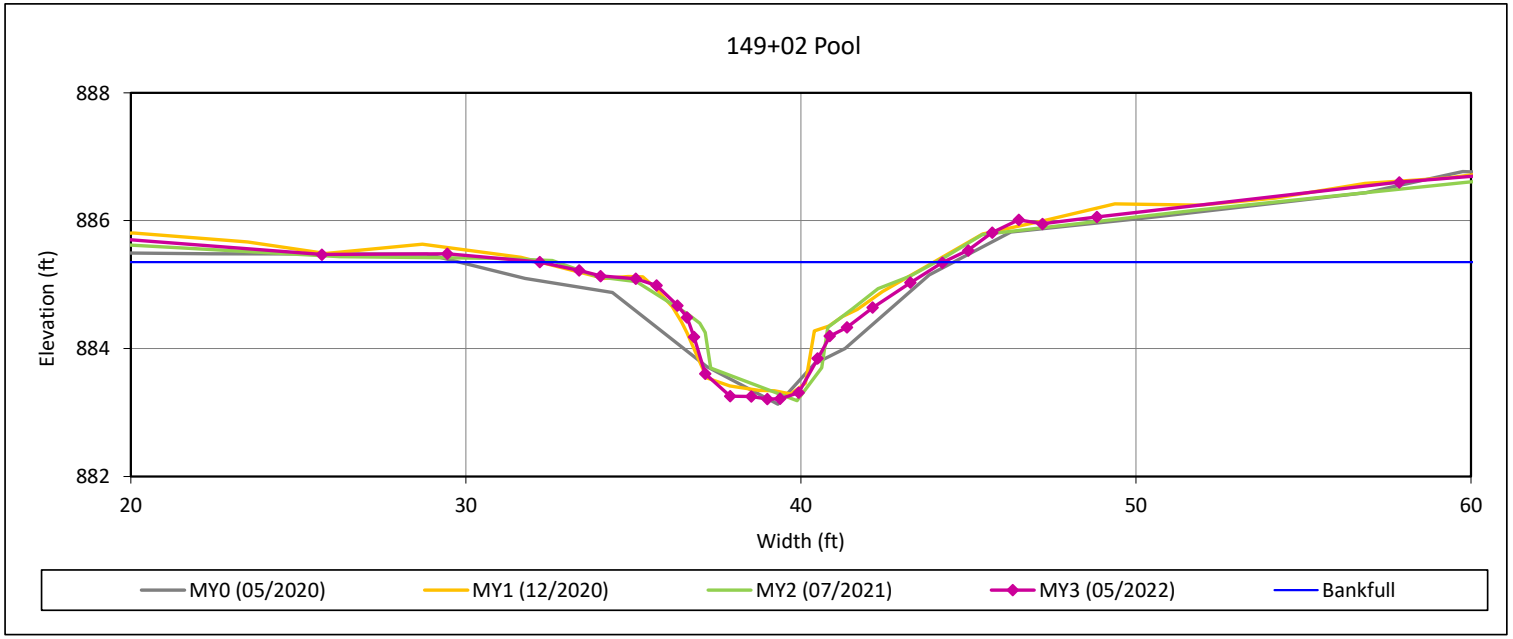
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 7-UT1 Reach 4A



Bankfull Dimensions	
11.1	x-section area (ft.sq.)
12.1	width (ft)
0.9	mean depth (ft)
2.1	max depth (ft)
13.3	wetted perimeter (ft)
0.8	hydraulic radius (ft)
13.1	width-depth ratio

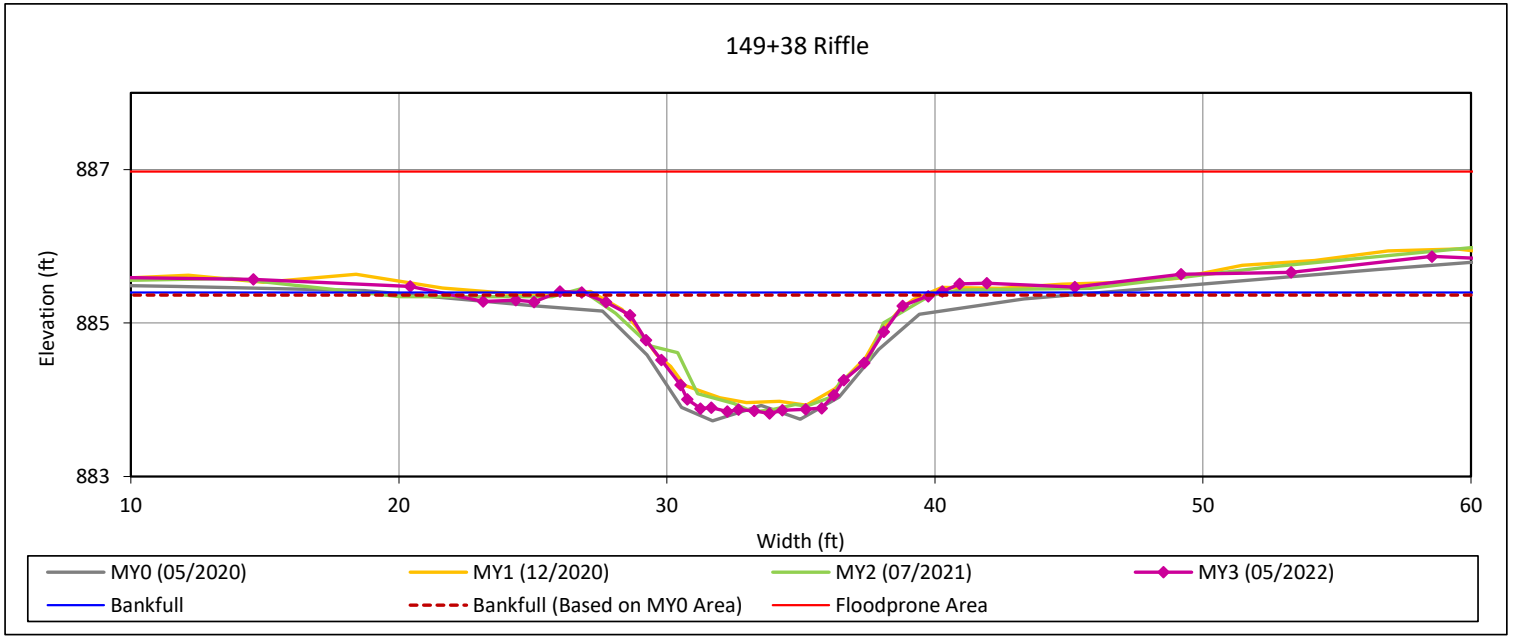
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 8-UT1 Reach 4A



