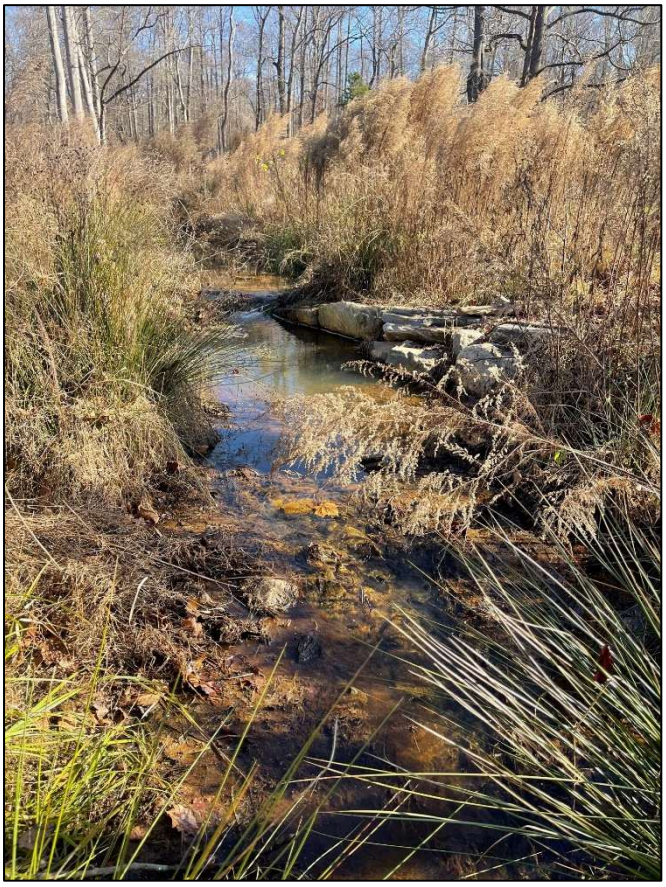
UT to Magness Creek Mitigation Project
Year 1 (2023) Monitoring Report FINAL

Cleveland County, North Carolina
Broad River Basin: 03050105
DMS Project ID No. 100081
DMS RFP #16-007400 (Issued: 12/7/17)
DEQ Contract No. 7604
USACE Action ID No. SAW-2018-01759
DWR# 20181275
Year 1 Collection Period: October - November 2023



Submitted to/Prepared for:
NC Department of Environmental Quality
Division of Mitigation Services (DMS)
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Michael Baker
INTERNATIONAL

Submission Date: January 2024

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January 30, 2024

Paul Wiesner, PM
NCDEQ, Division of Mitigation Services
Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

Subject:
Response to DMS Comments (January 4, 2024) for DRAFT Monitoring Year1 Report.
UT to Magness Creek
Broad River Basin: 03050105
DMS Project #100081 DEQ Contract #7604

Dear Mr. Wiesner,

Please find below our responses to the NC Division of Mitigation Services (DMS) review comments dated January 4, 2024 in reference to the UT to Magness Creek Stream Mitigation Project's DRAFT Monitoring Year 1 Report. We have revised the Draft document in response to review comments as outlined below.

General: Please include the August 22, 2023, IRT Notice of Initial Credit Release email; IRT comments and Baker's response letter in an Appendix of the final MY1 (2023) report (files attached). Please review all IRT comments and Baker responses to confirm that the IRT comments and concerns have been fully addressed in the MY1 (2023) report.
RESPONSE: The IRT comments and Baker's response letter have been included in Appendix F as requested. Comments and concerns have been reviewed and addressed.

General: As discussed in the MY0 IRT comments, the IRT would like a condition update and additional photos at Photo Point 10 where there was a reported mid-channel bar (see IRT comments (E. Davis) for further detail).
RESPONSE: The mid-channel bar was repaired by hand using shovels to fill in one side of the split channel. A photo of the repair is shown in Appendix B, Monitoring Gauges and Additional Photographs, Page 2. The photo was taken on December 6, 2023 and at that time the repair appeared to be intact, with the channel maintaining a single thread.

General: In the revised report, please explain why vegetation plot 3 was not moved into the wetland re-establishment area as requested by the IRT during the MY0 review.
RESPONSE: An explanation of why vegetation plot 3 was not moved into the wetland re-establishment area as requested by the IRT has been included in the revised report in Section 1.4 Monitoring Results and Project Performance.

General: In the revised report text, please reiterate and discuss the plan (per the IRT responses) to move MCW4 starting in MY2 (2024). Please report a proposed date or timeframe to relocate the well.
RESPONSE: A discussion of the plan to relocate MCW4 prior to the start of the growing season of MY2 has been added to Section 1.4 Monitoring Results and Project Performance as requested.

General: Crossing photos should be provided for the crossing between Reach 1A and 1B; photos of both the inlet and outlet should be provided to document potential debris jamming, sedimentation/infilling, scouring, etc. Please provide clear upstream and downstream crossing photos in the revised report. Many of the photo point photos provided are obscured by vegetation. The IRT has been asking for winter photos in such cases, if possible. Please consider taking dormant season reach photos for some/ all of the stream photo points for the MY2 (2024) report.
RESPONSE: New photos of the crossing between Reach 1A, 1B have been provided with the revised report. These photos are PP31 and PP32 in the Stream Station Photo Points in Appendix B. In future monitoring years, beginning in MY2, stream photo points will be taken in March prior to the start of the growing season.

Section 1.4 Monitoring Results and Project Performance: "*All observed project rainfall was collected from the Spindale Tower through the North Carolina State Climate Office Cardinal System.*" In the revised report text, please discuss how far this station is located from the project site.
RESPONSE: The station location and proximity to the project site has been added to the revised report as requested.

Section 1.4 Monitoring Results and Project Performance: "*We expect these wells to meet performance criteria in future years."* In the revised report text, please discuss why Michael Baker believes these wells will meet the success criteria in future years.
RESPONSE: This discussion has been added to the report text as requested.

Section 1.4 Monitoring Results and Project Performance: "*The automated flow gauge (FG1), on UT2 exceeded the minimum 30-day performance criteria during MY1 (Table 12).*" Please report the results in the report text: 224 consecutive days.
RESPONSE: The results have been added to the report as requested.

Figure 2 – Project Asset Map: Please label the reaches and wetland areas as shown in the figure credit table & Table 1. Project Mitigation Quantities and Credits.
RESPONSE: Labels have been added to the reaches and wetland areas as shown on the Project Asset Map as shown in the figure credit table and Table 1 as requested.

Table 1.2 - Project Credits: Please correct the spelling typo in the table title.
RESPONSE: The spelling typo has been corrected as requested.

Table 2. Project Activity and Reporting History: The vegetation monitoring data collection date should be split out in a separate row from the stream survey data collection date (similar to the As-Built Survey rows).
RESPONSE: The vegetation monitoring data collection date and stream survey data collection date has been added to the table as requested.

Table 5 – Visual Morphology Stream Assessment and Table 6 - Vegetation Conditions Assessment: Data collection dates should be listed as month/day(s)/ year, ideally (rather than month/year).

RESPONSE: Data collection dates have been changed to include month/day/year as requested.

Table 5 – Visual Morphology Stream Assessment and Table 6 - Vegetation Conditions Assessment: These versions of the tables are no longer in use. DMS recommends updating the tables to the October 2020 DMS Monitoring Report Table versions (available on the DMS website and attached).
RESPONSE: Tables 5 & 6 have been updated to the October 2020 DMS Monitoring Report Table version as requested.

General: The report should include "Table 2: Summary: Goals, Performance and Results" from the October 2020 DMS Monitoring Report Table guidance. DMS also recommends updating the Asset Table to the 2020 standard (available on the DMS website and attached).
RESPONSE: A summary: Goals, Performance and Results table has been added to section 1.2 Goals and Objectives as requested. Table numbers and new formatting will be updated in the MY2 report.

Table 9 - Cross-Section Morphology Data Summary: The footer is incorrect on the table (shown as 'As built Baseline Monitoring Report'). Please review and correct the footers in the revised report.
RESPONSE: Footers have been double checked and corrected as needed.

CCPV Maps: The CCPV map title boxes should indicate the monitoring year. Please update accordingly.
RESPONSE: The monitoring year has been added to the CCPV map title boxes as requested.

Table 10 & Crest Gauge CG1: As discussed previously, please review, and confirm that the project's crest gauge has been installed so the corresponding monitoring graph will show the thalweg, water/ pressure line, and established bankfull elevation data to accurately show when flow events reach the bankfull stage elevation. Please review and confirm that the graphs and data presented are accurate. It is difficult to determine how the provided crest gauge data correlates with the provided rainfall data. In addition, numerous water/ pressure line spikes are shown above the "Bankfull Elevation" line; however, only one (1) bankfull event is reported. As currently presented, the graph and data do not appear correct.
RESPONSE: During MY1, the crest gauge was located on the right floodplain with the logger sitting at bankfull elevation. Water pressure spikes above the bankfull elevation line represent changes in barometric pressure and in some cases perched water on the floodplain; however, the event reported on 3/15/2023 represents enough of a spike at 0.62 feet to indicate an over bank event more significant than a perched water scenario. In January 2024 the crest gauge was moved to instream and future monitoring report graphs will include the stream bed elevation, water pressure line, and the bankfull elevation line as requested.

Digital Deliverable Comments:

- Please submit the data files for the 14 project cross sections in the revised digital support file submittal.
  RESPONSE: The data files for the project cross sections has been submitted as requested.

As requested, Michael Baker has provided an electronic response letter addressing the DMS comments received and two (2) hardcopies of the FINAL report, and the updated e-submission digital files will be sent via secure ftp link. A full final electronic copy with electronic support files have been included on a USB drive. Please do not hesitate to contact me (Jason.york@mbakerintl.com 828-412-6101) should you have any questions regarding our response submittal.

Sincerely,

Jason York

Jason York
Environmental Scientist

Enclosure: Final MY1 Report UT to Magness Creek Mitigation Project

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APPENDICES

1.0 PROJECT SUMMARY

1.1 Project Description

Michael Baker Engineering, Inc. (Michael Baker) restored 3,200.754 linear feet (LF) and enhanced an additional 289.340 LF of stream along three project reaches. Additionally, the project restored-by-reestablishment or restored-by-rehabilitation a total of 1.852 acres of riparian wetlands. All of these resources are protected within a permanent conservation easement. The project area lies within the Broad River Basin, Hydrologic Unit Code (HUC) 03050105-080060 (the Big Harris/Magness Creek Watershed), which is identified as a Targeted Local Watershed (TLW) in the NC Division of Mitigation Services' (NCDMS) 2009 *Broad River Basin Restoration Priorities* (RBRP) report. The project is located in the Piedmont Physiographic Region, within the Southern Outer Piedmont Level IV ecoregion. The project watershed drains into Magness Creek approximately 0.5 miles below the project easement. Magness Creek then flows for approximately 1.5 miles to its confluence with the First Broad River. Both of these receiving streams are designated as WS-IV waters by the DWR surface water classification.

The UT to Magness Creek Mitigation Project (project) is located on four adjacent parcels of an active cattle farm in Cleveland County, North Carolina, roughly halfway between the communities of Fallston and Lawndale as shown on the Project Vicinity Map (Figure 1). The project farm entrance is located at 2803 Selkirk Drive (State Road 1803), on the left about 0.6 miles south of the intersection of Selkirk Drive at Falls Street. The coordinates for the approximate center of the project are 35.406463 N Latitude, -81.528866 W Longitude.

The project generates a total of 3,391.287 warm-water stream mitigation credits along with 1.879 wetland mitigation credits, and the site will be protected by an 11.632-acre permanent conservation easement (Appendix B).

1.2 Goals and Objectives

Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Reconnect stream reaches to their floodplains	To raise channel beds and/or excavate sloping vegetated floodplains appropriate for stream type, by utilizing either a Priority I Restoration approach for Reach 1 (C-type), or an Enhancement Level I approach for UT2 (B-type).	Deposition of sediments on the floodplain and increase and improve wetland habitat.	Overbank Events	Flood frequency and Cross-Sectional Survey	Documentation of overbank events using automated Crest Gauges

Restore or improve hydrology to adjacent hydric soils and riparian wetlands	To raise adjacent channel beds and remove drainage ditches to raise groundwater tables within the buffer.	Increase and improve wetland habitat.	Duration of hydrology	Groundwater Wells	Documentation of improved hydrology using automated loggers to record underground water levels.
Improve stream stability	To construct streams of appropriate dimensions, pattern, and profile in restored reaches, slope stream banks on enhanced streams, install grade control with plunge pools, and utilize bioengineering to provide long term stability.	Reduced erosive capacity and reduction of sedimentation.	Stream stability/intact geomorphology	Cross-Sectional Survey, Visual Inspection and Photo Points	Annual overlay of Cross-Sections and multi-year data table and annual photos demonstrating stability.
Improve aquatic habitat	Construct an appropriate channel morphology to all streams increasing the number and depths of pools, increasing the amount of woody debris with structures including geo-lifts with brush toe, woody riffles, log vanes/weirs, cross-vanes, and/or J-hooks.	Provide habitat and refugia for aquatic species.	Stream stability/intact geomorphology and integrity of in-stream structures.	Cross-Sectional Suvey, Visual Inspection and Photo Points	Annual overlay of Cross-Sections and multi-year data table and annual photos demonstrating stability.
Reestablish forested riparian buffers	Establish riparian buffers at a 50-ft minimum width along all stream reaches, planted with native tree and shrub species.	Increase in native stem density and filtration of nutrient runoff.	Stability of the floodplain.	Vegetation Plots, Visual Inspection, Photo Points	Annual vegetation plots and visual inspections.
Permanently protect the project	Establish a permanent conservation easement restricting land use in perpetuity. This will prevent site disturbance and allow the project to mature and stabilize.	Exclusion of cattle from the stream channel.	Exclusion of cattle from the stream channel.	Visual Inspection	Visual inspections. Fencing remains intact throughout the life of the project.

1.3 Project Success Criteria

The success criteria and performance standards for the project will follow the NCDMS's templates As-Built Baseline Monitoring Report Format, Data Requirements, and Content Guidance (NCDMS 2020a), and the Annual Monitoring Report Format, Data Requirements, and Content Guidance (NCDMS 2020b), and as described in Section 7 of the approved Mitigation Plan. All specific monitoring activities will follow those outlined in detail in Section 8 of the approved Mitigation Plan and will be conducted for a period of 7 years unless otherwise directed by the IRT.

1.4 Monitoring Results and Project Performance

The Year 1 monitoring survey data of the fourteen permanent cross-sections indicates that these stream sections are geomorphically stable, both laterally and vertically, and in-stream structures are performing as designed and are rated at 100 percent for all parameters evaluated (Table 5 in Appendix B). There were no Stream Problem Areas (SPAs) identified; however, a small mid-channel bar formed after construction in the vicinity of Photo Point 10, where bedrock in the channel accumulated silt and plant material. This bar was repaired by hand using shovels during MY1 monitoring in October 2023. A photo of the repair was taken on December 6, 2023, and is included in Appendix B, Monitoring Gauges and Additional Photographs. At the time of the photo the repair appeared intact and the channel was maintaining a single thread.

During Year 1 monitoring, the planted acreage performance categories were functioning well overall. The average density of total planted stems, based on data collected from the 6 permanent and 2 random monitoring plots for the Year 1 monitoring conducted in October 2023 was 460 stems per acre (Table 7 in Appendix C). Thus, the Year 1 vegetation data demonstrate that the Site is on track to meet the success interim criteria of 320 trees per acre by the end of Year 3. In September 2023 the IRT requested that vegetation plot 3 be relocated completely within the wetland reestablishment area; however, we chose not to relocate the vegetation plot because of field conditions. The proposed relocation area suggested by the IRT is dominated by mature poplar trees and overland flow from the wetland area and is not representative of the planted wetland floodplain; however, a random vegetation plot was surveyed located fully in the reestablishment area to provide additional stem density data and we will continue to monitor these areas in future years. No vegetation problem areas (VPAs) were identified as exceeding the reportable mapping threshold of 0.1 acres.

During Year 1 monitoring, one post-construction bankfull event was observed. This event occurred on 3/15/2023 as documented by a spike in the water levels shown in the data from automated Crest Gauge 1 on R1A (Table 10). Woody debris indicating an overbank event was visible on the floodplains throughout the project during MY1; however, this evidence is difficult to attribute to one rain event and therefore is not mentioned in Table 10. Examples of these occurrences are shown in Appendix B, Monitoring Gauges and Additional Photographs.

As the observed monthly rainfall data for the project presented in Figure 7 (Appendix E) demonstrates, the past 12 months have varied dramatically from month to month, as compared to historic average monthly precipitation. A total of 50.16 inches of rainfall was observed for the project site since November 2022, while the region averages 59.49 inches of annual rainfall, a deficit of 9.33 inches. All observed project rainfall was collected from the Spindale Tower through the North Carolina State Climate Office Cardinal System.

During Year 1 monitoring, three of the four automated groundwater monitoring wells met or exceeded the minimum hydroperiod performance criteria approved in the Mitigation Plan of 12% of the 226-day growing season (27 or more consecutive days. Table 11). MCW 4 will be relocated closer to the stream channel per USACE and DWR request prior to the start of the growing season (February 2024) of MY2. We expect these wells to meet performance criteria in future years as the site hydrology becomes more established.

The automated flow gauge (FG1), on UT2 exceeded the minimum 30-day performance criteria during MY1 (Table 12) logging 224 consecutive days of flow.

The easement boundary has been walked and signage is posted according to the specifications. No encroachment area were identified. The conservation easement boundary will continue to be monitored and reported on in all future monitoring reports.

Summary information/data related to the site and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report Appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan. Any raw data supporting the tables and figures in the Appendices is available from DMS upon request.

This report documents the successful completion of the Year 1 monitoring activities for the post-construction monitoring period.

1.5 Technical and Methodological Descriptions

Stream survey data was collected to a minimum of Class C Vertical and Class A Horizontal Accuracy using a Leica TS06 Total Station and was georeferenced to the NAD83 State Plane Coordinate System, FIPS3200 in US Survey Feet, which was derived from the As-built Survey. The survey data from the permanent project cross-sections were collected and classified using the Rosgen Stream Classification System to confirm design stream type (Rosgen 1994).

The six vegetation-monitoring quadrants (plots) were installed across the site in accordance with the CVS-DMS Protocol for Recording Vegetation, Version 4.1 (Lee 2007) and the data collected from each was input into the DMS Veg Table Production Tool (2021).

Four automated groundwater monitoring wells, one flow gauge, and one crest gauge were installed in the channel and floodplain following USACE protocols (USACE 2005). The gauges themselves, both flow and groundwater gauges, are all Win-Situ brand data loggers.

All observed project rainfall was collected from the North Carolina Climate Office Weather Climate Database Legacy System using the Spindale Tower (SPIN) located approximately 22 miles southwest of the project site at Isothermal Community College.

The specific locations of monitoring features, such as vegetation plots, permanent cross-sections, reference photograph stations, and crest gauges, are shown on the CCPV map found in Appendix B.

1.6 References

Carolina Vegetation Survey (CVS) and NC Division of Mitigation Services (DMS). CVS-DMS Data Entry Tool v. 2.3.1. University of North Carolina, Raleigh, NC. 2012.

Lee, M., Peet R., Roberts, S., Wentworth, T. 2007. CVS-DMS Protocol for Recording Vegetation, Version 4.1. DMS Veg Table Production Tool (2021).

North Carolina Division of Mitigation Services. 2020a. Annual Monitoring Report Format, Data Requirements, and Content Guidance October 2020. NC Department of Environmental Quality. Raleigh, NC.

North Carolina Interagency Review Team (NCIRT). 2020. Guidance document “Wilmington District Stream and Wetland Compensatory Mitigation Update”. October 2020

Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena 22:169-199.

Rosgen, D.L. 1996. Applied River Morphology. Wildlands Hydrology. Pagosa Springs, CO.

State Climate Office of NC: Dot precipitation. (n.d.). https://legacy.climate.ncsu.edu/dot/

United States Army Corps of Engineers (USACE). 2005. "Technical Standard for Water-Table Monitoring of Potential Wetland Sites," WRAP Technical Notes Collection (ERDC TN-WRAP-05-2), U.S. Army Engineer Research and Development Center. Vicksburg, MS.

APPENDIX A

Background Tables and Figures

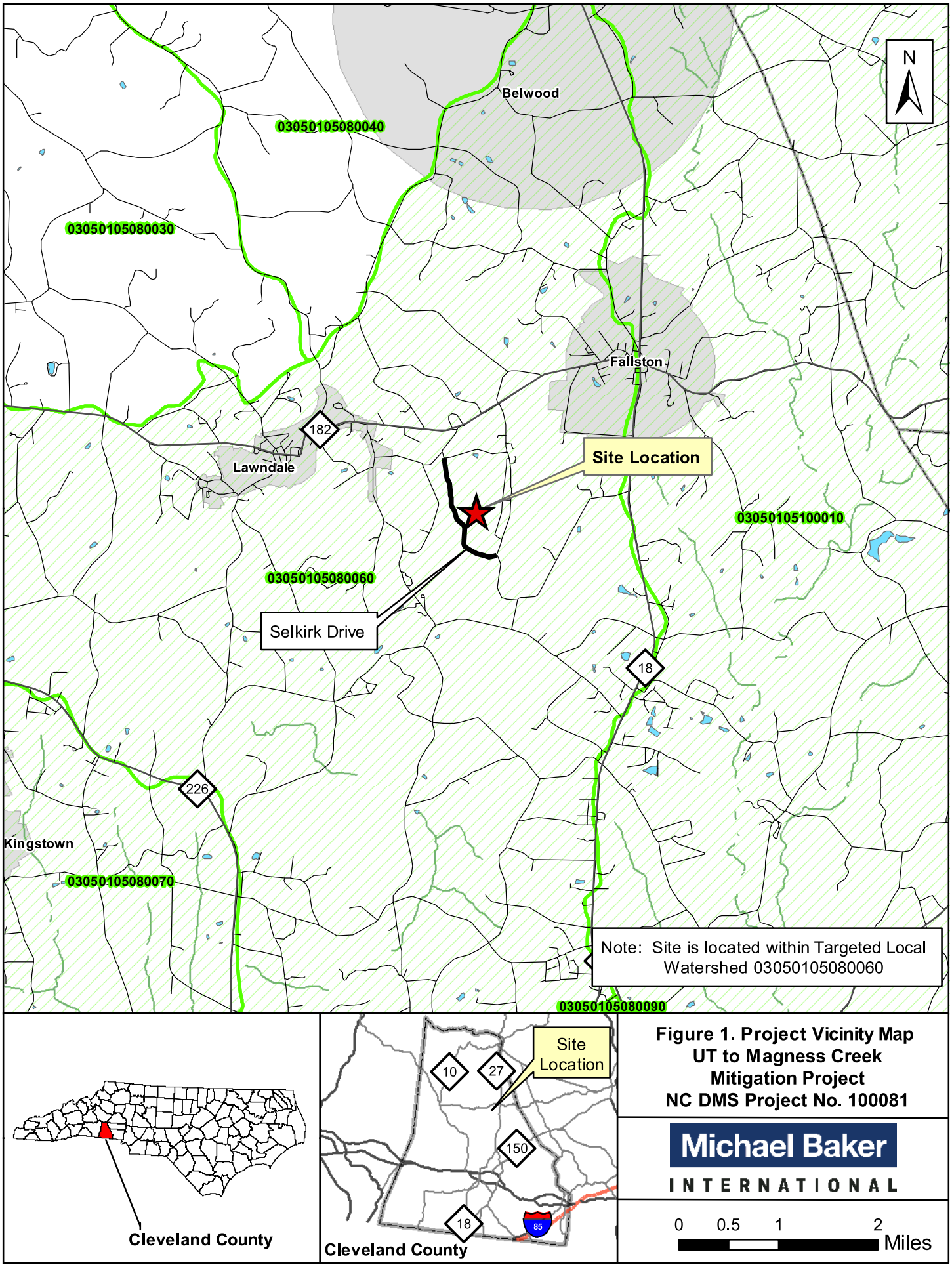

Figure 1. Project Vicinity Map
UT to Magness Creek
Mitigation Project
NC DMS Project No. 100081

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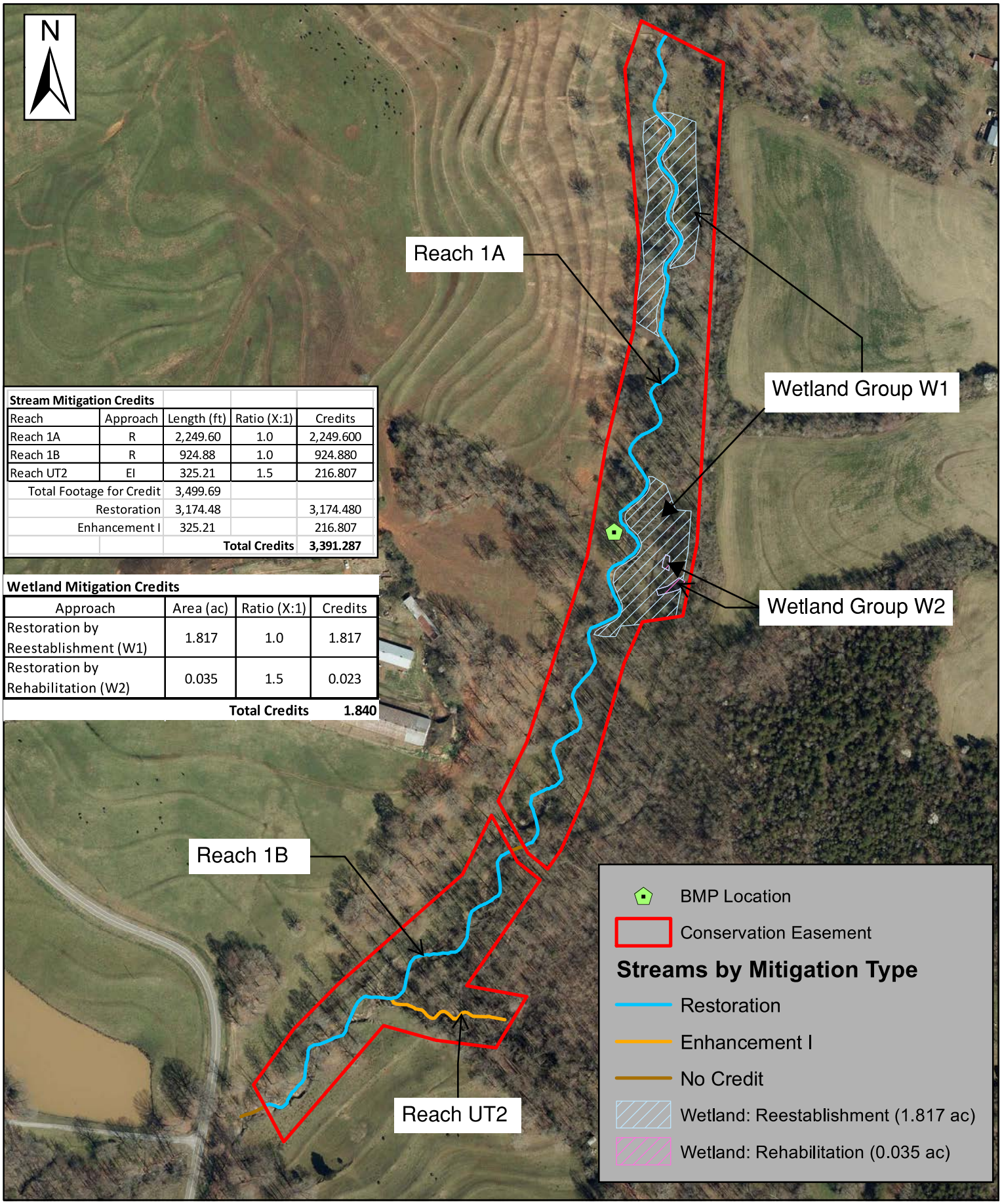

Stream Mitigation Credits

Reach	Approach	Length (ft)	Ratio (X:1)	Credits
Reach 1A	R	2,249.60	1.0	2,249.600
Reach 1B	R	924.88	1.0	924.880
Reach UT2	EI	325.21	1.5	216.807
Total Footage for Credit		3,499.69		
Restoration		3,174.48		3,174.480
Enhancement I		325.21		216.807
			Total Credits	**3,391.287**

Wetland Mitigation Credits

Approach	Area (ac)	Ratio (X:1)	Credits
Restoration by Reestablishment (W1)	1.817	1.0	1.817
Restoration by Rehabilitation (W2)	0.035	1.5	0.023
		Total Credits	**1.840**

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0 125 250 500 Feet

Figure 2.
Project Asset Map
UT to Magness Creek Project
Cleveland County

Table 1. Project Mitigation Quantities and Credits

UT to Magness Creek Mitigation Project - NCDMS Project No. 100081

Project Segment	Original Mitigation Plan Ft/Ac	As-Built Ft/Ac	Original Mitigation Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Credits
Stream						
Reach 1A	2249.600	2257.034	Warm	R	1.0	2,249.600
Reach 1B	924.880	943.720	Warm	R	1.0	924.880
Reach UT2	325.210	289.340	Warm	E1	1.5	216.807
					Total:	**3,391.287**
Wetland						
Wetland Group W1	1.856	1.817	R	REE	1.0	1.856
Wetland Group W2	0.035	0.035	R	RH	1.5	0.023
					Total:	**1.879**

Table 1.2 Project Credits

As-Built Centerline Length and Area Summations by Mitigation Category

	Stream			Riparian	Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Wetland	Wetland	Marsh
Restoration	3,174.480	0.000	0.000	0.000	0.000	0.000
Re-establishment				1.856	0.000	0.000
Rehabilitation				0.023	0.000	0.000
Enhancement				0.000	0.000	0.000
Enhancement I	216.807	0.000	0.000			
Enhancement II	0.000	0.000	0.000			
Creation				0.000	0.000	0.000
Preservation	0.000	0.000	0.000	0.000	0.000	
Totals	**3,391.287**	**0.000**	**0.000**	**1.879**	**0.000**	**0.000**

Table 2. Project Activity and Reporting History
UT to Magness Creek Mitigation Project - NCDMS Project No. 100081

Elapsed Time Since grading complete:	**16 months**
Elapsed Time Since planting complete:	**9 months**
Number of Reporting Years[1]:	**1**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Project Instituted	N/A	Jun-18
Mitigation Plan	N/A	Jul-21
Final Design – Construction Plans[2]	N/A	May-22
Construction Grading Completed	N/A	Aug-22
As-Built Survey	Jan-23	Jan-23
Stream Survey	Jan-23	Jan-23
Vegetation Monitoring	Mar-23	Mar-23
Livestake and Bareroot Planting Completed	Mar-23	Mar-23
As-Built Baseline Monitoring Report (MY0)	Apr-23	Jun-23
Monitoring Report (MY1)	Nov-23	Dec-23
Stream Survey	Oct-23	Oct-23
Vegetation Monitoring	Oct-23	Oct-23

[1] = The number of monitoring reports excluding the as-built/baseline report.
[2] = date includes approved revisions.

Table 3. Project Contacts
UT to Magness Creek Mitigation Project - NCDMS Project No. 100081

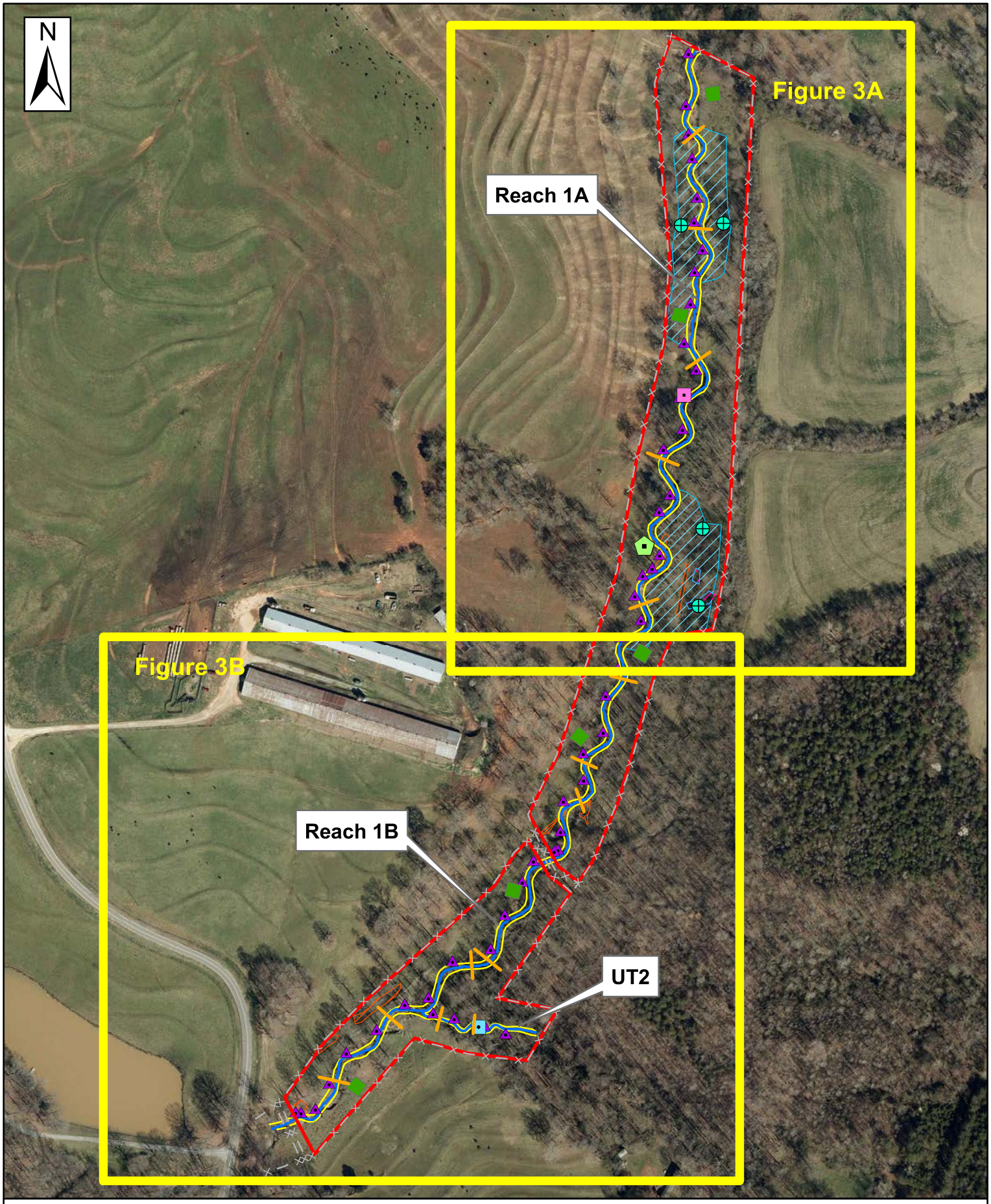
Designer	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact: Katie McKeithan, Tel. 919-481-5703
Construction Contractor	
KBS Earthworks, Inc.	5616 Coble Church Rd Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Survey Contractor	
Kee Mapping and Surveying	88 Central Avenue Asheville, NC 28801 Contact: Brad Kee, Tel. 828-575-9021
Planting Contractor	
Ripple EcoSolutions	215 Moonridge Road Chapel Hill, NC 27516 Contact: George Morris, Tel. 919-818-3984
Seeding Contractor	
KBS Earthworks, Inc.	5616 Coble Church Rd Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Seed Mix Sources	
Green Resources	Green Resource 5204 Highgreen Court Colfax, NC 27235
Nursery Stock Suppliers	
Strader Fencing, Inc. **Native Forest Nursery**	5434 Amick Rd. Julian, NC 28238 11306 US-441, Chatswort, GA 30705 Telephone: 336-855-6363
Monitoring Performers	
Michael Baker Engineering, Inc. Stream Monitoring POC Vegetation Monitoring POC	797 Haywood Rd., Suite 201 Asheville, NC 28806 Jason York, Tel. 828-380-0118 Jason York, Tel. 828-380-0118

Table 4. Project Baseline Information and Attributes

Project Attribute Table			
Project Name	UT to Magness Creek Mitigation Project		
County	Cleveland		
Project Area (acres)	11.632		
Project Coordinates (latitude and longitude decimal	35.406463 N, -81.528866 W		
Project Watershed Summary Information			
Physiographic Province	Piedmont		
River Basin	Broad		
USGS Hydrologic Unit 8-digit	03050105		
DWR Sub-basin	03-08-04		
Project Drainage Area (acres)	397 acres / 0.62 square miles		
Project Thermal Regime	Warm		
Project Drainage Area Percentage of Impervious Area	2.35% impervious area		
Land Use Classification	48.1% pasture/hay, 25.7% forested, 9.2% open space, 8.9% cultivated crops, 4.9% developed, 2.6% herbaceous, 0.6% scrub/shrub.		
Reach Summary Information			
Parameters	Reach 1A	Reach 1B	UT2
Pre-project length (feet)	2,141	932	320
Post-project (feet)	2,257	944	289
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined	Moderately Confined	Moderately Confined
Drainage area (acres)	330	397	31
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial
NCDWR Water Quality Classification	WS-IV	WS-IV	WS-IV
Dominant Stream Classification (existing)	B4	B4	F4
Dominant Stream Classification (proposed)	C4	C4	B4
Dominant Evolutionary class (Simon) if applicable	IV - Degradation and Widening	IV - Degradation and Widening	III - Degrading
Wetland Summary Information			
Parameters	**Wetland Group W1 (REE)**	**Wetland Group W2 (RH)**	
Pre-project (acres)	0.000	0.035	
Post-project (acres)	1.817	0.035	
Wetland Type (non-riparian, riparian)	Riparian	Riparian	
Mapped Soil Series	Chewacla loam	Chewacla loam	
Soil Hydric Status	Yes	Yes	
Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting**
Water of the United States - Section 404	Yes	Yes	PCN
Water of the United States - Section 401	Yes	Yes	PCN
Endangered Species Act	Yes	Yes	Catergorical Exclusion
Historic Preservation Act	Yes	Yes	Catergorical Exclusion
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