Bankfull Dimensions	
12.4	x-section area (ft.sq.)
12.9	width (ft)
1.0	mean depth (ft)
1.6	max depth (ft)
13.5	wetted perimeter (ft)
0.9	hydraulic radius (ft)
13.5	width-depth ratio
62.6	W flood prone area (ft)
4.8	entrenchment ratio
1.0	low bank height ratio

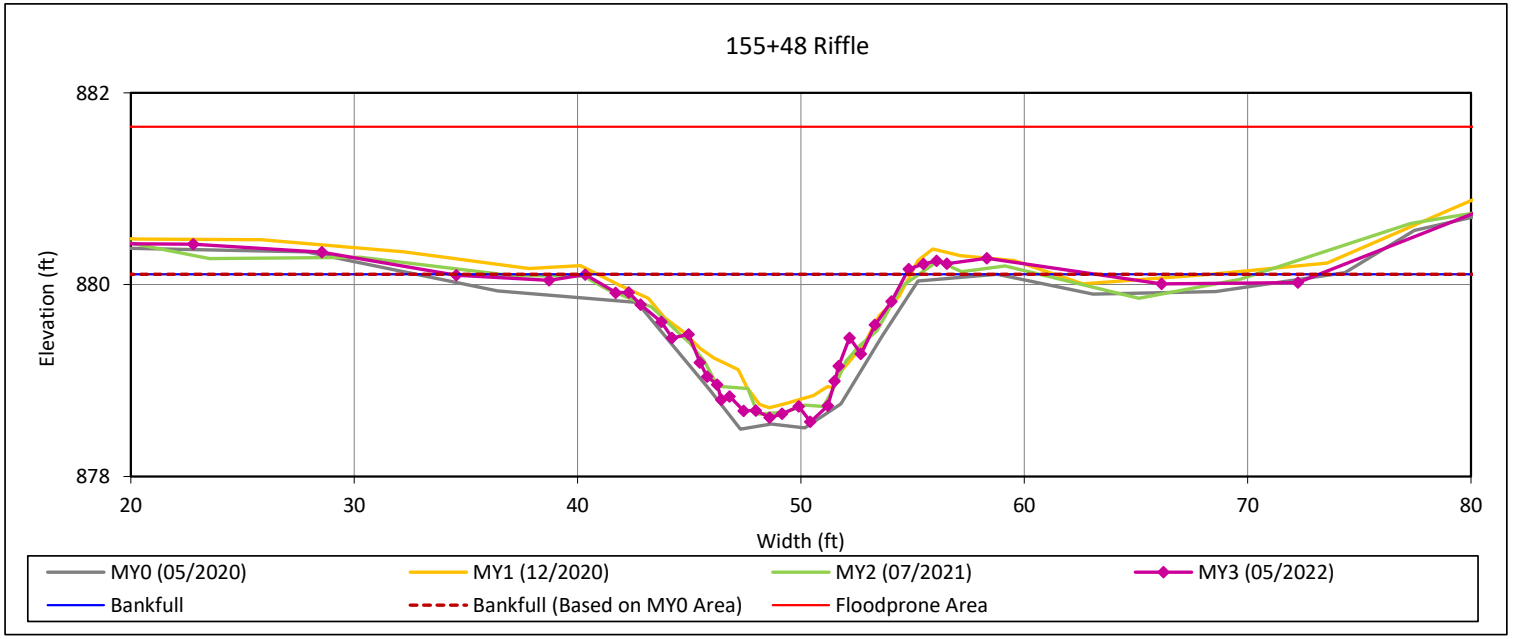
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 9-UT1 Reach 4B



Bankfull Dimensions	
11.9	x-section area (ft.sq.)
14.4	width (ft)
0.8	mean depth (ft)
1.5	max depth (ft)
15.1	wetted perimeter (ft)
0.8	hydraulic radius (ft)
17.3	width-depth ratio
80.9	W flood prone area (ft)
5.6	entrenchment ratio
1.0	low bank height ratio

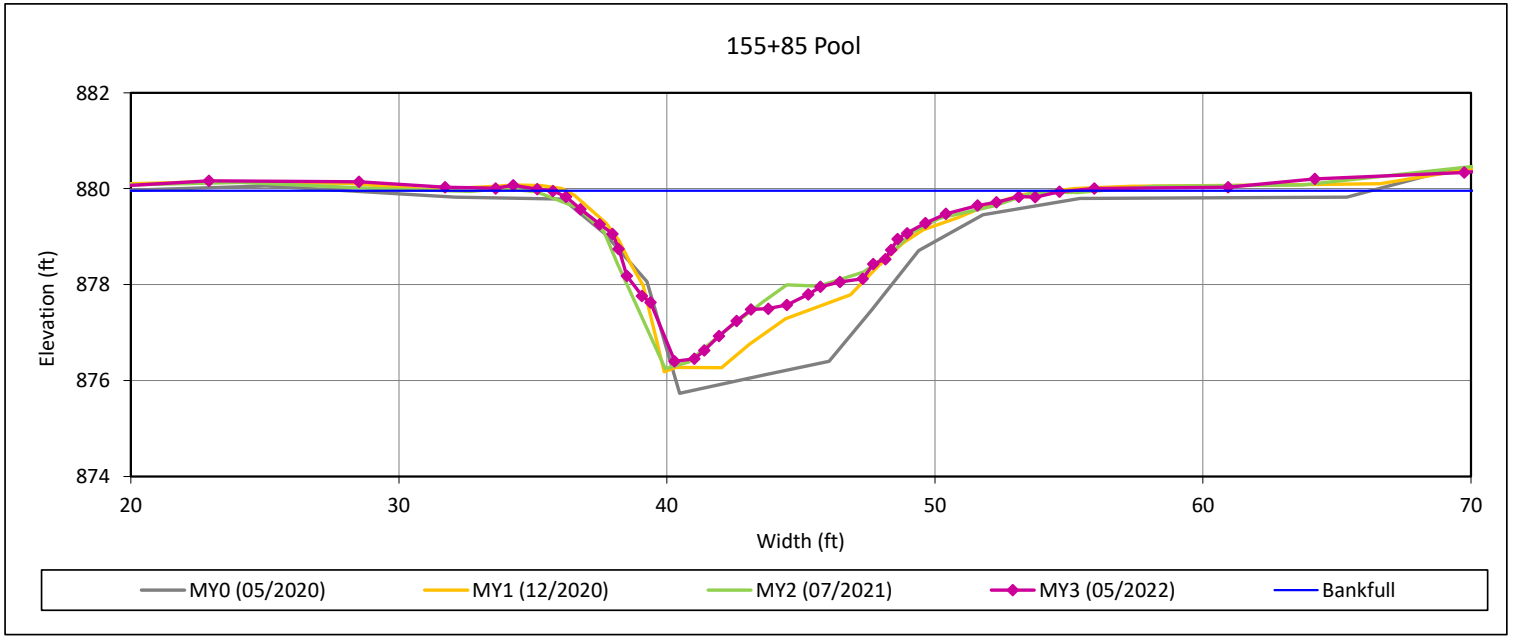
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 10-UT1 Reach 4B