APPENDIX B

Visual Assessment Data



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0 150 300 600 Feet

Overview Map: Current Condition Plan View (CCPV)
UT to Magness Creek Mitigation Project
Cleveland County, NC

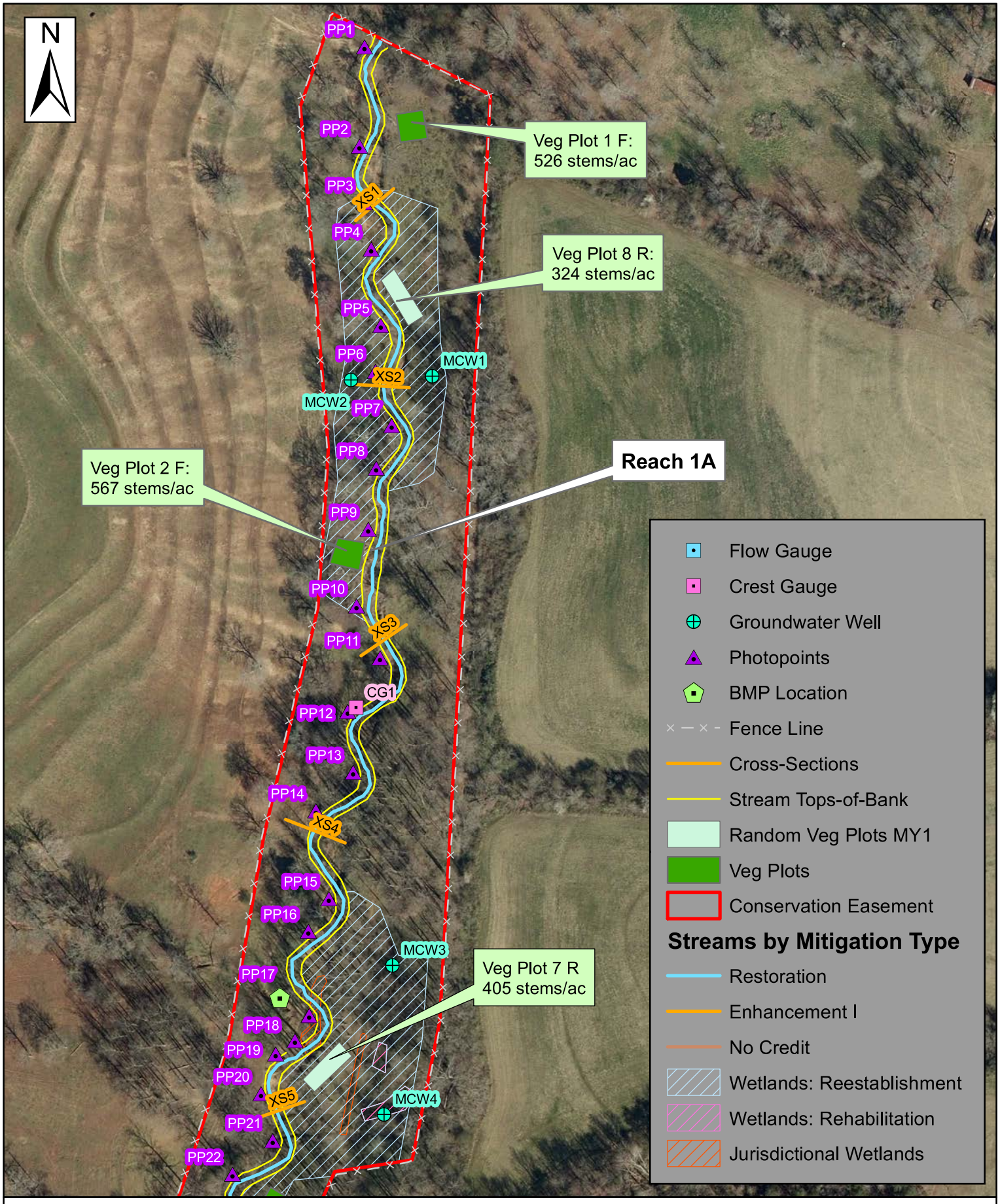

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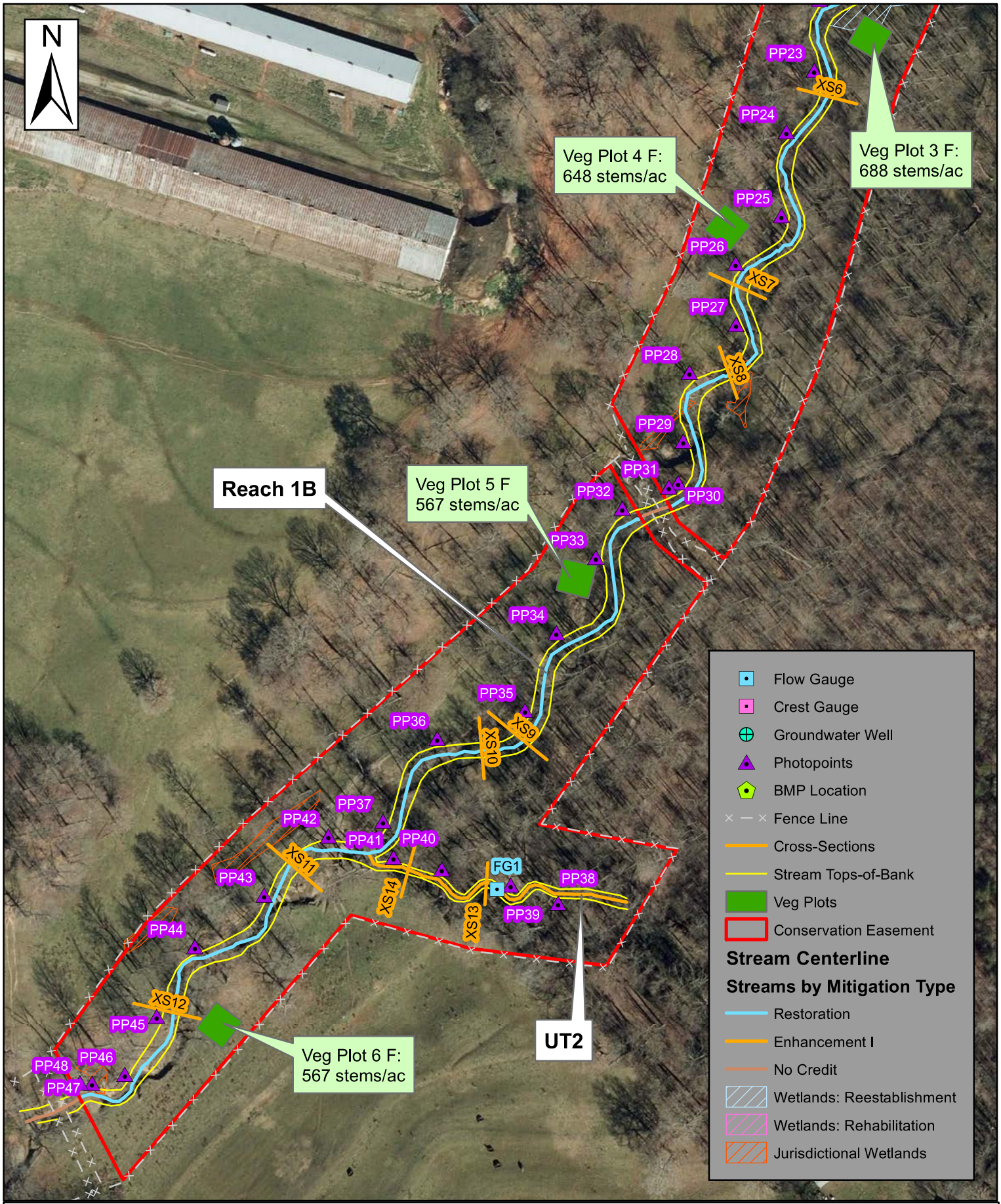
Figure 3A. Current Condition Plan View (CCPV)
UT to Magness Creek Mitigation Project
Cleveland County, NC



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0 75 150 300 Feet

Figure 3B: Current Condition Plan View (CCPV)
UT to Magness Creek Mitigation Project
Cleveland County, NC

Table 5. Visual Stream Stability Assessment - Assessed November 1, 2023

Reach **Reach 1A**
Assessed Stream Length **2257.03**
Assessed Bank Length **4514.06**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	Surface Scour/Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
		Totals			0	100%
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	23	23		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)				100%

Reach **Reach 1B**
Assessed Stream Length **943.72**
Assessed Bank Length **1887.44**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	Surface Scour/Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour				100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.				100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse				100%
		Totals			0	100%
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)				100%

Reach **Reach UT2**
Assessed Stream Length **289.34**
Assessed Bank Length **578.68**

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	Surface Scour/Bare Bank	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour				100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.				100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse				100%
		Totals			0	100%
Structure	Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)				100%

Table 6. Visual Vegetation Assessment - Assessed October 2, 2023

Planted acreage **7.3**

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10 acres	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10acres	0.00	0.0%
		Total	0.00	0.0%
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10 acres	0.00	0.0%
		Cumulative Total	0.00	0.0%

Easement Acreage **8.3**

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Species included in summation above should be identified in report summary.	0.10 acres	0.00	0.0%
Easement Encroachment Areas	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	none	# Encroachments noted	

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-1: Reach 1A, Upstream, Station 11+25- Begin Reach 1A. October 2, 2023

PP-2: Reach 1A, Upstream, Station 12+50. October 2, 2023

PP-3: Reach 1A, Upstream, Station 13+15. October 2, 2023

PP-4: Reach 1A, Upstream, Station 13+80. October 2, 2023

PP-5: Reach 1A, Upstream, Station 14+80. October 2, 2023

PP-6: Reach 1A, Upstream, Station 15+70. October 2, 2023

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-7: Reach 1A, Upstream, Station 16+30. October 2, 2023

PP-8: Reach 1A, Upstream, Station 17+00. October 2, 2023

PP-9: Reach 1A, Upstream, Station 17+70. October 2, 2023

PP-10: Reach 1A, Upstream, Station 18+50. October 2, 2023

PP-11: Reach 1A, Upstream, Station 19+15. October 2, 2023

PP-12: Reach 1A, Upstream, Station 20+20. December 6, 2023.

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-13: Reach 1A, Upstream, Station 21+00. December 6, 2023.

PP-14: Reach 1A, Upstream, Station 21+90. December 6, 2023.

PP-15: Reach 1A, Upstream, Station 22+90. December 6, 2023.

PP-16: Reach 1A, Upstream, Station 23+60. December 6, 2023.

PP-17: Reach 1A, Upstream, Station 24+60. December 6, 2023.

PP-18: Reach 1A, Upstream, Station 25+30. October 2, 2023

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-19: Right Floodplain BMP, Reach 1A Station 25+40. October 2, 2023

PP-20: Reach 1A, Upstream, Station 26+00. October 2, 2023

PP-21: Reach 1A, Upstream, Station 26+60. October 2, 2023

PP-22: Reach 1A, Upstream, Station 27+45. October 2, 2023

PP-23: Reach 1A, Upstream, Station 28+20. October 2, 2023

PP-24: Reach 1A, Upstream, Station 28+90. October 2, 2023

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-25: Reach 1A, Upstream,
Station 29+70. October 2, 2023

PP-26: Reach 1A, Upstream,
Station 30+60. October 2, 2023

PP-27: Reach 1A, Upstream,
Station 31+30. October 2, 2023

PP-28: Reach 1A, Upstream,
Station 32+30. October 2, 2023

PP-29: Reach 1A, Upstream,
Station 32+90. October 2, 2023

PP-30: Reach 1A, Upstream,
Station 33+50. October 2, 2023

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-31: End of Reach 1A, Downstream, Station 33+55 at Crossing. January 29, 2024

PP-32: Begin Reach 1B, Upstream, Station 33+90 at Crossing. January 29, 2024

PP-33: Reach 1B, Upstream, Station 34+40. October 2, 2023

PP-34: Reach 1B, Upstream, Station 35+60. October 2, 2023

PP-35: Reach 1B, Upstream, Station 36+50. October 2, 2023

PP-36: Reach 1B, Upstream, Station 37+70. October 2, 2023

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-37: Reach 1B, Upstream, Station 38+50. October 2, 2023

PP-38: Begin UT2, Upstream, Station 10+90. October 2, 2023

PP-39: UT2, Upstream, Station 11+60. October 2, 2023

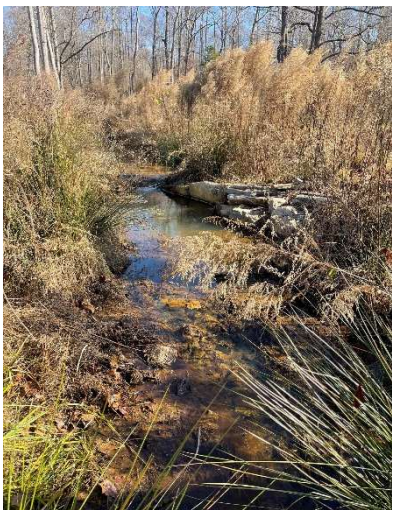
PP-40: UT2, Upstream, Station 12+25. October 2, 2023

PP-41: UT2, Upstream, Station 12+80-End UT2. October 2, 2023

PP-42: Reach 1B, Upstream, Confluence with UT2, Station 39+30. December 6, 2023.

UT to Magness Creek: Monitoring Year 1 Stream Station Photo-Points
NCDMS Project No. #100081

PP-43: Reach 1B, Upstream, Station 40+00. December 6, 2023.



PP-44: Reach 1B, Upstream, Station 41+20. December 6, 2023.

PP-45: Reach 1B, Upstream, Station 42+00. December 6, 2023.

PP-46: Reach 1B, Upstream, Station 42+90. December 6, 2023.

PP-47: Reach 1B, Upstream, Station 43+05. December 6, 2023.

PP-48: Reach 1B, Project terminus, Station 43+10. October 2, 2023

UT to Magness Creek: Vegetation Plot Photographs
NCDMS Project No. 100081

Vegetation Plot #1: Photo taken October 2, 2023

Vegetation Plot #2: Photo taken October 2, 2023

Vegetation Plot #3: Photo taken October 2, 2023

Vegetation Plot #4: Photo taken October 2, 2023

Vegetation Plot #5: Photo taken October 2, 2023

Vegetation Plot #6: Photo taken October 2, 2023

UT to Magness Creek: Vegetation Plot Photographs
NCDMS Project No. 100081

Random Vegetation Plot #1: Photo taken October 2, 2023

Random Vegetation Plot #2: Photo taken October 2, 2023

Monitoring Gauges and Additional Photographs

Monitoring Well 1. (Photo taken November 16, 2023)

Monitoring Well 2. (Photo taken November 16, 2023)

Monitoring Well 3. (Photo taken November 16, 2023)

Monitoring Well 4. (Photo taken November 16, 2023)

Crest Gauge. (Photo taken November 16, 2023)

Flow Gauge. (Photo taken November 16, 2023)

Monitoring Gauges and Additional Photographs

Overbank evidence. Debris in upper Reach 1B floodplain (Photo taken November 16, 2023)

Overbank evidence. Debris in upper Reach 1B floodplain (Photo taken May 11, 2023)

Overbank evidence. Debris in lower Reach 1A floodplain. (Photo taken May 11, 2023)

Mid-Channel Bar Repair on Reach 1A (Photo taken December 6, 2023)

BMP. Lower Reach 1A. (Photo taken November 16, 2023)

Gate at Railroad Bridge Crossing. Below Reach 1A. (Photo taken November 16, 2023)

Monitoring Gauges and Additional Photographs

Railroad Bridge Crossing. Below Reach 1A. (Photo taken November 16, 2023)

Crossing at terminus of project. (Photo taken November 16, 2023)

Fence in crossing. Bottom of Reach 1B. (Photo taken November 16, 2023)

APPENDIX C

Vegetation Plot Data

Table 7. Planted Stem Counts by Plot and Species

Planted Acreage	7.3
Date of Initial Plant	2023-03-01
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	10/4/2023
Date of Current Survey	2023-10-04
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 R	Veg Plot 8 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	Aronia arbutifolia	red chokeberry	Shrub	FACW			1	1									1	
	Betula nigra	river birch	Tree	FACW	3	3			1	1	4	4	2	2			2	3
	Carpinus caroliniana	American hornbeam	Tree	FAC	2	2	1	1	1	1			2	2	1	1		1
	Celtis laevigata	sugarberry	Tree	FACW					1	1					1	1		
	Cephalanthus occidentalis	common buttonbush	Shrub	OBL					1	1								
	Cercis canadensis	eastern redbud	Tree	FACU					2	2								
	Cornus amomum	silky dogwood	Shrub	FACW														1
	Diospyros virginiana	common persimmon	Tree	FAC			1	1	1	1			1	1				1
	Fraxinus pennsylvanica	green ash	Tree	FACW	1	1	1	1	1	1			1	1			1	
	Hamamelis virginiana	American witchhazel	Tree	FACU							1	1						
	Liriodendron tulipifera	tuliptree	Tree	FACU						1			1	1			2	1
	Nyssa sylvatica	blackgum	Tree	FAC					1	1	1	1			1	1	2	1
	Platanus occidentalis	American sycamore	Tree	FACW	3	3	4	4	3	3	4	4	1	1	4	4		1
	Quercus michauxii	swamp chestnut oak	Tree	FACW							2	2						1
	Quercus nigra	water oak	Tree	FAC	1	1					1	1	1	1				
	Quercus palustris	pin oak	Tree	FACW					1	1								
	Quercus phellos	willow oak	Tree	FAC	1	1	1	1	1	1	1	1	2	2	3	3		
	Ulmus americana	American elm	Tree	FACW					2	2					1	1		
Sum	Performance Standard				11	11	9	9	16	17	14	14	11	11	11	11	8	10
Post Mitigation Plan Species	*Juglans nigra*	*black walnut*	*Tree*	*FACU*												*1*		
Sum	Proposed Standard				11	11	9	9	16	17	14	14	11	11	11	11	8	10
Mitigation Plan Performance Standard	Current Year Stem Count					11		9		17		14		11		11	8	10
	Stems/Acre					445		364		688		567		445		445	324	405
	Species Count					6		6		13		7		8		6	5	8
	Dominant Species Composition (%)					27		44		18		29		18		33	25	30
	Average Plot Height (ft.)					2		2		2		2		2		2	2	2
	% Invasives					0		0		0		0		0		0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					11		9		17		14		11		11	8	10
	Stems/Acre					445		364		688		567		445		445	324	405
	Species Count					6		6		13		7		8		6	5	8
	Dominant Species Composition (%)					27		44		18		29		18		33	25	30
	Average Plot Height (ft.)					2		2		2		2		2		2	2	2
	% Invasives					0		0		0		0		0		0	0	0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Vegetation Performance Standards Summary Table