Bankfull Dimensions	
28.1	x-section area (ft.sq.)
18.9	width (ft)
1.5	mean depth (ft)
3.6	max depth (ft)
21.1	wetted perimeter (ft)
1.3	hydraulic radius (ft)
12.7	width-depth ratio

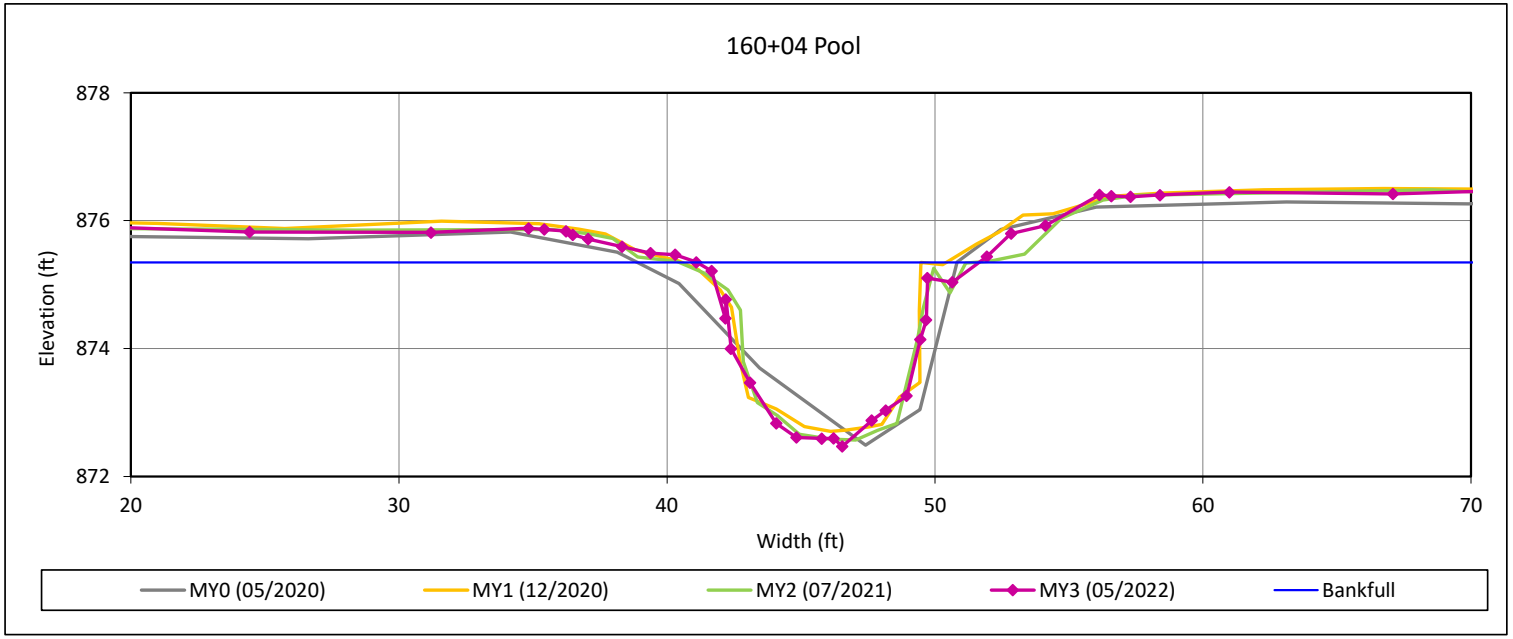
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 11-UT1 Reach 4B



Bankfull Dimensions	
17.9	x-section area (ft.sq.)
10.6	width (ft)
1.7	mean depth (ft)
2.9	max depth (ft)
13.7	wetted perimeter (ft)
1.3	hydraulic radius (ft)
6.2	width-depth ratio

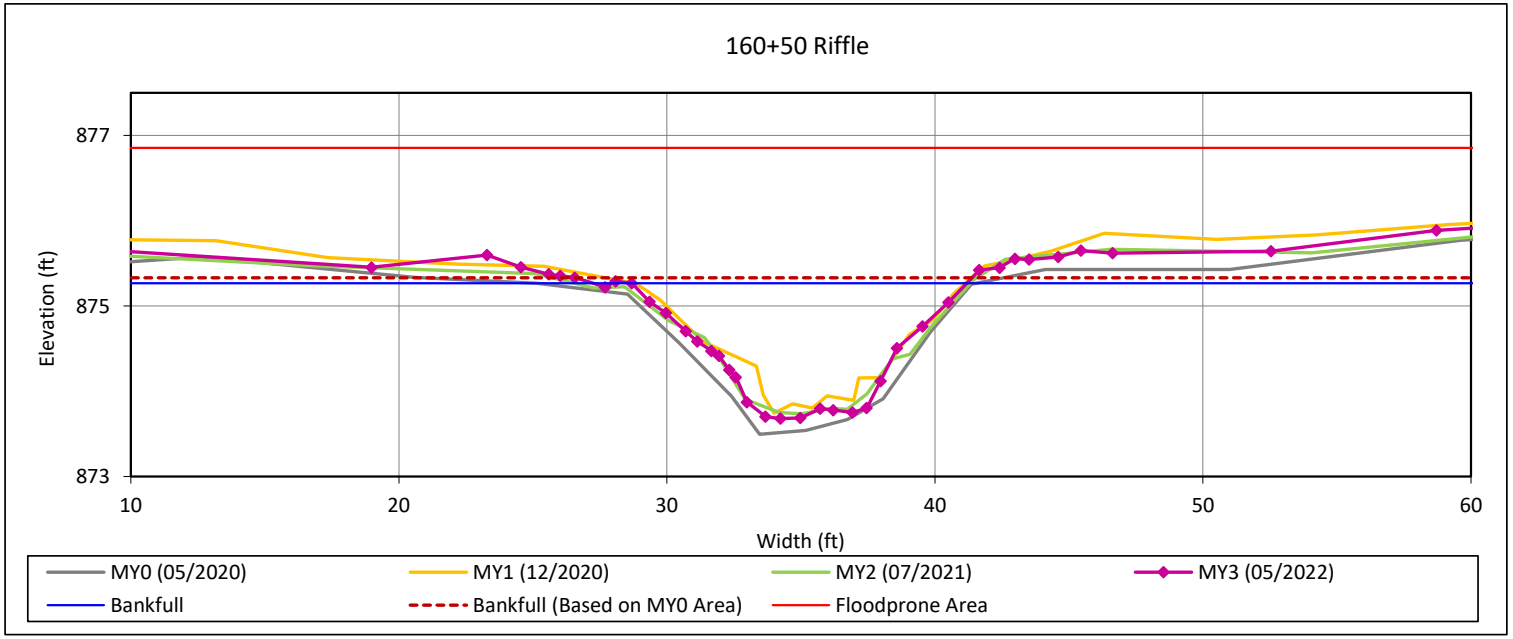
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 12-UT1 Reach 4B



Bankfull Dimensions	
11.7	x-section area (ft.sq.)
12.5	width (ft)
0.9	mean depth (ft)
1.6	max depth (ft)
13.1	wetted perimeter (ft)
0.9	hydraulic radius (ft)
13.3	width-depth ratio
74.6	W flood prone area (ft)
6.0	entrenchment ratio
1.0	low bank height ratio

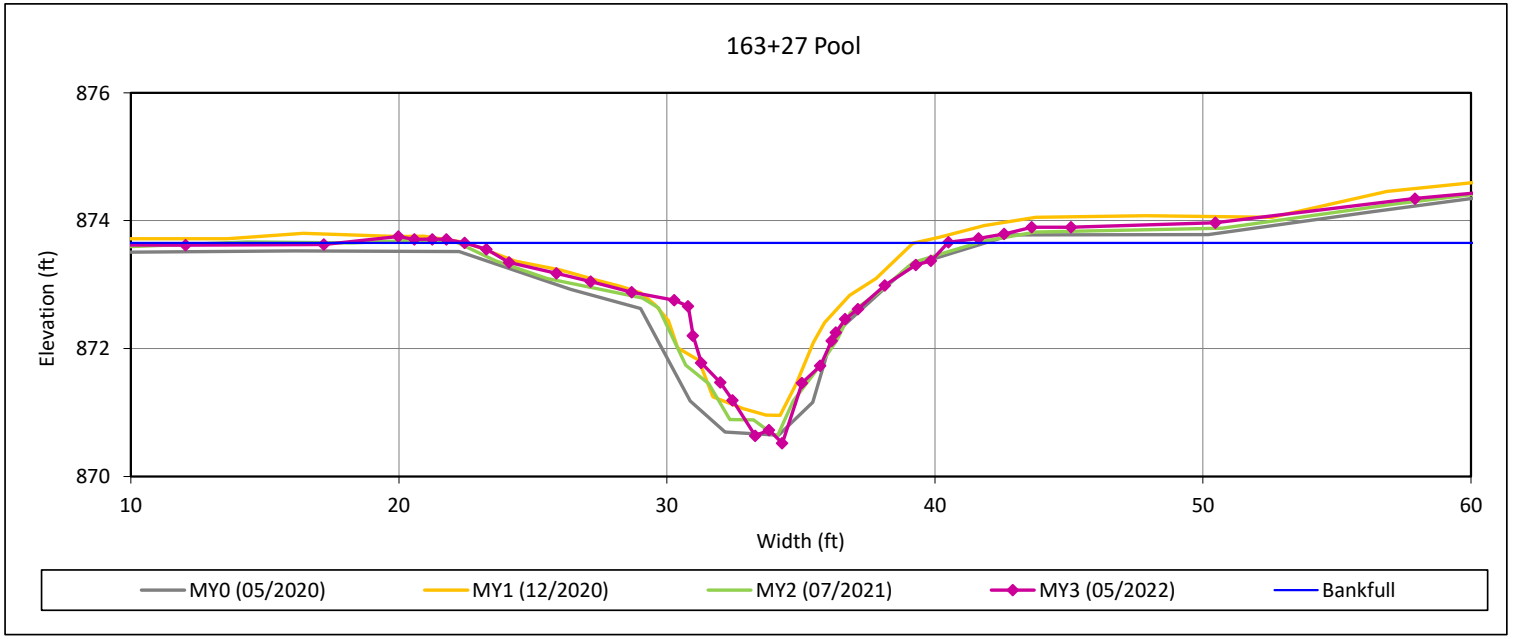
Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 13-UT1 Reach 4B



Bankfull Dimensions	
20.0	x-section area (ft.sq.)
18.0	width (ft)
1.1	mean depth (ft)
3.1	max depth (ft)
19.9	wetted perimeter (ft)
1.0	hydraulic radius (ft)
16.2	width-depth ratio