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	445		6	0	364		6	0	688		13	0
Monitoring Year 0	526		7	0	567		9	0	688		10	0
	Veg Plot 4 F				**Veg Plot 5 F**				**Veg Plot 6 F**			
	Stems/Ac.	**Av. Ht. (ft)**	**# Species**	**% Invasives**	**Stems/Ac.**	**Av. Ht. (ft)**	**# Species**	**% Invasives**	**Stems/Ac.**	**Av. Ht. (ft)**	**# Species**	**% Invasives**
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	567		7	0	445		8	0	445		6	0
Monitoring Year 0	648		8	0	567		8	0	567		7	0
	Veg Plot Group 1 R				**Veg Plot Group 2 R**							
	Stems/Ac.	**Av. Ht. (ft)**	**# Species**	**% Invasives**	**Stems/Ac.**	**Av. Ht. (ft)**	**# Species**	**% Invasives**				
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1	324		5	0	405		8	0				
Monitoring Year 0	405		8	0	648		9	0				

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

APPENDIX D

Stream Geomorphology Data

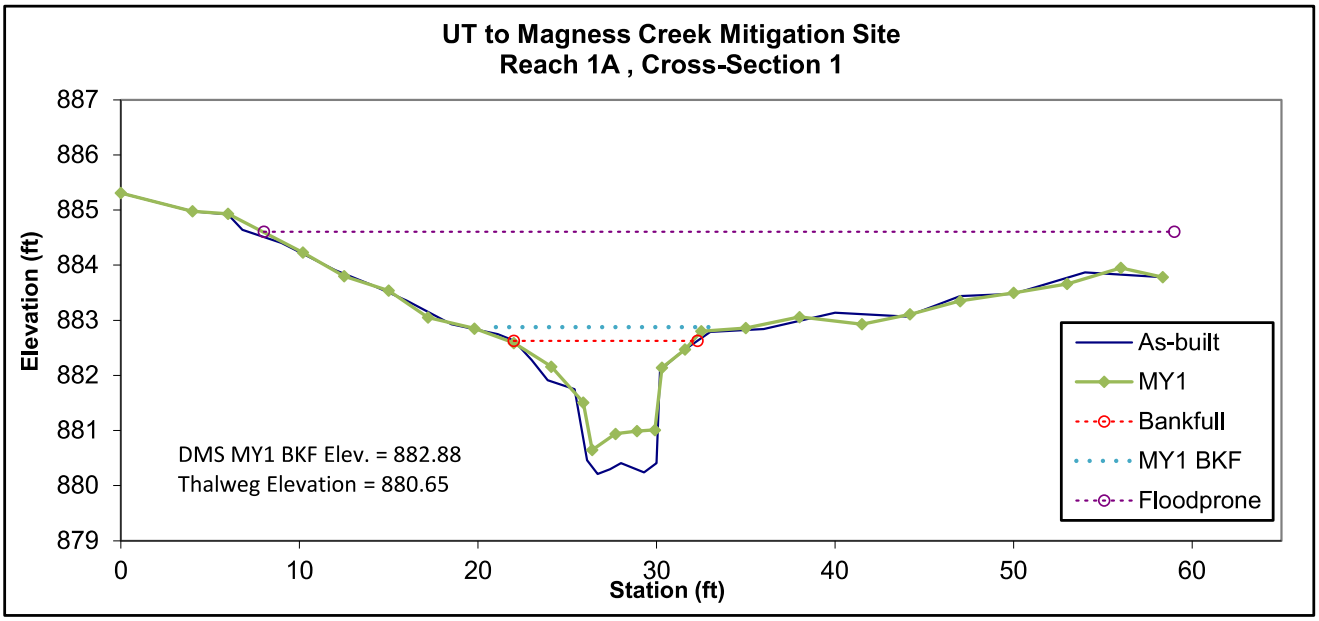
Permanent Cross-Section 1

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	C4	9.6	10.4	0.9	2.0	11.2	0.9	2.9	882.63	882.60



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

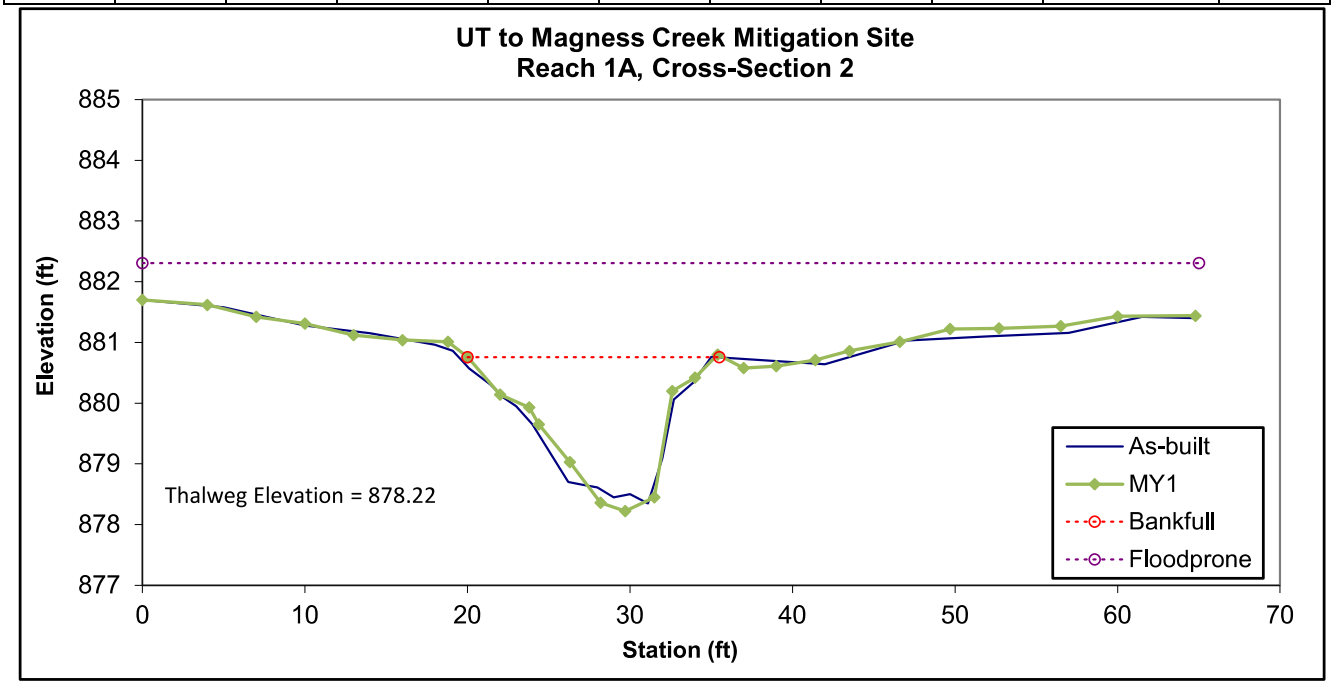
Permanent Cross-Section 2

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Pool	C4	19.6	15.3	1.3	2.5	11.9	--	--	880.76	880.76



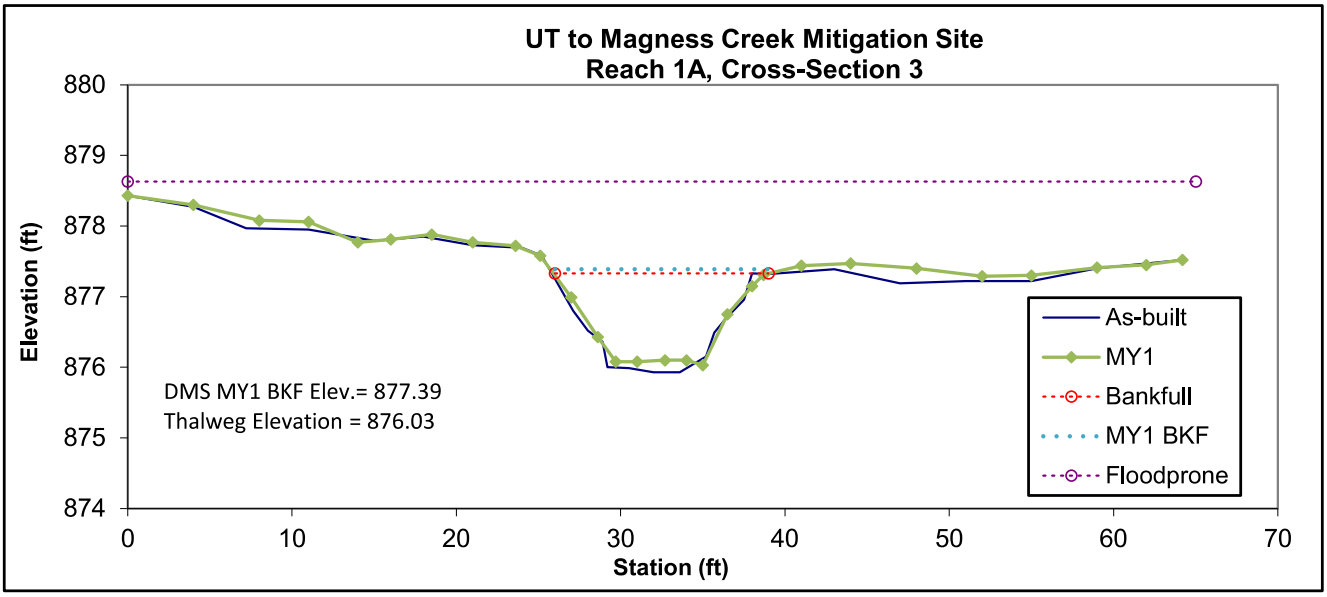
Permanent Cross-Section 3

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	C4	11.0	13.1	0.8	1.3	15.7	1.0	2.5	877.33	877.33



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

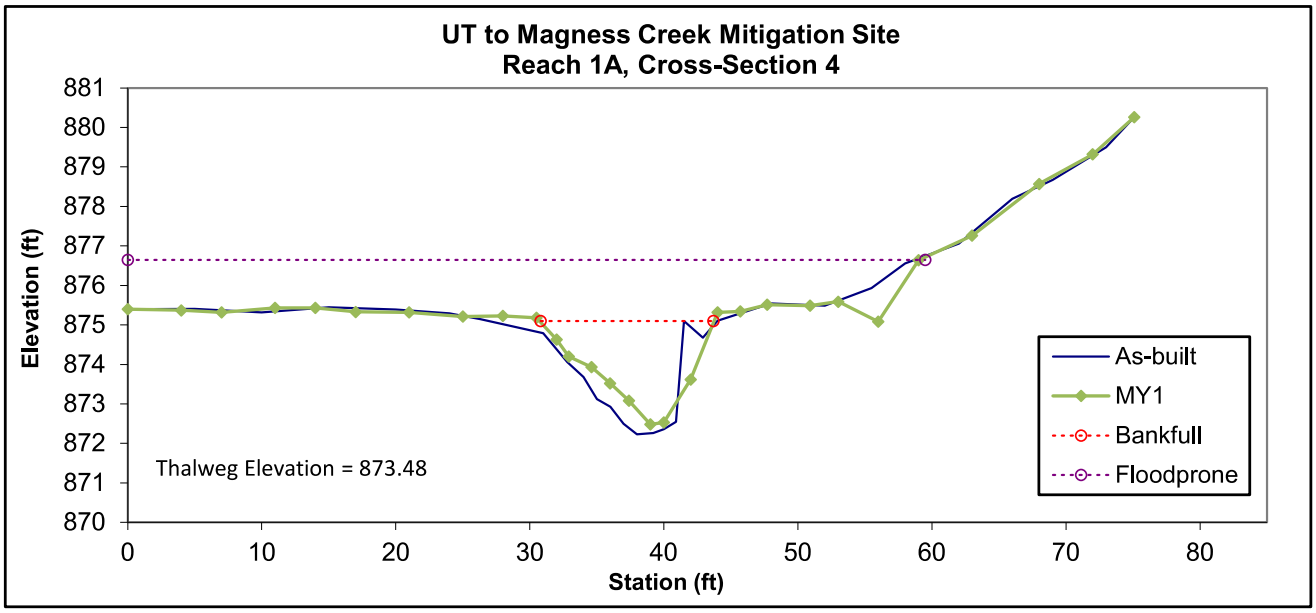
Permanent Cross-Section 4

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Pool	C4	18.8	13.2	1.4	2.6	9.3	--	--	875.10	875.18



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

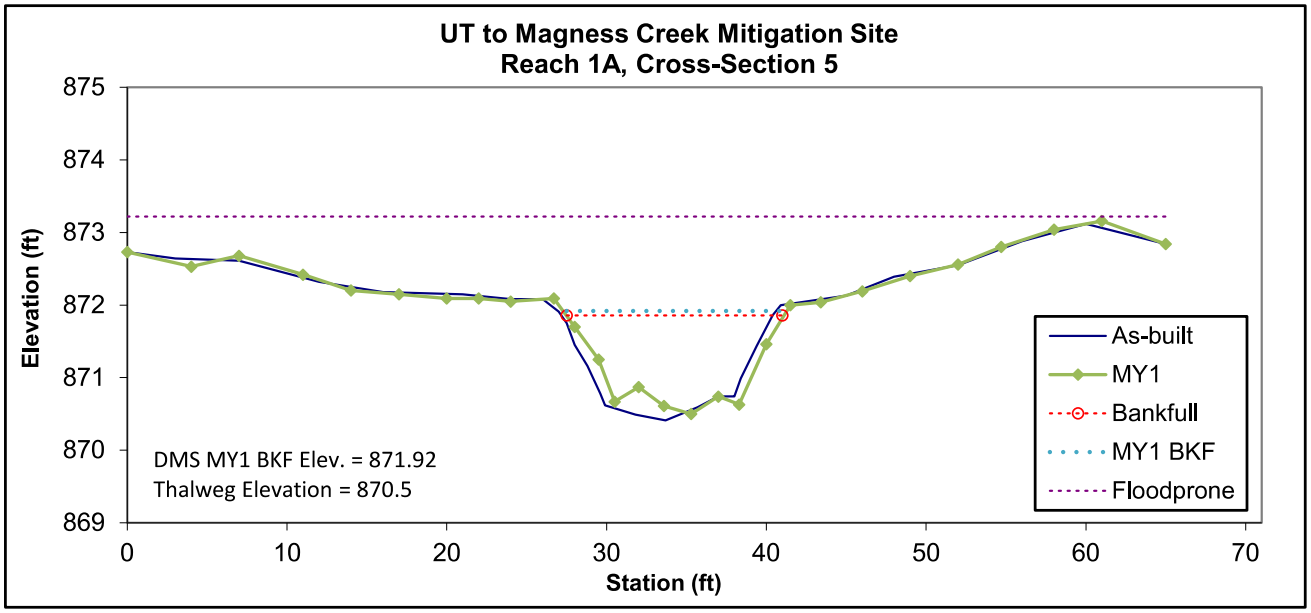
Permanent Cross-Section 5

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	C4	12.4	13.6	0.9	1.4	15.0	1.1	2.5	871.86	872.00



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

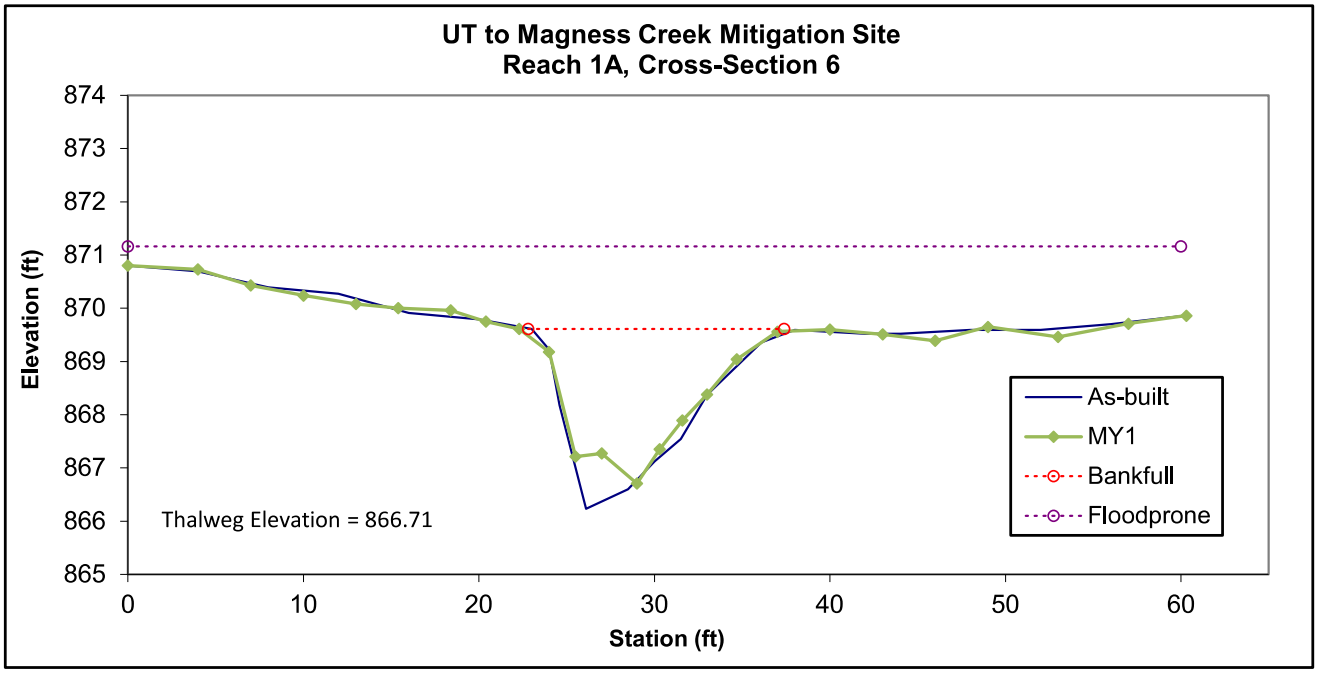
Permanent Cross-Section 6

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Pool	C4	21.6	17.7	1.2	2.9	14.5	--	--	869.61	869.56



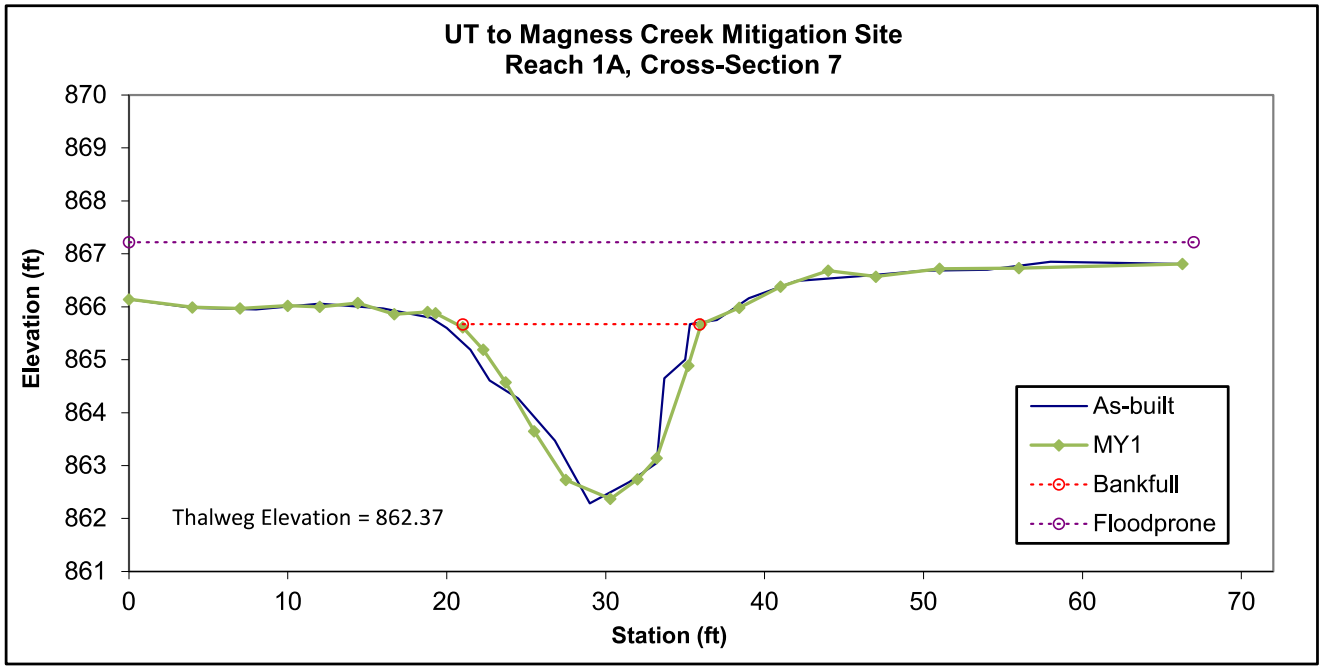
Permanent Cross-Section 7

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Pool	C4	30.2	15.4	2.0	3.3	7.8	--	--	865.67	865.67



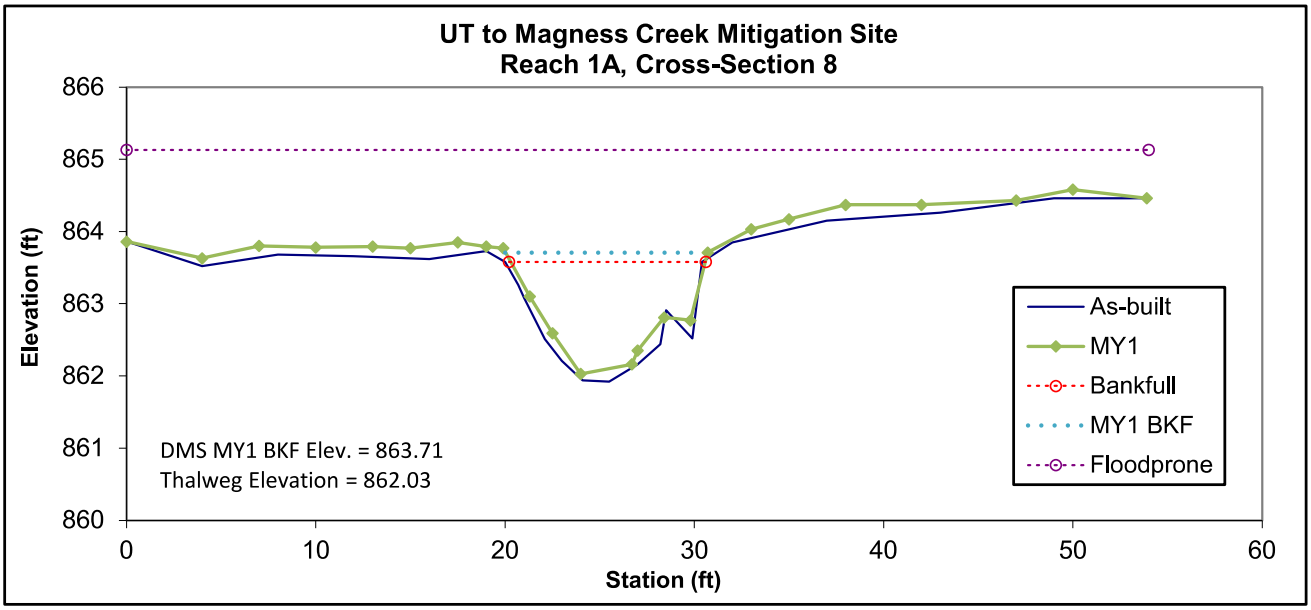
Permanent Cross-Section 8

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	C4	10.3	10.3	1.0	1.6	10.3	1.0	4.0	863.58	863.71



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

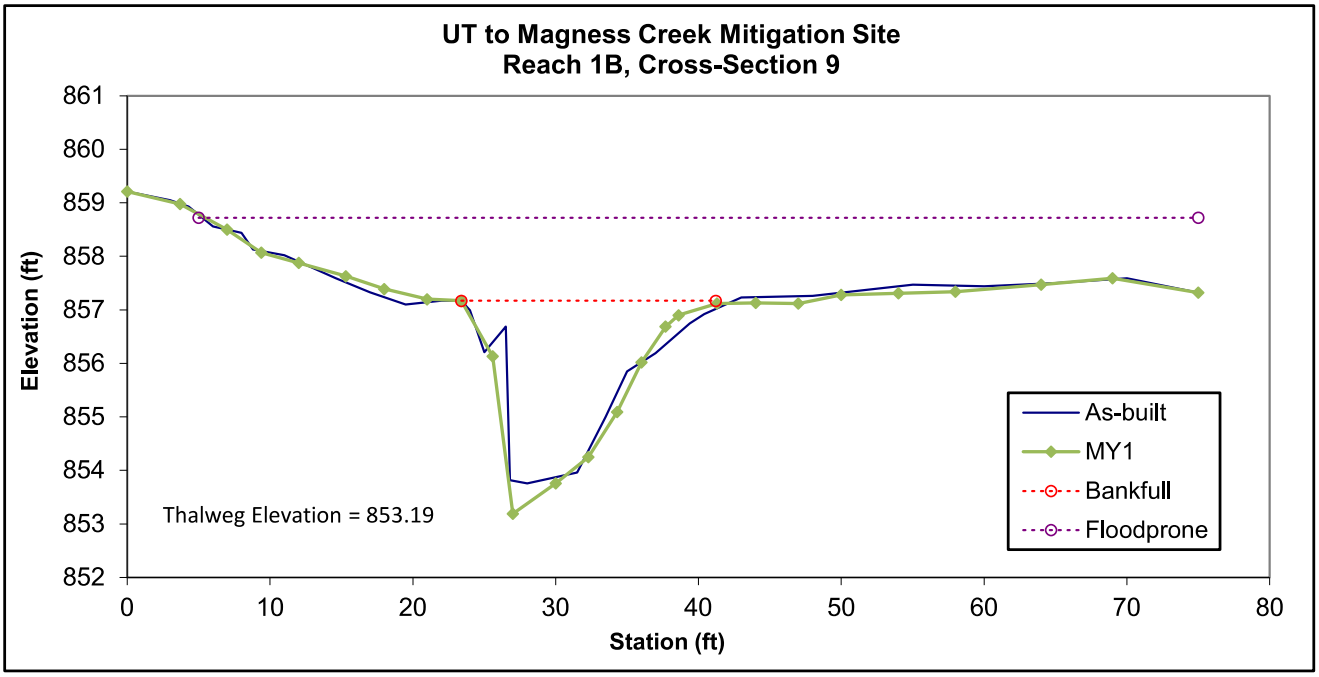
Permanent Cross-Section 9

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Pool	C4	33.2	24.5	1.4	4.0	18.1	--	--	857.17	856.90



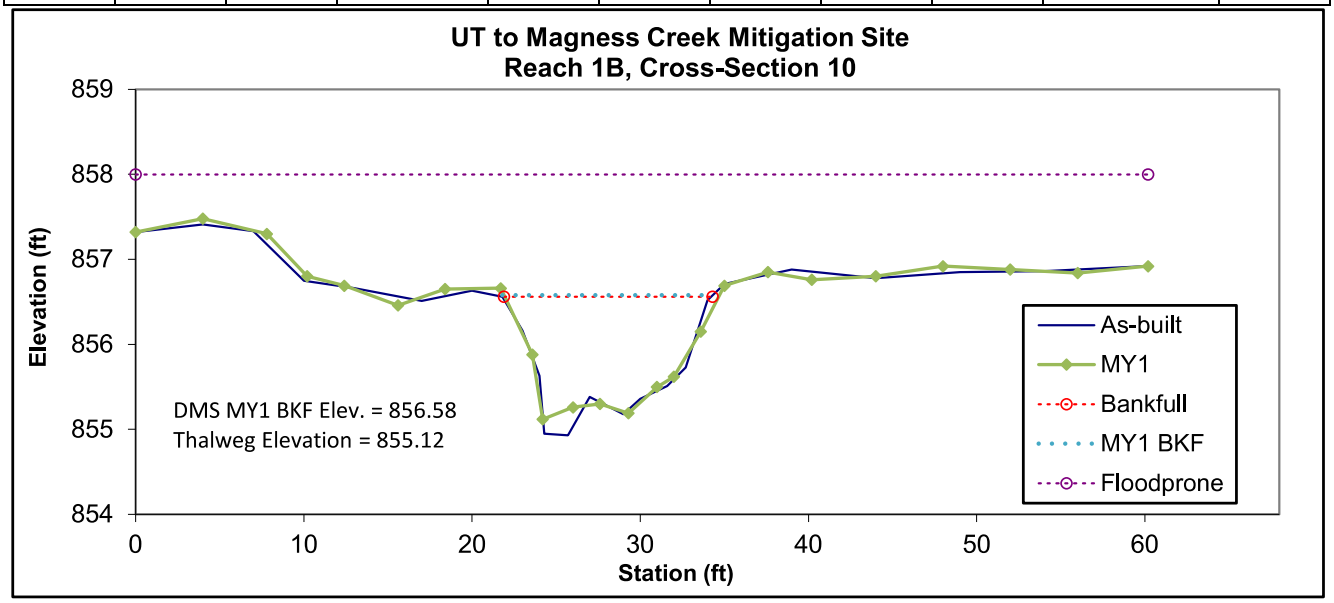
Permanent Cross-Section 10

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	C4	12.3	12.7	1.0	1.4	13.1	1.1	4.7	856.56	856.66



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

Permanent Cross-Section 11

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	C4	26.4	16.6	1.6	3.1	10.5	--	--	854.31	854.31

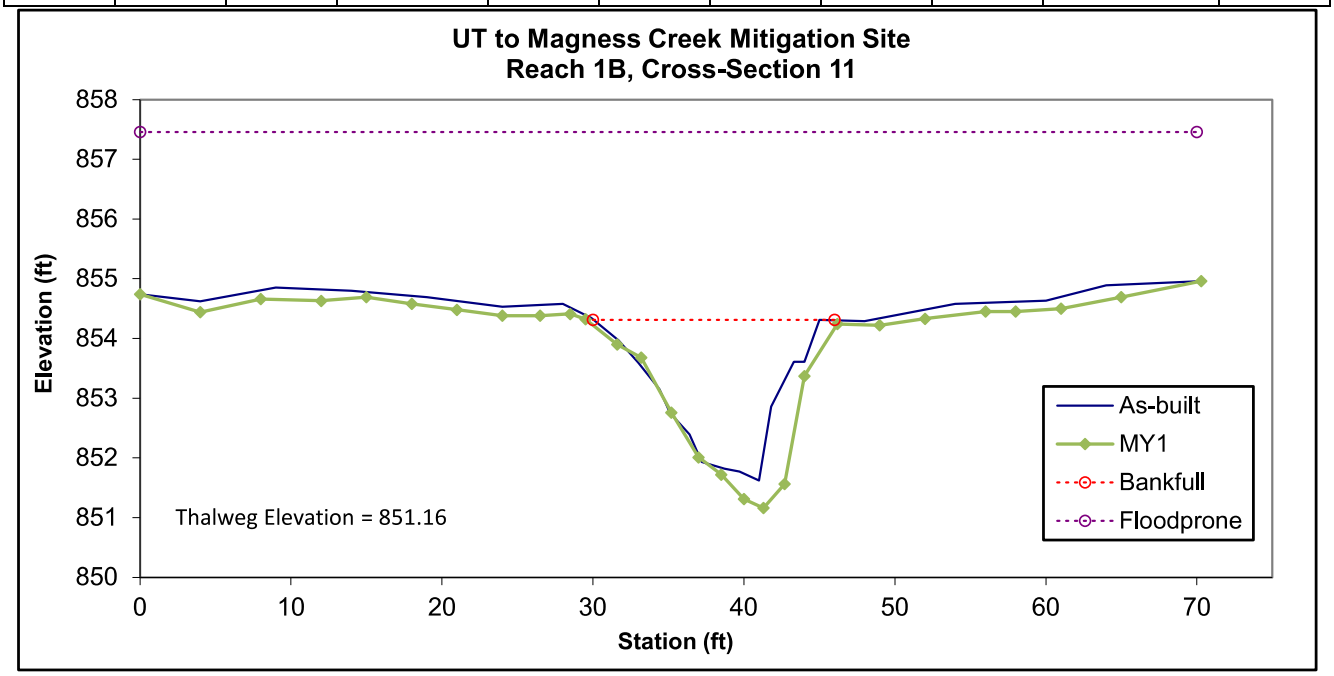


FIGURE 4. CROSS SECTIONS WITH ANNUAL OVERLAY

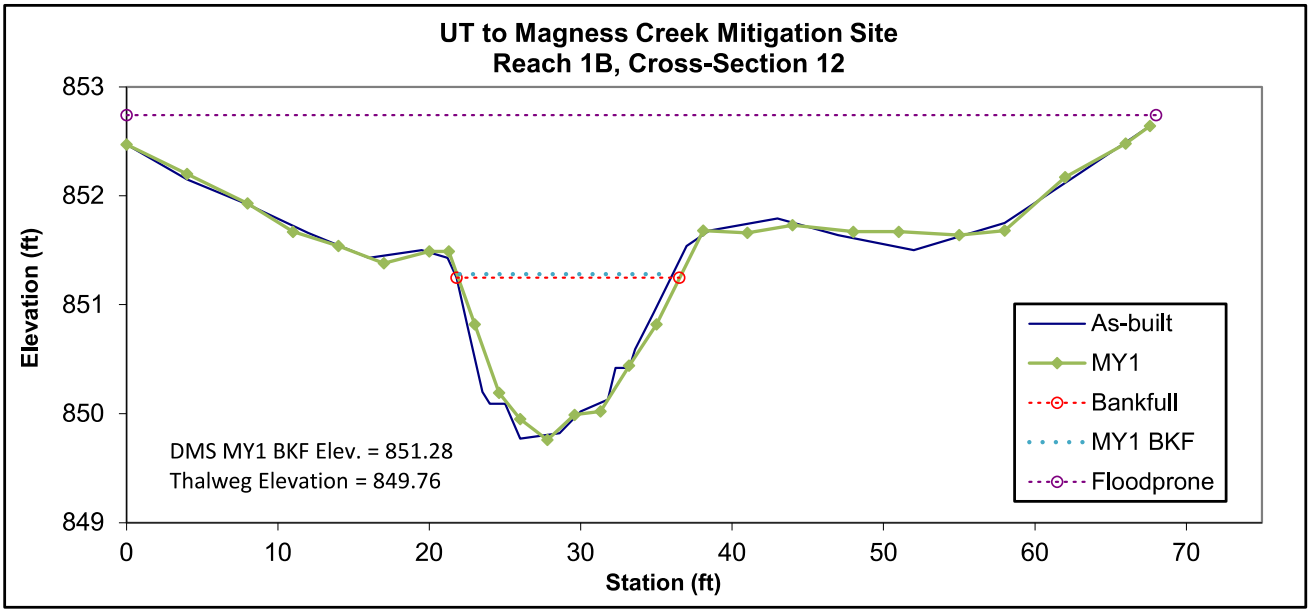
Permanent Cross-Section 12

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	C4	13.6	14.6	0.9	1.5	15.8	1.1	1.9	851.25	851.49



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

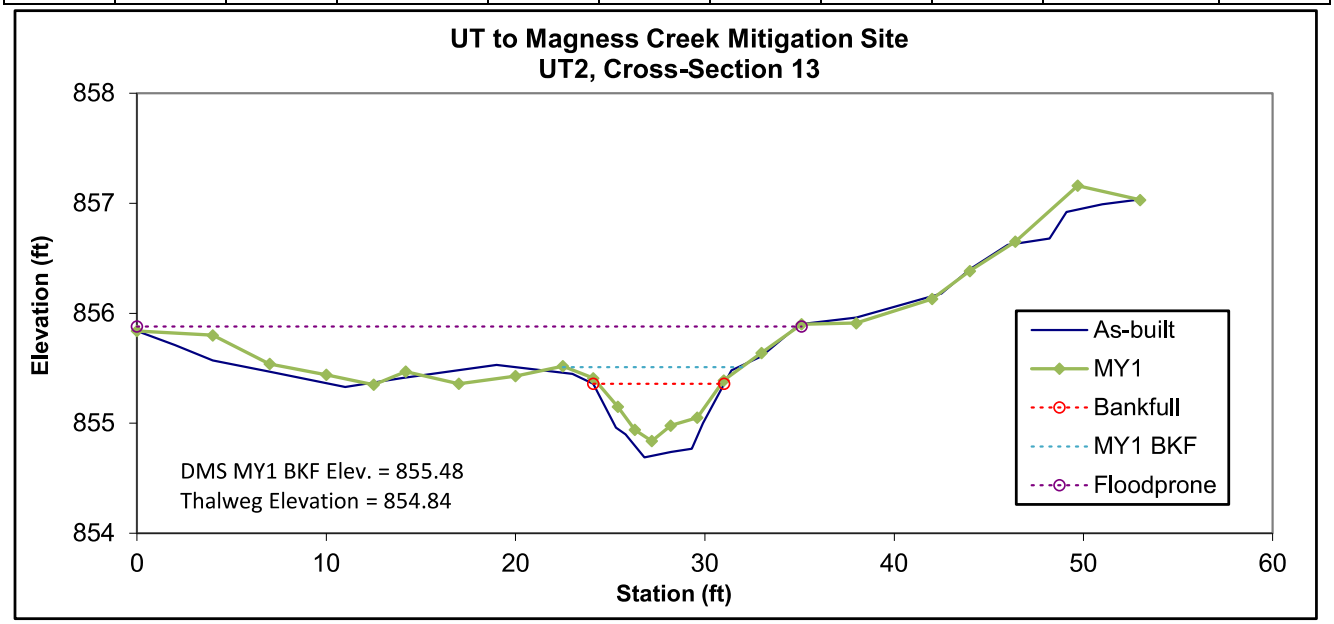
Permanent Cross-Section 13

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Riffle	B4	1.9	6.9	0.3	0.5	24.7	0.9	1.3	855.36	855.39



Note: Per DMS/IRT request, bank height ratio for MY1 has been calculated using the bankfull elevation as determined from the as-built bankfull area. All other values were calculated using the as-built bankfull elevation.