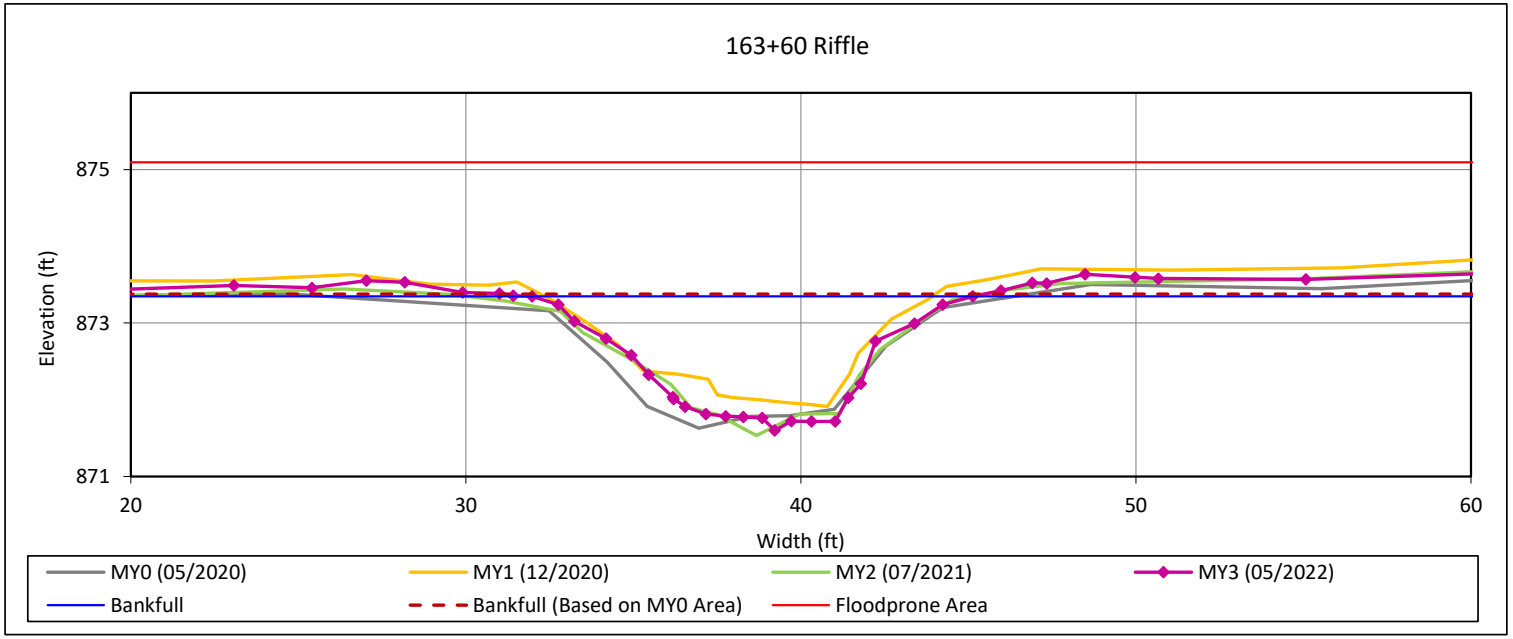
View Downstream

Survey Date: 05/2022
Field Crew: Wildlands Engineering

Cross-Section Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 3 - 2022

Cross-Section 14-UT1 Reach 4B



Bankfull Dimensions	
12.2	x-section area (ft.sq.)
13.2	width (ft)
0.9	mean depth (ft)
1.7	max depth (ft)
13.9	wetted perimeter (ft)
0.9	hydraulic radius (ft)
14.2	width-depth ratio
73.9	W flood prone area (ft)
5.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 05/2022
Field Crew: Wildlands Engineering

View Downstream

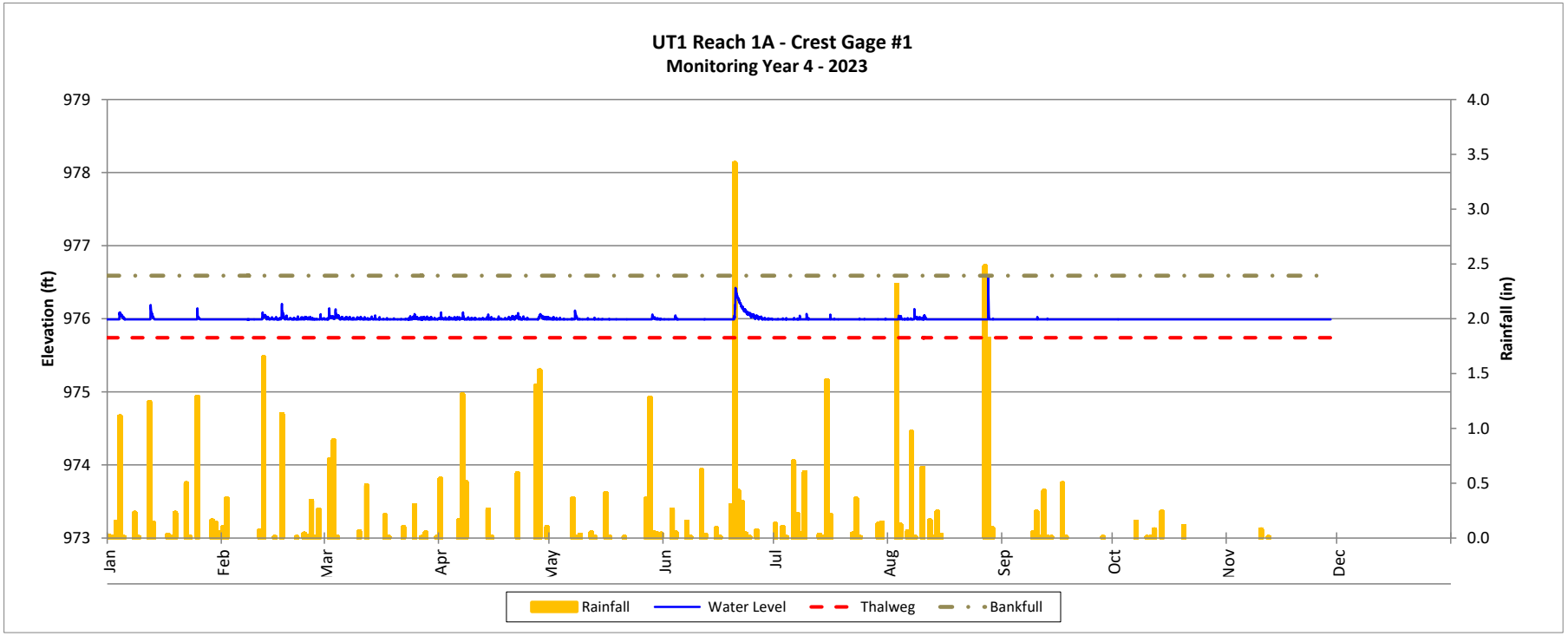
APPENDIX D. Hydrology Data

Table 12. Verification of Bankfull Events
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023

Reach	Gage Name	MY	Date of Occurrence	Date of Data Collection	Method
UT1 - 1A	CG1	MY1	11/12/2020	11/12/2020	Crest Gage
		MY2	---	---	
		MY3	---	---	
		MY4	8/27/2023	8/27/2023	
UT1 - 4A	CG2	MY3	5/23/2022	5/23/2022	Crest Gage
		MY4	8/27/2023	8/27/2023	

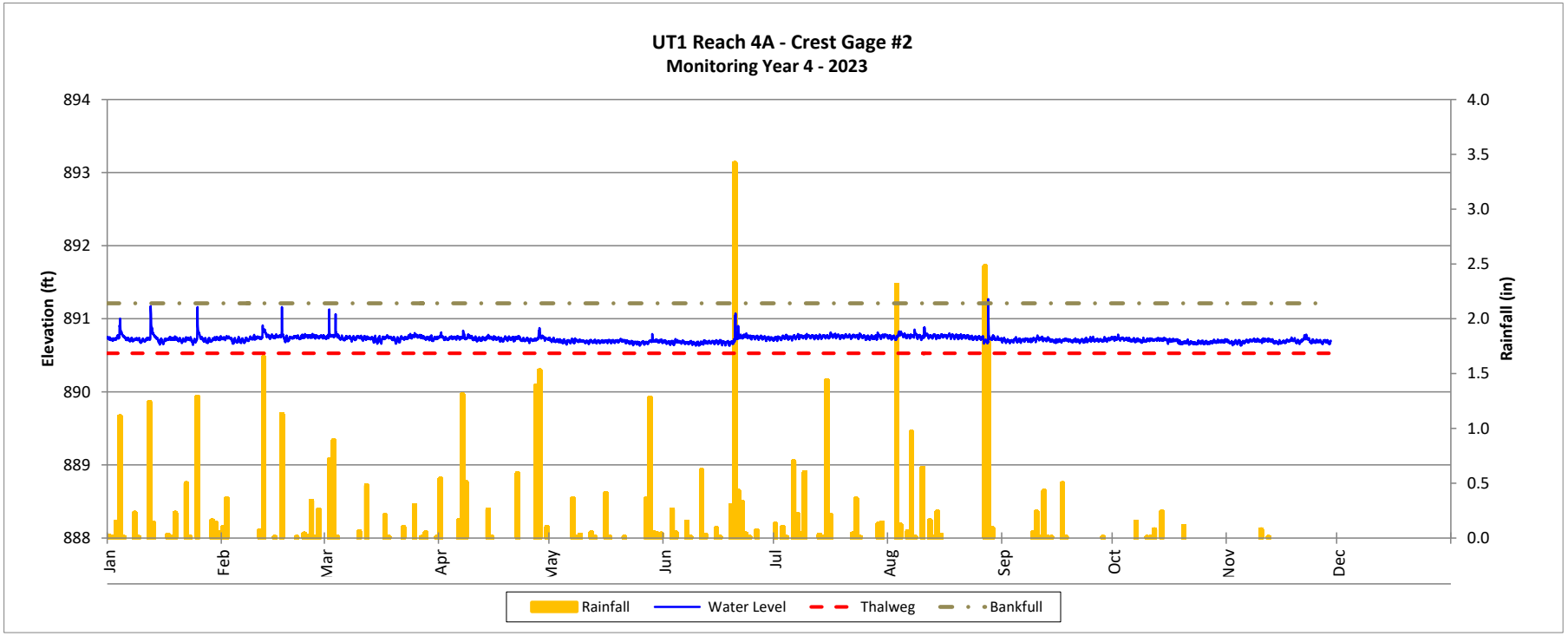
Recorded Bankfull Events

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023



Recorded Bankfull Events

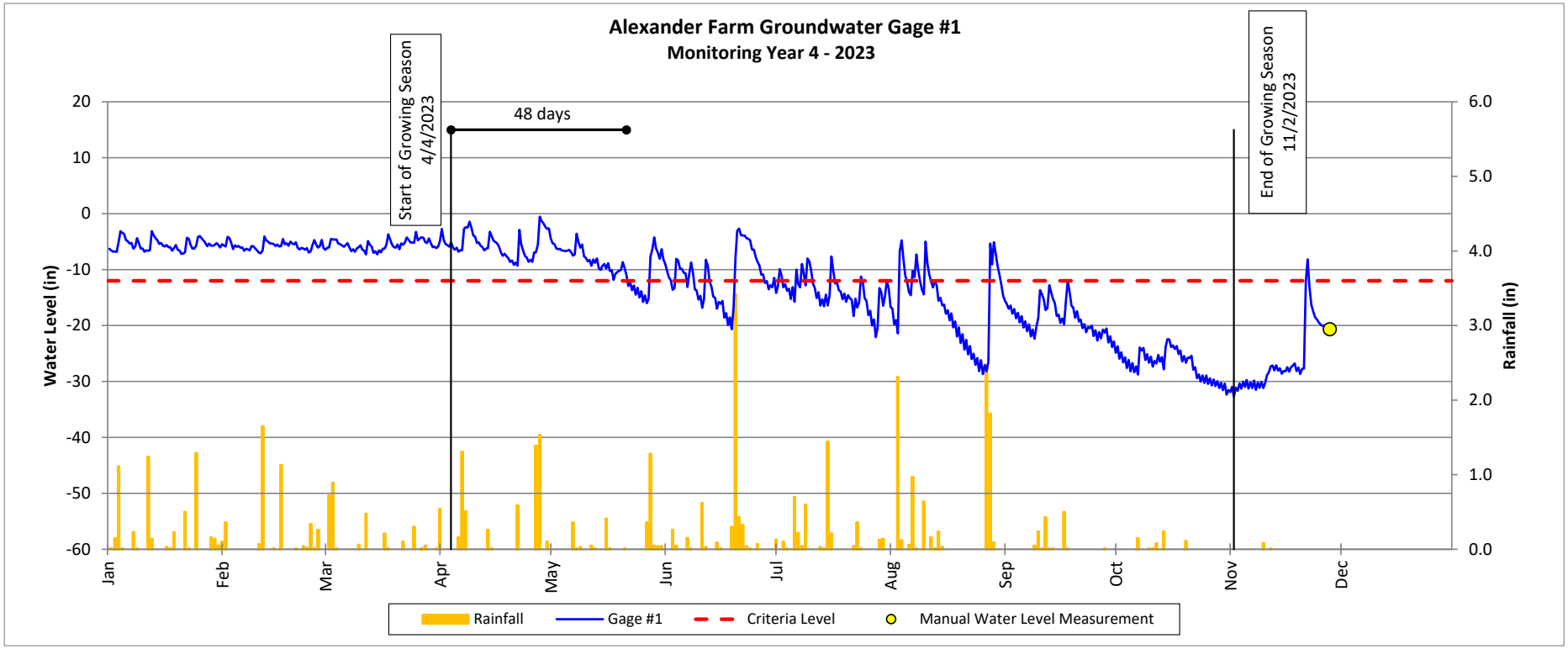
Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023