Permanent Cross-Section 14

Year 1 Survey Collected: November 2023

Looking at the Left Bank

Looking at the Right Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	LTOB Elev
Pool	B4	5.8	8.1	0.7	1.2	11.4	--	--	856.97	856.94

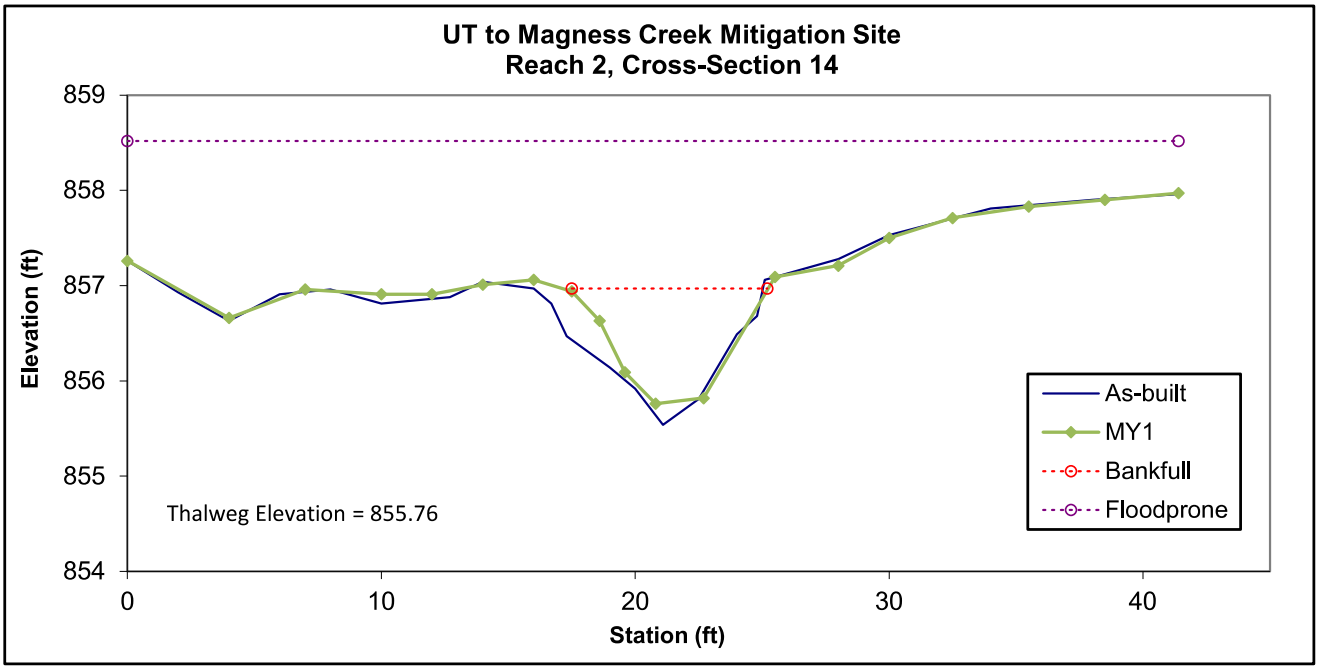


Table 8. Baseline Stream Data Summary
UT to Magness Creek Mitigation Project: DMS Project No ID. 100081
Reach 1A - Restoration

Parameter	Pre-Existing Condition				Reference Reach(es) Data Composite				Design				As-built			
Dimension and Substrate - Riffle	Min	Mean	Med	Max	Min	Mean	Med	Max	Min	Mean	Med	Max	Min	Mean	Med	Max
BF Width (ft)	-----	11.32-29.0	----	----	9.40	-----	11.90	14.40	----	12.50	-----	----	10.30	11.53	11.30	13.24
Floodprone Width (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	53.90	59.58	59.70	65.00
BF Mean Depth (ft)	-----	-----	----	----	----	-----	----	-----	----	0.90	-----	----	0.97	1.09	1.08	1.24
BF Max Depth (ft)	-----	0.90-0.44	----	----	0.84	-----	1.00	1.16	----	0.90	-----	----	1.40	1.73	1.56	2.42
BF Cross-sectional Area (ft^2)	-----	10.2-12.6	----	----	10.50	-----	12.10	13.70	----	11.00	-----	----	11.76	12.46	12.31	13.46
Width/Depth Ratio	-----	12.58-65.9	----	----	8.14	-----	11.67	15.20	----	14.20	-----	----	8.31	9.80	9.17	12.57
Entrenchment Ratio	-----	1.96-1.07	----	----	1.80	-----	2.50	3.20	----	3.20	-----	----	4.91	5.18	5.23	5.36
Bank Height Ratio	-----	3.09-6.25	----	----	1.00	-----	2.14	3.28	----	1.00	-----	----	1.00	1.00	1.00	1.00
Profile																
Riffle Length (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	31.82	38.99	40.87	49.68
Riffle Slope (ft/ft)	-----	.0124-.0076	----	----	----	0.01	----	-----	----	0.0110	-----	----	0.00	0.01	0.01	0.01
Pool Length (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	20.71	35.00	38.26	59.54
Pool to Pool Spacing (ft)	-----	----	----	----	----	-----	----	-----					52.67	84.31	81.79	101.45
Pool Max Depth (ft)	-----	----	----	----	----	-----	----	-----		2.5			1.62	2.22	2.36	3.42
Additional Reach Parameters																
Drainage Area (SM)	-----	0.392-0.458	----	----	0.43	-----	0.70	0.97	0.38	----	0.45	0.52	----	0.392-0.458	----	----
Impervious cover estimate (%)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	----	----	----	----
Rosgen Classification	-----	B4c	----	----	----	B4/C4	----	-----	----	C4	-----	----	----	C4	----	----
BF Velocity (fps)	-----	2.7-2.9	----	----	2.50	-----	2.60	2.70	----	2.5	-----	----	----	----	----	----
BF Discharge (cfs)	-----	26.9-36.0	----	----	26.90	-----	31.95	37.00	----	27.0	-----	----	----	----	----	----
Valley Length	-----	----	----	----	----	-----	----	-----	----	----	-----	----	----	----	----	----
Channel Length (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	----	----	----	----
Sinuosity	-----	1.14-1.23	----	----	----	1.20	----	-----	----	1.20	-----	----	----	1.20	----	----

Table 8. Baseline Stream Data Summary
UT to Magness Creek Mitigation Project: DMS Project No ID. 100081
Reach 1B - Restoration

Parameter	Pre-Existing Condition				Reference Reach(es) Data Composite				Design				As-built			
Dimension and Substrate - Riffle	Min	Mean	Med	Max	Min	Mean	Med	Max	Min	Mean	Med	Max	Min	Mean	Med	Max
BF Width (ft)	-----	11.32-29.0	----	----	9.40	-----	11.90	14.40	----	14.50	-----	----	12.41	13.29	13.29	14.17
Floodprone Width (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	60.20	63.90	63.90	67.60
BF Mean Depth (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	0.99	1.01	1.01	1.02
BF Max Depth (ft)	-----	.90-.44	----	----	0.84	-----	1.00	1.16	----	1.00	-----	----	1.48	1.56	1.56	1.63
BF Cross-sectional Area (ft²)	-----	10.2-12.6	----	----	10.50	-----	12.10	13.70	----	13.80	-----	----	12.63	13.32	13.32	14.00
Width/Depth Ratio	-----	12.58-65.9	----	----	8.14	-----	11.67	15.20	----	15.20	-----	----	12.17	13.24	13.24	14.31
Entrenchment Ratio	-----	1.96-1.07	----	----	1.80	-----	2.50	3.20	----	2.80	-----	----	4.77	4.81	4.81	4.85
Bank Height Ratio	-----	3.09-6.25	----	----	1.00	-----	2.14	3.28	----	1.00	-----	----	1.00	1.00	1.00	1.00
Profile																
Riffle Length (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	41.22	46.66	46.99	50.55
Riffle Slope (ft/ft)	0.0124	----	0.0100	0.0076	----	0.0110	----	-----	----	0.0110	-----	----	0.0000	0.0191	0.0156	0.0305
Pool Length (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	29.36	36.04	39.37	52.49
Pool to Pool Spacing (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	37.90	79.64	76.17	117.29
Pool Max Depth (ft)	-----	----	----	----	----	-----	----	-----	----	3.0	-----	----	2.94	3.62	3.63	4.34
Additional Reach Parameters																
Drainage Area (SM)	-----	0.58	----	----	0.43	-----	0.70	0.97	0.55	----	0.59	0.62	----	0.60	----	----
Impervious cover estimate (%)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	----	----	----	----
Rosgen Classification	-----	C4	----	----	----	B4/C4	----	-----	----	C4	-----	----	----	C4	----	----
BF Velocity (fps)	-----	2.7-2.9	----	----	2.50	-----	2.60	2.70	----	2.70	-----	----	----	----	----	----
BF Discharge (cfs)	-----	26.9-36.0	----	----	26.9	-----	32.0	37.0	----	37.0	-----	----	----	----	----	----
Valley Length	-----	----	----	----	----	-----	----	-----	----	----	-----	----	----	----	----	----
Channel Length (ft)	-----	----	----	----	----	-----	----	-----	----	----	-----	----	----	----	----	----
Sinuosity	-----	1.14-1.23	----	----	----	1.20	----	-----	----	1.20	-----	----	----	1.20	----	----

Table 8. Baseline Stream Data Summary
UT To Magness Creek Mitigation Project: DMS Project No ID. 100081
Reach UT2 - Enhancement

Parameter	Pre-Existing Condition				Reference Reach(es) Data Composite				Design				As-built			
Dimension and Substrate - Riffle	Min	Mean	Med	Max	Min	Mean	Med	Max	Min	Mean	Med	Max	Min	Mean	Med	Max
BF Width (ft)	-----	5.05	---	---	5.71	-----	7.58	9.44	---	8.00	-----	---	---	8.31	---	---
Floodprone Width (ft)	-----	---	---	---	---	-----	---	-----	---	---	-----	---	---	42.70	---	---
BF Mean Depth (ft)	-----	---	---	---	---	-----	---	-----	---	---	-----	---	---	0.45	---	---
BF Max Depth (ft)	-----	0.32	---	---	0.46	-----	0.81	1.16	---	0.50	-----	---	---	0.76	---	---
BF Cross-sectional Area (ft²)	-----	1.63	---	---	2.66	-----	6.78	10.90	---	2.70	-----	---	---	3.76	---	---
Width/Depth Ratio	-----	15.80	---	---	8.10	-----	10.20	12.30	---	12.30	-----	---	---	18.47	---	---
Entrenchment Ratio	-----	1.33	---	---	1.80	-----	2.00	2.20	---	2.20	-----	---	---	0.00	---	---
Bank Height Ratio	-----	7.62	---	---	1.00	-----	2.10	3.20	---	1.00	-----	---	---	1.00	---	---
d50 (mm)	-----	2.37	---	---	---	-----	---	-----	---	2.37	-----	---	---	---	---	---
Profile	-----	---	---	---	---	-----	---	-----	---	---	-----	---	---	---	---	---
Riffle Length (ft)	-----	---	---	---	---	-----	---	-----	---	---	-----	---	9.9	15.20	18.2	30.8
Riffle Slope (ft/ft)	-----	0.0206	---	---	---	-----	---	-----	---	0.0100	-----	---	0.0000	0.0115	0.0103	0.0234
Pool Length (ft)	-----	---	---	---	---	-----	---	-----	---	---	-----	---	8.55	12.16	14.03	21.28
Pool to Pool Spacing (ft)	-----	---	---	---	---	-----	---	-----	---	---	-----	---	19.76	33.15	32.04	44.07
Pool Max Depth (ft)	-----	---	---	---	---	-----	---	-----		1.30	-----		1.10	1.40	1.42	1.73
Additional Reach Parameters	-----	---	---	---	---	-----	---	-----	---	---	-----	---	---	---	---	---
Drainage Area (SM)	-----	0.05	---	-----	31.00	-----	153.00	275.00	---	31.00	-----	---	---	---	---	---
Impervious cover estimate (%)	-----	---	---	---	---	-----	---	-----	---	---	-----	---	---	---	---	---
Rosgen Classification	-----	F4	---	---	---	B4/B4	---	-----	---	B4	-----	---	---	B4	---	---
BF Velocity (fps)	-----	3.16	---	---	1.94	-----	2.28	2.61	---	1.90	-----	---	---	---	---	---
BF Discharge (cfs)	-----	5.15	---	---	5.15	-----	16.83	28.50	---	5.15	-----	---	---	---	---	---
Valley Length	-----	---	---	---	---	-----	---	-----	---	---	-----	---	---	---	---	---
Channel Length (ft)	-----	---	---	---	---	-----	---	-----	---	---	-----	---	---	---	---	---
Sinuosity	-----	1.18	---	---	---	1.20	---	-----	---	1.20	-----	---	---	1.20	---	---

Table 9. Cross-Section Morphology Data Summary
UT to Magness Creek Restoration Project: DMS Project No ID. 100081

Stream Reach	Reach 1A																									
	Cross-section X-1 (Riffle)							Cross-section X-2 (Pool)							Cross-section X-3 (Riffle)							Cross-section X-4 (Pool)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation (ft) - Based on AB-Bankful[1] Area	882.63	882.88						880.76	–						877.33	877.39						875.10	–					
Bank Height Ratio_Based on AB Bankful[1] Area	1.00	0.90						–	–						1.00	1.00						--	–					
Thalweg Elevation	880.21	880.65						878.35	878.22						877.33	876.03						872.23	873.48					
LTOB[2] Elevation	882.63	882.60						880.76	880.76						877.33	788.33						875.10	875.18					
LTOB[2] Max Depth (ft)	2.42	2.00						2.41	2.50						1.40	1.30						2.87	2.60					
LTOB[2] Cross Sectional Area (ft[2])	12.75	9.60						20.41	19.60						11.86	11.00						21.05	18.80					

Stream Reach	Reach 1A																									
	Cross-section X-5 (Riffle)							Cross-section X-6 (Pool)							Cross-section X-7 (Pool)							Cross-section X-8 (Riffle)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation (ft) - Based on AB-Bankful[1] Area	871.86	871.92						869.61	–						865.67	--						863.58	863.71					
Bank Height Ratio_Based on AB Bankful[1] Area	1.00	1.10						–	–						–	--						1.00	1.00					
Thalweg Elevation	870.41	870.50						866.23	866.71						862.29	862.37						861.92	862.03					
LTOB[2] Elevation	871.86	872.00						869.61	869.56						865.67	865.67						863.58	863.71					
LTOB[2] Max Depth (ft)	1.45	1.40						3.38	2.90						3.38	3.30						1.66	1.60					
LTOB[2] Cross Sectional Area (ft[2])	13.46	12.40						24.61	21.60						28.66	30.20						11.76	10.30					

Stream Reach	Reach 1B																									
	Cross-section X-9 (Pool)							Cross-section X-10 (Riffle)							Cross-section X-11 (Pool)							Cross-section X-12 (Riffle)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation (ft) - Based on AB-Bankful[1] Area	857.17	--						856.56	856.58						854.31	--						851.25	851.28					
Bank Height Ratio_Based on AB Bankful[1] Area	–	--						1.00	1.10						--	--						1.00	1.10					
Thalweg Elevation	853.76	853.19						854.93	855.12						854.93	851.16						849.77	849.76					
LTOB[2] Elevation	857.17	856.90						856.56	856.66						854.31	854.31						851.25	851.49					
LTOB[2] Max Depth (ft)	3.41	4.00						1.63	1.40						2.69	3.10						1.48	1.50					
LTOB[2] Cross Sectional Area (ft[2])	30.50	33.20						12.63	12.30						20.93	26.40						14.00	13.60					

Stream Reach	UT2													
	Cross-section X-13 (Riffle)							Cross-section X-14 (Pool)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation (ft) - Based on AB-Bankful[1] Area	855.36	855.48						856.97	–					
Bank Height Ratio_Based on AB Bankful[1] Area	1.00	0.90						–	–					
Thalweg Elevation	854.69	854.84						854.69	855.76					
LTOB[2] Elevation	855.36	855.39						856.97	856.94					
LTOB[2] Max Depth (ft)	0.67	0.50						1.43	1.20					
LTOB[2] Cross Sectional Area (ft[2])	3.08	1.90						7.07	5.80					

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

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

APPENDIX E

Hydrologic Data

Table 10. Verification of Bankfull Events
UT to Magness Creek Mitigation Project - NCDMS Project No. 100081

Date of Data Collection	Reach 1A (CG1)	Reach 1B	Estimated Date of Bankfull Event Occurrence	Method of Data Collection
Year 1 Monitoring (2023)				
5/11/2023	0.62 Feet		3/15/2023	Continuous Stage Recorder & Photographic Evidence

Note: Crest gauge readings were corroborated with associated spikes in the automated Continuous Stage Recorder (see graph in Below) and/or with photographs (Appendix B).