Groundwater Gage Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023

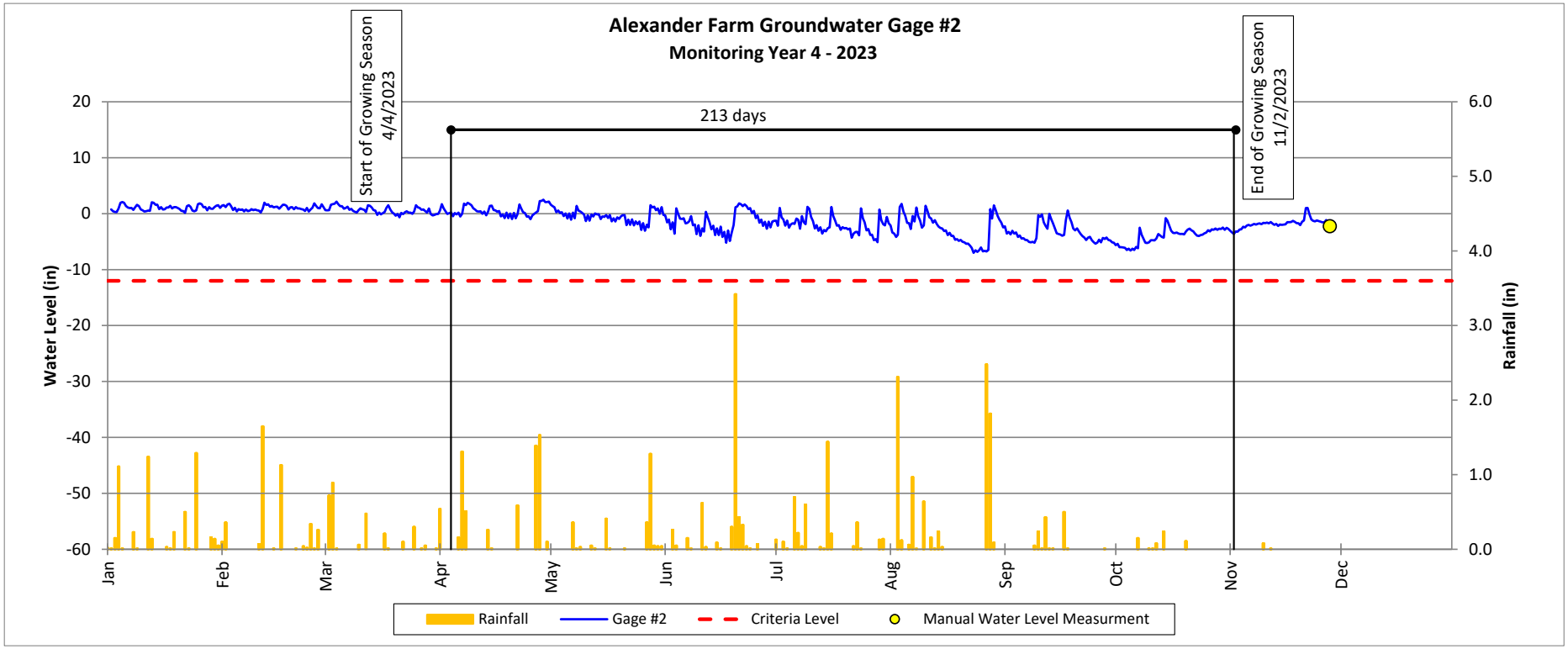
Wetland E on UT1 R1B



Groundwater Gage Plots

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023

Wetland N on UT1 R4A

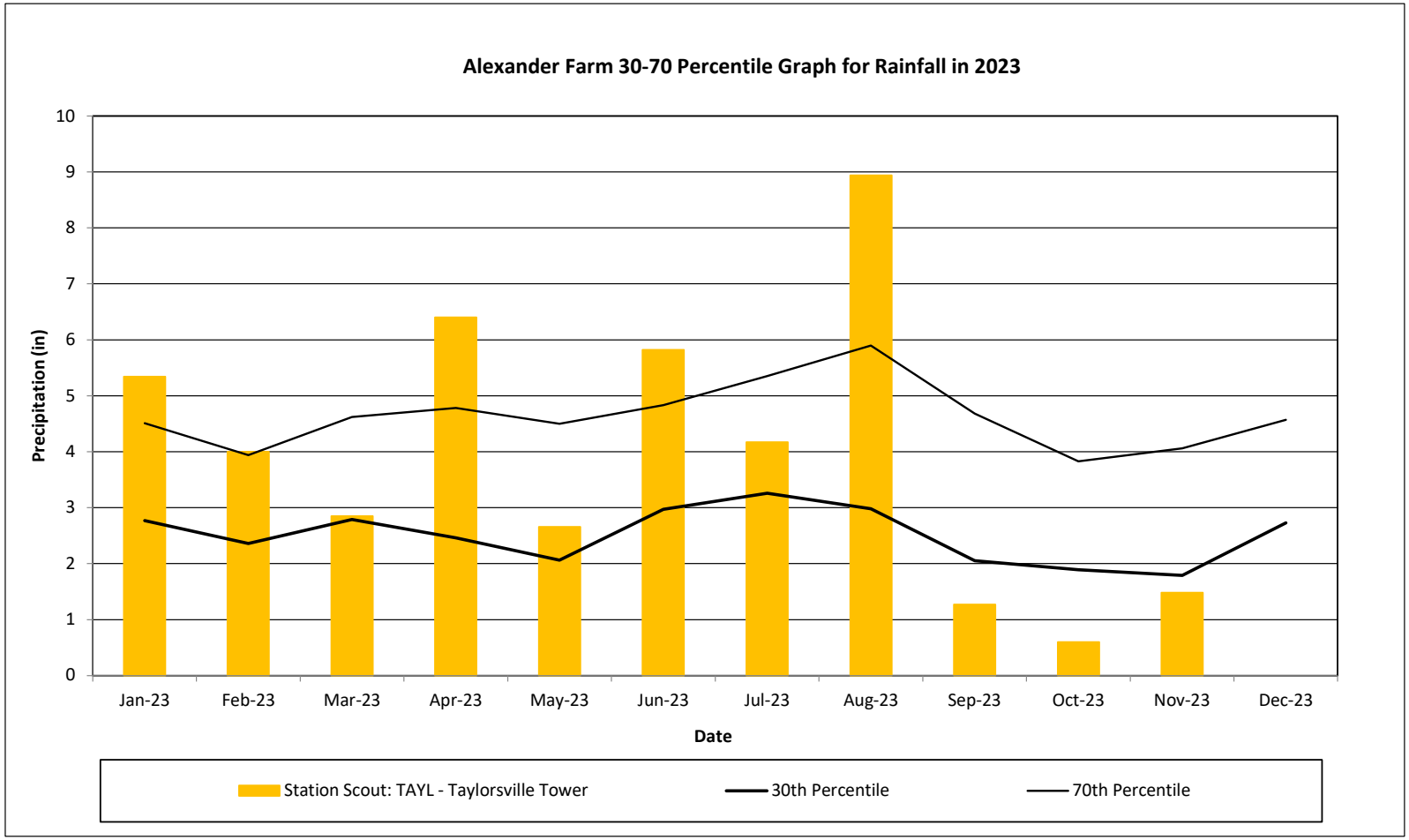


Monthly Rainfall Data

Alexander Farm Mitigation Site

DMS Project No. 100048

Monitoring Year 4 - 2023



Annual Rainfall collected until November 30, 2023 from NCSU Cardinal Station: TAYL - Taylorsville Tower (State Climate Office of NC, 2023)

30th and 70th percentile rainfall data collected from WETS station Statesville 2 NNE, NC (USDA, 2020)

Groundwater Gage Photographs
Monitoring Year 4

	
Groundwater Gage 1 - *(02/08/2023)*	**Groundwater Gage 2** - *(02/08/2023)*

APPENDIX E. Project Timeline and Contact Information

Table 13. Project Activity and Reporting History

Alexander Farm Mitigation Site
DMS Project No. 100048
Monitoring Year 4 - 2023

Activity or Report		Data Collection Complete	Completion or Delivery
404 Permit		October 2019	November 2019
Mitigation Plan		March 2018 - October 2019	October 2019
Final Design - Construction Plans		September 2019	September 2019
Construction		December 2019 - April 2020	April 2020
Temporary S&E mix applied to entire project area[1]		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 (Year 0)	Stream Survey	April - May 2020	September 2020
	Vegetation Survey	Collected - April 2020 Verified - June 2020	
Year 1 Monitoring	Invasive treatment	May - August 2020	December 2020
	Stream Survey	December 2020	
	Vegetation Survey	October 2020	
Year 2 Monitoring	Supplemental Plantings	March 2021	December 2021
	Live Stake Install	March 2021	
	Soil Amendments & Seeding	June 2021	
	Invasive treatment	July 2021	
	Stream Survey	July 2021	
	Vegetation Survey	November 2021	
Year 3 Monitoring	Supplemental Plantings	Feburary 2022	November 2022
	Invasive treatment	Feburary 2022	
	Stream Survey	May 2022	
	Invasive treatment	June 2022	
	AOC Repair	June 2022	
	Vegetation Survey	August 2022	
	AOC Repair	November 2022	
Year 4 Monitoring	Stream Survey	N/A	December 2023
	Vegetation Survey	N/A	
	UT1 Flow Camera Installed	January 2023	
	Beavers Trapped	June 2023	
	Dam Removed	August 2023	
	In-Stream Invasive Treatment	August 2023	
	Invasive treatment	April - October 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 14. Project Contact Table

Alexander Farm Mitigation Site
DMS Project No. 100048
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	**Baker Grading & Landscaping, Inc** 970 Bat Cave Road Old Fort, NC 28762
Planting Contractor	**Bruton Natural Systems, Inc.** PO Box 1197 Fremont, NC 27830
Seeding Contractor	**Baker Grading & Landscaping, Inc.** 970 Bat Cave Road Old Fort, NC 28762
Seed Mix Sources	**Baker Grading & Landscaping, 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. DMS Correspondence

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
MARC RECKTENWALD
Director

NORTH CAROLINA
Environmental Quality

February 27, 2023

Kristi Suggs
Senior Environmental Scientist
Wildlands Engineering, Inc.
1430 S. Mint St, Suite 104
Charlotte, NC 28203

Subject: Conservation Easement Inspection Report - MY3 Site
Alexander Farms
Catawba River Basin - CU# 03050101 - Alexander County
DMS ID No.100048 - Contract #7416

Dear Kristi,

The MY3 DMS boundary inspection was conducted on January 30, 2023 by myself and Kelly Phillips. The inspection was conducted in accordance with the DMS Property Checklist which included a pre-inspection office review of the plat, aerial photographs, as-built, conservation easement and monitoring reports. The entire easement boundary was inspected to validate the easement integrity and identify any potential issues on the site. The site inspection results are shown in the attached checklist and kmz map, with embedded photos.

Office Review:

- The documents show one external crossing for Elk Shoals Church Loop and one internal crossing approximately 1000' to the north.
- The conservation easement specifies livestock must be excluded from the stream within crossing areas and fencing must prevent cattle access to the stream, or alternatively; gates must remain closed except when rotating livestock between pastures within ford crossings.

Field Inspection:

- No encroachment was seen.
- The easement corners were monumented with stamped aluminum caps. Five caps were field verified, but most caps were buried and not visible.
- The easement corners were marked with wooden posts and attached easement signs.
- In-line marker spacing was adequate.
- Fallen tree/limbs were leaning on the fence near platted corners #8 and #17.
- Metal trash and debris was located inside the easement approximately 60' north of corner #8.
- The fence wire was loose on the western boundary approximately 160' south of corner #8.
- Corner post #35 was leaning.
- The ground surface within the internal crossing was barren muddy soil and heavily impacted by cattle hoof shear.

Action Items

- Fallen trees/limbs should be removed from the fence, all sections of damaged wire and the leaning corner post should be repaired.
- Remove metal and trash debris from the easement.
- Although five stamped aluminum monument caps were found, most of the caps were buried and not visible. Recommend field verification that the stamped caps are installed at each corner.

- Maintenance should be conducted within the internal crossing to stabilize the heavily impacted ground surface (see photos). Recommend cattle gates to reduce future impact.

Let me know if you have any questions or need additional information; I plan to follow up with you in 2-3 months to see what the status is on these items, if I do not hear from you sooner.

Sincerely,

Harry Tsomides
Project Manager, NCDEQ-DMS

North Carolina Department of Environmental Quality | Division of Mitigation Services
217 West Jones Street | 1652 Mail Service Center | Raleigh, North Carolina 27699-1652
919.707.8976

December 11, 2023

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

RE: Conservation Easement Inspection Report – MY3 Site
Alexander Farm Mitigation Site, Alexander County, Yadkin River CU 03040101
DMS Project ID No. 100022 / DEQ Contract #007186

Dear Mr. Tsomides:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Conservation Easement Inspection Report MY3 Site visit. DMS' Action Items are listed below in **bold**. Wildlands' follow-up responses are noted in *italics*.

Action Item: Fallen trees/limbs should be removed from the fence, all sections of damaged wire and the leaning corner post should be repaired.

Wildlands' response: All Fallen trees/limbs were removed from the fence on March 6th, 2023. After the tree/ limbs were removed the damaged fence wire was repaired along with any areas noted by DMS. Wildlands plans to brace the leaning corner post in early January 2024.

Action Item: Remove metal and trash debris from the easement.

Wildlands' response: The metal debris and associated trash within the Conservation Easement are too large to remove by hand and will require heavy machinery to remove. Wildlands is currently working with our construction crew and the tenant farmer on a plan to remove it as soon as possible.

Action Item: Although five stamped aluminum monument caps were found, most of the caps were buried and not visible. Recommend field verification that the stamped caps are installed at each corner.

Wildlands' response: Wildlands field verified 50 out of the 55 aluminum monument caps. All located monuments were stamped with the correct plat number as shown on the plat. Wildlands will try to locate the missing monuments with total station survey in early 2024. If they are not found, we will contact the surveyor.

Action Item: Maintenance should be conducted within the internal crossing to stabilize the heavily impacted ground surface (see photos). Recommend cattle gates to reduce future impact.

Wildlands' response: On April 6, 2023, Wildlands overseeded the existing vegetation that had reemerged on the internal crossing. Refer to Appendix F in the MY4 Annual Report for a picture of the vegetated internal crossing from October 4th, 2023.

Please let me know if you have any questions.

Sincerely,

Kristi Suggs

Kristi Suggs
Senior Environmental Scientist
ksuggs@wildlandseng.com

Vegetated Internal Crossing Photograph
Monitoring Year 4

Vegetated Internal Crossing – view East – Between UT1 R1B & UT1 R2 (10/04/2023)