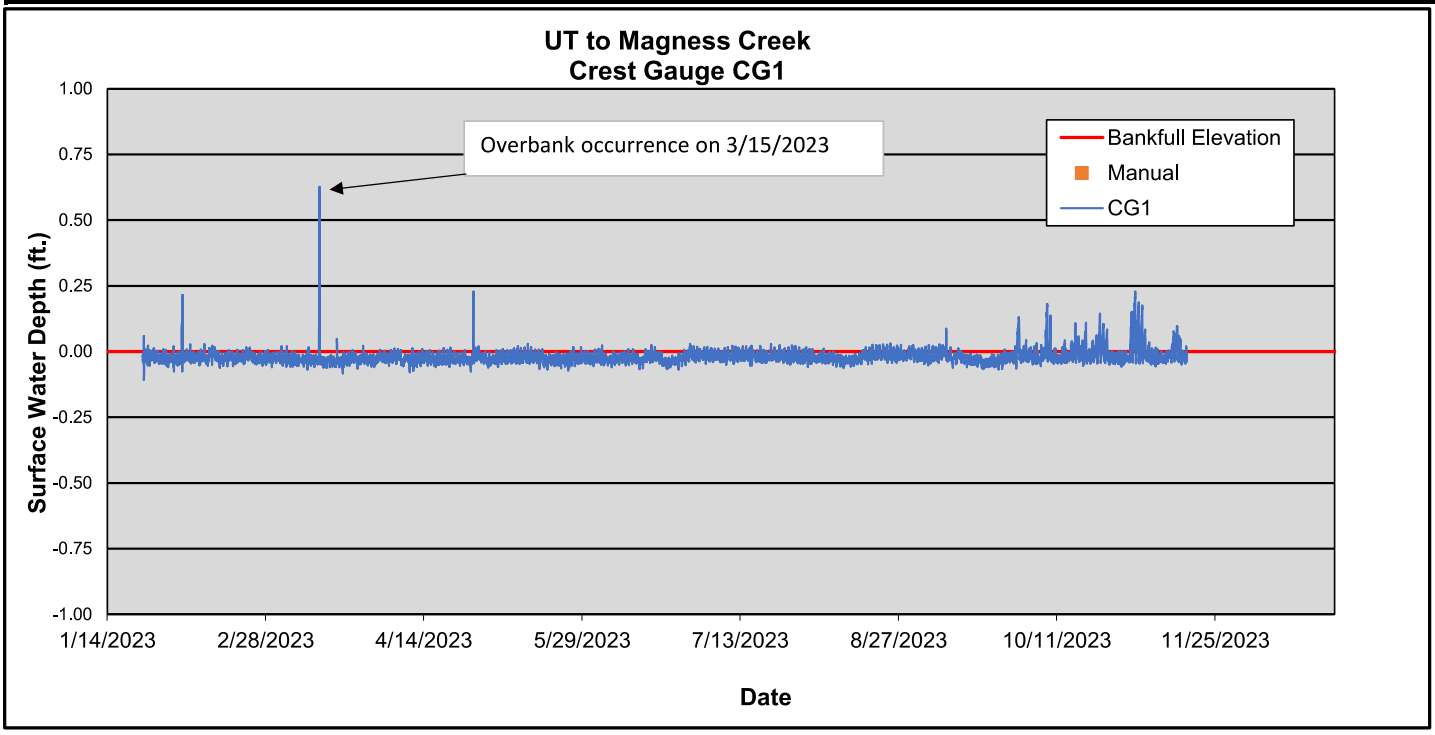


Figure 5. Wetland Monitoring Well Graphs

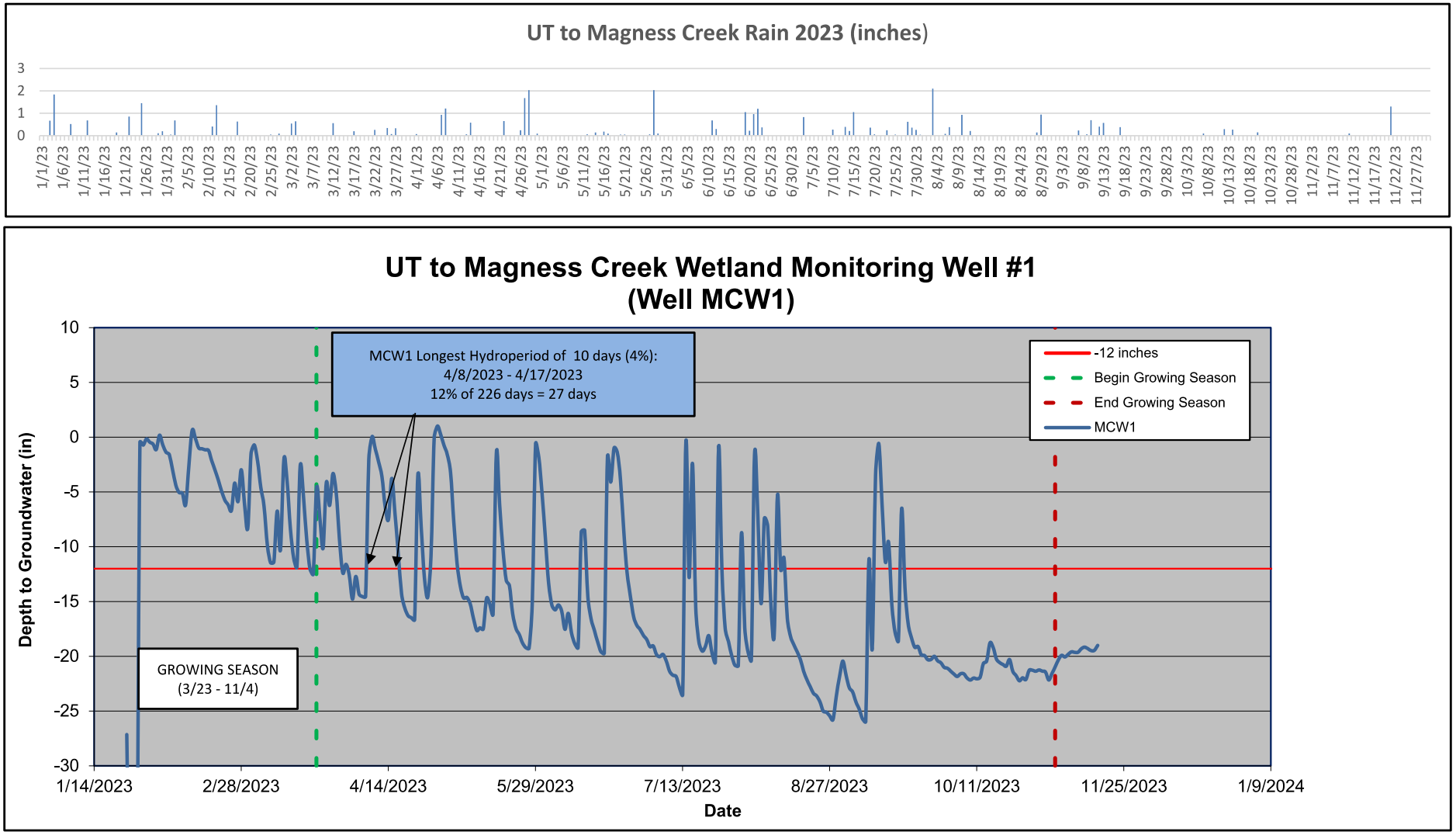
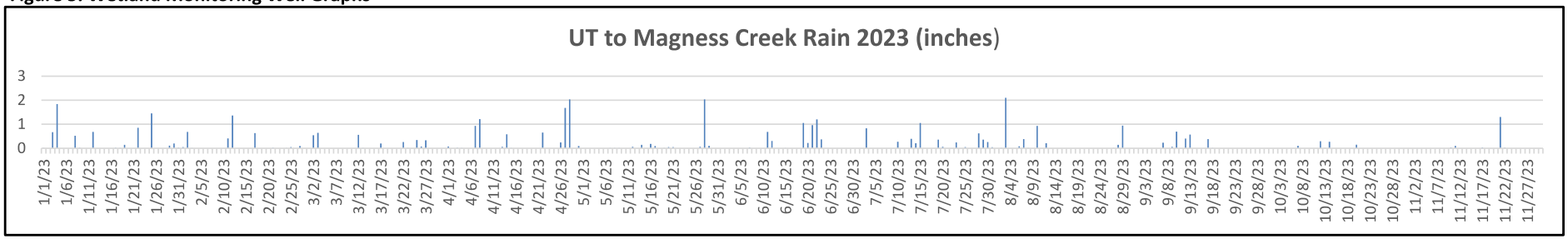


Figure 5. Wetland Monitoring Well Graphs



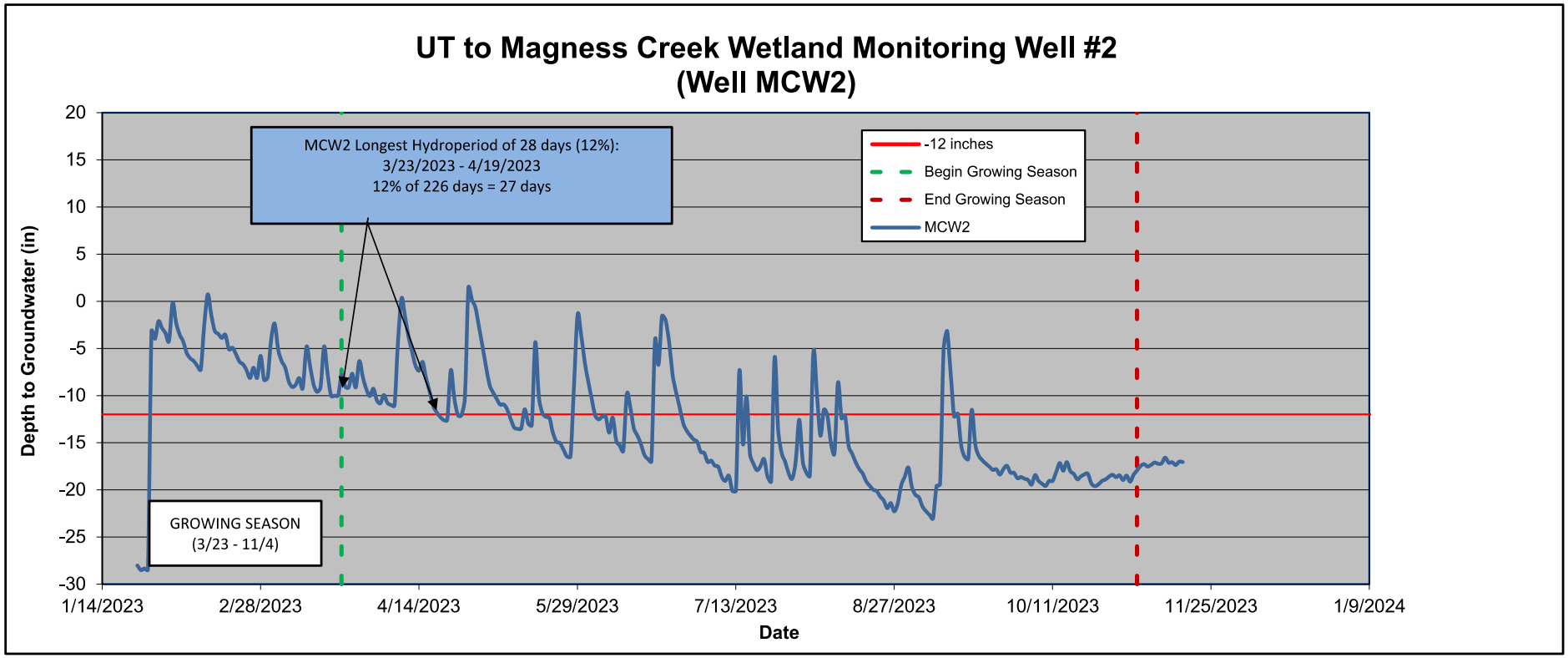
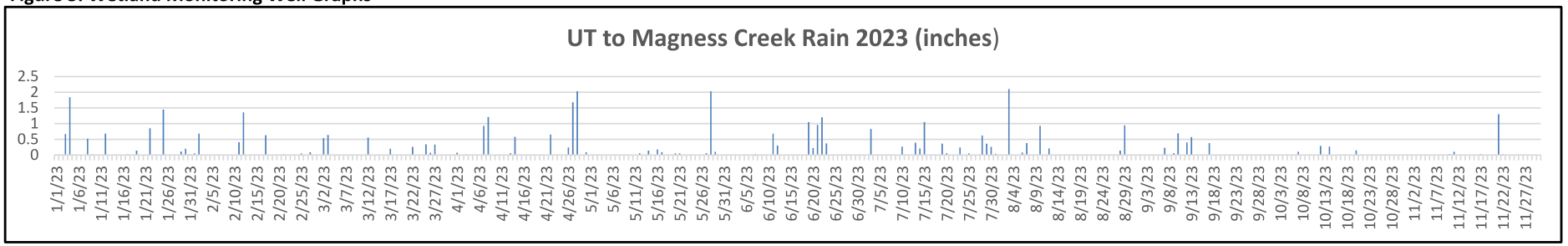


Figure 5. Wetland Monitoring Well Graphs



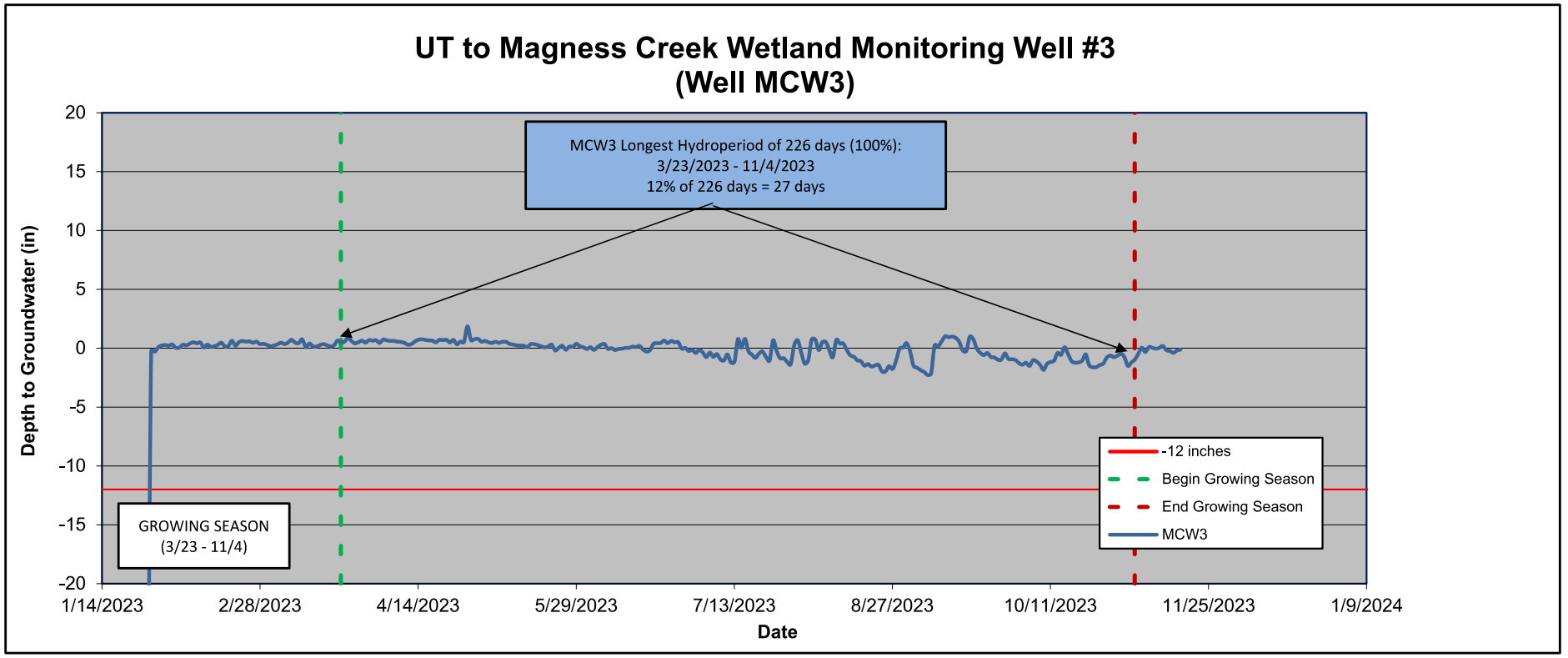


Figure 5. Wetland Monitoring Well Graphs

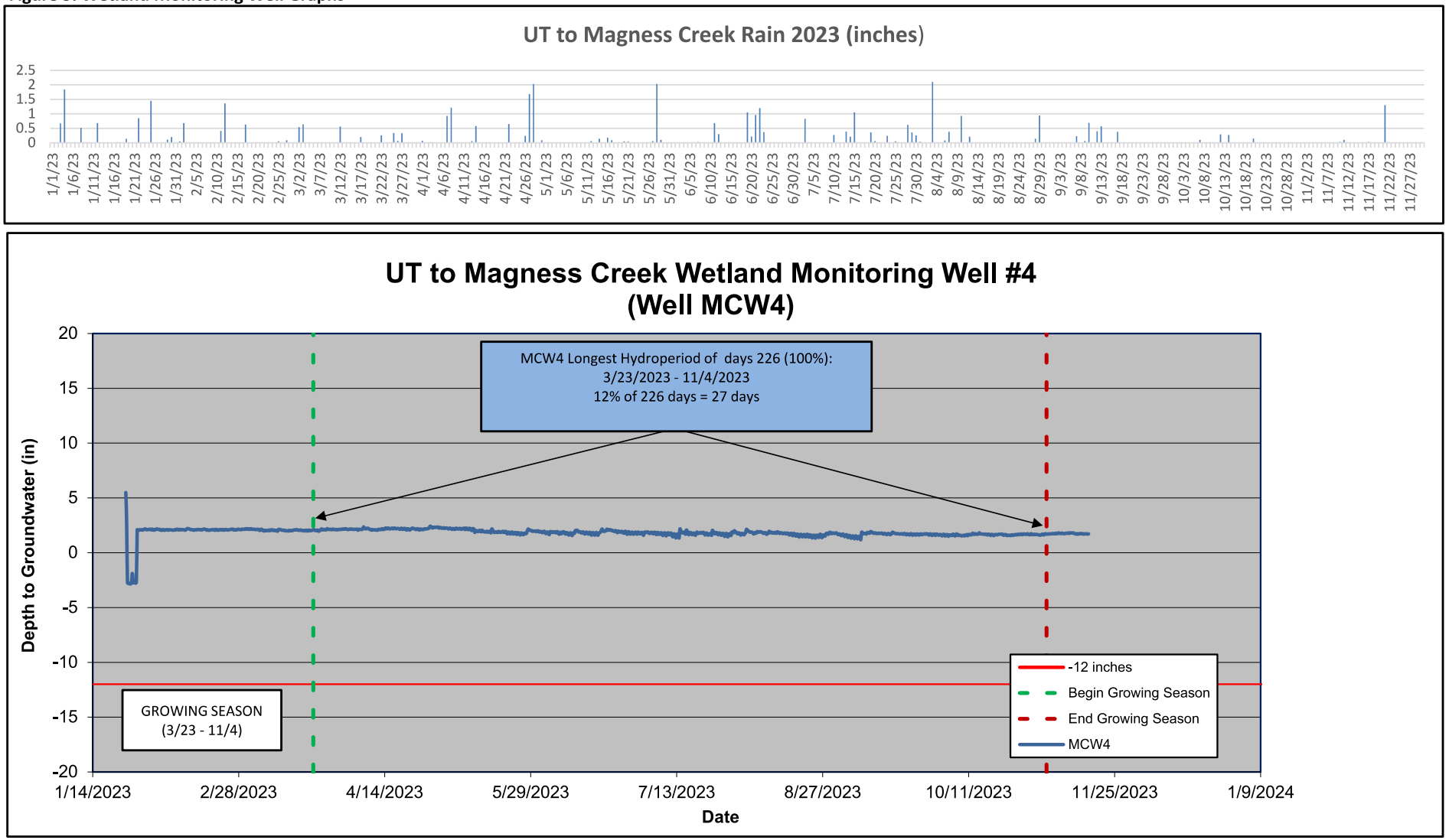


Table 11. Wetland Hydrology Summary Data

UT to Magness Creek Stream Mitigation Project - NCDMS Project No. 100081

Well ID	Percentage of Consecutive Days <12 inches from Ground Surface[1]							Most Consecutive Days Meeting Criteria[2]							Percentage of Cumulative Days <12 inches from Ground Surface							Cumulative Days Meeting Criteria[3]						
	Year 1 (2023)	Year 2 (2024)	Year 3 (2025)	Year 4 (2026)	Year 5 (2027)	Year 6 (2028)	Year 7 (2029)	Year 1 (2023)	Year 2 (2024)	Year 3 (2025)	Year 4 (2026)	Year 5 (2027)	Year 6 (2028)	Year 7 (2029)	Year 1 (2023)	Year 2 (2024)	Year 3 (2025)	Year 4 (2026)	Year 5 (2027)	Year 6 (2028)	Year 7 (2029)	Year 1 (2023)	Year 2 (2024)	Year 3 (2025)	Year 4 (2026)	Year 5 (2027)	Year 6 (2028)	Year 7 (2029)
Wetland Monitoring Wells (Installed January 2023)																												
MCW1	4.0							10							27.0							62						
MCW2	12.0							28							33.0							75						
MCW3	100.0							226							100.0							100						
MCW4	100.0							226							100.0							100						

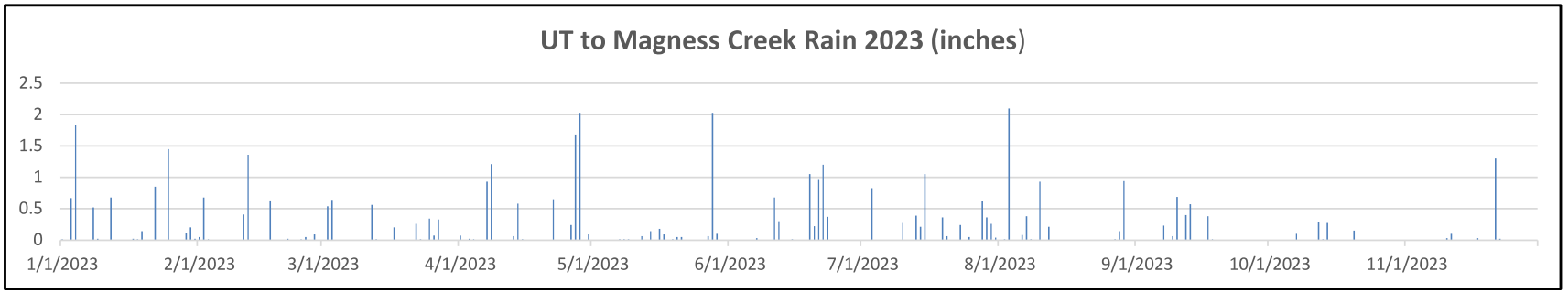
[1]Indicates the percentage of the single greatest consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

[2]Indicates the single greatest consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

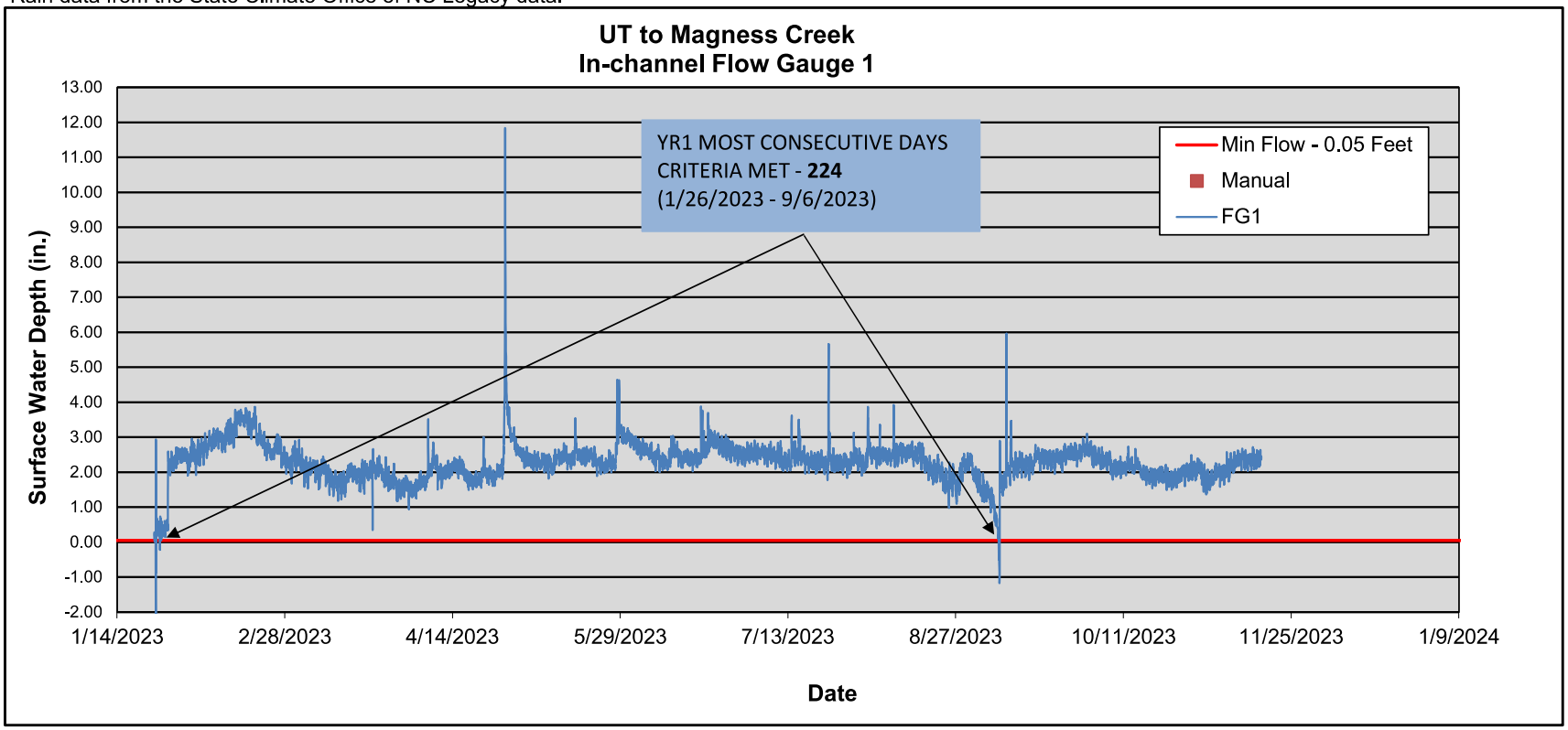
[3]Indicates the total number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

Growing season for Cleveland County is from March 23 to November 4 and is **226** days long. 12% of the growing season is **27** days.

Figure 6: Flow Gauge Graphs



Rain data from the State Climate Office of NC Legacy data.



*Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Table 12. All Years Flow Gauge Success
UT to Magness Creek Mitigation Project - NCDMS Project No. 100081

Flow Gauge ID	Most Consecutive Days Meeting Criteria[1]							Cumulative Days Meeting Criteria[2]						
	Year 1 (2023)	Year 2 (2024)	Year 3 (2025)	Year 4 (2026)	Year 5 (2027)	Year 6 (2028)	Year 7 (2029)	Year 1 (2023)	Year 2 (2024)	Year 3 (2025)	Year 4 (2026)	Year 5 (2027)	Year 6 (2028)	Year 7 (2029)
Flow Gauges (Installed January 2023)														
FG1	224.0							293.0						

Notes:

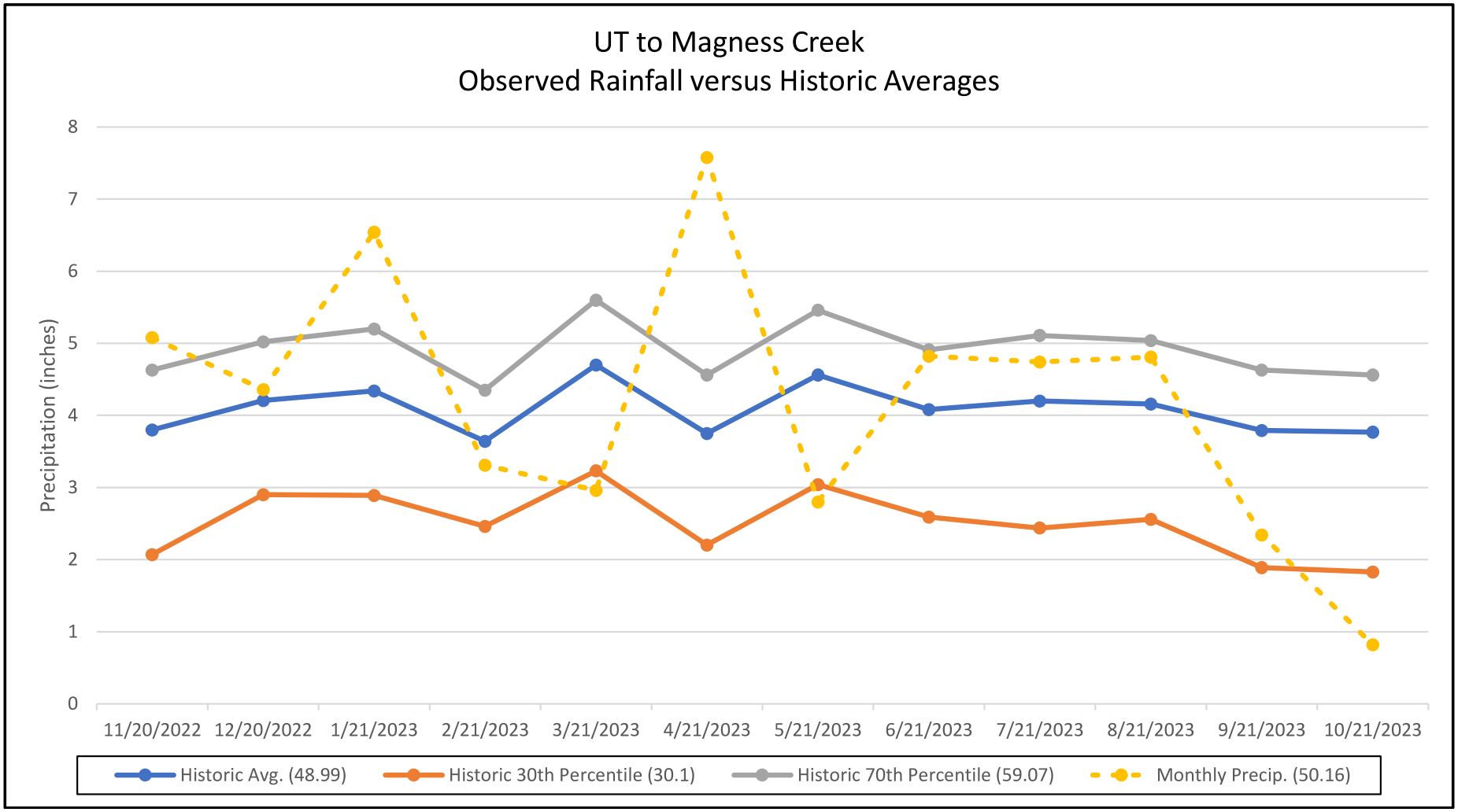
[1]Indicates the number of consecutive days within the monitoring year where flow was measured.

[2]Indicates the number of cumulative days within the monitoring year where flow was measured.

Success criteria will include 30 days of consecutive baseflow for monitoring gauges during a normal rainfall year.

Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Figure 7. Observed Rainfall vs. Historical Average



APPENDIX F

IRT Comments

September 7, 2023

Subject: Response to IRT Comments based on their review of the MY0/ As-Built Baseline Report and Record Drawing. UT to Magness Creek Mitigation Project; Cleveland County, NC
Broad River Basin: 03050105; DMS Project #100081

Dear IRT Members,

Please find below our responses to the IRT review comments dated August 23, 2023, in reference to the IRT review of our UT to Magness Creek Mitigation Project's MY0/As-Built Baseline Report. These comments will be incorporated into our MY1(2023) report and included in an appendix of that report.

Maria Polizzi,

1. The planting density of sycamore appears high in Veg. Plot 6 at 43%. The planting plan shows 15% for this species. Be sure to maintain proper spacing when planting to avoid areas with a high density of one species.
   RESPONSE: Yes, there are a significant number of sycamores in this one plot and we would prefer that those had been distributed more evenly. We disagree with the conclusion that this was an issue of spacing, which would have been reflected in the number of stems/plot or acre; this was an issue of not mixing the species available as well as they should have been (6 were planted rather than 2 to maintain the same stems/A). Our planting plan is a commitment to the number of each species that we plan to plant on the entire site but not necessarily within a random 100 m^2 plot. We do request that the contractor mix the species that are planted at a site, while being attentive to species habitat. In this case, for this plot, that was not followed as well as it might have been. We will make the planting contractor aware of this observation and emphasize how planting should be done on future projects.

2. I like the callouts for species density on your CCPV.
   RESPONSE: Thank you.

3. Thanks for including so many photos. These are very helpful.
   RESPONSE: Glad to, we know that it is difficult for the IRT to make visits to the many sites that they are working with, so we want to provide as much helpful information as possible. Thank you for letting us know what you find most helpful.

Dave McHenry, WRC david.mchenry@ncwildlife.org

1. Aside from being impressed by the cool rail car bridge crossing, the only thing that caught my attention was maybe a split channel at 18+50, though it's not real clear from photo if that is truly the case. They note they had bedrock issues in this general location and had to reroute things a bit.

   RESPONSE: The rail car bridge was in part a response to the difficulty of getting culverts during the pandemic. Given that we prefer a bridge, when it is affordable, this was a good alternative that we are happy with.

With regards to the feature at Station 18+50, I would characterize this as a mid-channel bar that has developed and not a split in the channel. The material that has deposited there is well below bankfull and subject to being moved on a high-water event. This bar is a response to building the channel wider than was planned. The widening of the channel was a field adjustment due to the presence of bedrock and the fact that where streams cross bedrock they are generally wider as a response to accommodate the cross-sectional area. The bedrock limits adjustments to depth, so the stream responds by increasing its width. This adjustment ended up being a bit wider than intended and the bar formed. We are working on narrowing the width in this area using hand labor. We will include photographs and a discussion of our progress modifying this area in the MY1 report.

Erin Davis,

1. Photo Point 10 – A vegetated mid channel bar is shown. This appears to the approximate location where bedrock was encountered, and the channel was widened. Please include a condition update and additional photos in the MY1 report, including whether proposed hand repairs were completed.
   RESPONSE: Please see response above, and updates on this area will be included in the MY1 report.

2. Photo point 19 – The BMP outlet appears heavily armored. In future designs please consider embedding the stone more to reduce the risk of riprap trapping crossing wildlife.
   RESPONSE: Thank you for this suggestion. We will consider this comment in future BMP design.

3. Figure 3 CCPV – Several monitoring stations were relocated from the approved mitigation plan monitoring figure 11 locations. While it is anticipated that some gauges and veg plots may be slightly shifted (a few feet) in the field, we expect the general locations of monitoring stations to align with the mitigation plan figure that was reviewed, commented on, and approved by the IRT. Justifications need to be provided for any major monitoring station changes (e.g., bedrock encountered, change in planted area).

    a. Planted wetland reestablishment credit areas must demonstrate that they meet the vegetation performance standard; please relocate veg plot 3 completely within wetland reestablishment credit area as shown on the approved mitigation plan monitoring figure 11.
       RESPONSE: The location of veg plot 3 is located south of where it is shown in the approved mitigation plan monitoring figure 11. The proposed location is dominated by several mature poplar trees in the wetland reestablishment area and the proposed location of the veg plot. Bare root stems are planted among the mature poplar trees; however, a judgement was made in the field to not include the tall and mature stems in a veg plot. The present location of veg plot 3 is more representative of the planted wetland floodplain area than the proposed location and exhibits wetland hydrology and plant species despite being partially located outside of the mapped reestablishment area.

b. USACE made a mitigation plan comment (#3) requesting a temporary veg transect in the berm/spoil removal area along Reach 1A near XS 1. As stated in Baker's response, please include this data in the MY1 report.
RESPONSE: We acknowledge that this transect was not included in the As-Built/MY0 report. This transect and associated data will be included in the MY1 report.

c. DWR made a mitigation plan comment (#6) requesting shifts in the groundwater well locations in the southeast reestablishment wetland. The upper well was relocated closer to the credit area boundary as per USACE and DWR request. But the lower well (MCW4) was installed a distance from the stream and overlapping a rehabilitation area rather than closer to the stream channel as per DWR request. Please explain why the DWR request was not met.
RESPONSE: The MY1 report will include data from MCW4 in its current location. Following the end of the growing season in 2023, MCW4 will be moved closer to the stream channel as requested. Data from the new location will be reported starting in MY2.

d. Why were groundwater wells in the northwest reestablishment wetland shifted from their originally proposed locations, MCW1 to the south and MCW2 to the north?
RESPONSE: The locations of MCW1 and MCW2 on the approved mitigation plan Proposed Monitoring Features Figure 11 were mapped as suggested locations to represent the wetland restoration by reestablishment areas. The present locations of MCW1 and MCW2 are representative of the wetland reestablishment areas as intended and are located within the approved mapped boundaries.

We hope these responses adequately address the IRT comments. Please do not hesitate to contact me should you have any further questions regarding our response submittal.

Sincerely,

Jason York
Project Manager