As-built Baseline Monitoring Report FINAL
UT to Magness Creek Mitigation Project

Cleveland County, North Carolina

Broad River Basin: 03050105

DMS Project ID No. 100081

RFP# 16-007400 (Issued: December 7, 2017)

DEQ Contract No. 7604

USACE Action ID No. SAW-2018-01759

DWR# 20181275

Baseline Data Collection Period: January 2023 to March 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: June 2023

Michael Baker
INTERNATIONAL

We Make a Difference

June 15, 2023

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 (June 1, 2023) for DRAFT MY0/ As-Built Baseline Report and Record Drawing Review
UT to Magness Creek Mitigation Project, Cleveland County
Broad River Basin: 03050105
DMS Project #100081

Dear Mr. Wiesner,

Please find below our responses to the NC Division of Mitigation Services (DMS) review comments dated June 1, 2023, in reference to the UT to Magness Creek Mitigation Project's DRAFT MY0/As-Built Baseline Report. We have revised the Draft document in response to review comments as outlined below.

- General/ Report Text; Table 1; Table 1.2; Figure 2: The total project mitigation credits in the MY0 report should correspond with the credits established in the IRT approved mitigation plan. Total project credit amounts can only be updated if a mitigation plan addendum is submitted to and approved by the IRT. Please update the report text, tables, and figures to reflect the project credits from the IRT approved mitigation plan (3,391.287 SMUs (warm) & 1.879 WMUs (riparian)).
  RESPONSE: The credit amounts have been adjusted in the report text, tables, and figures to reflect project credit quantities from the approved IRT mitigation plan.

- General: Please confirm that vegetation planting was completed prior to March 15, 2023. Please note that vegetation must be planted, and plots established at least 180 days prior to the initiation of the first year of monitoring (Year 1). Please make sure to schedule the MY1 (2023) vegetation monitoring accordingly.
  RESPONSE: All bare root stems were planted by the first week of February 2023 and live stakes installation as completed the first week of March 2023, details added in Section 1.5 Project Timeline. Vegetation monitoring for Year 1 will not occur prior to September 15, 2023.

- Section 1.1 Project Description: The project's reported total linear stream footage and wetland acreage should be consistent with Table 1 (3,200.750 LF restored; 289.340

797 Haywood Rd. Suite 201| Asheville, NC 28806
Office: 828-412-6101| Mobile: 828-380-0118

enhanced & 1.852 acres restored-by reestablishment or restored-by-rehabilitation). Please review and update the report text and/or table accordingly.
RESPONSE: The reported total linear stream footage is consistent with our As-Built footage and acreage. The wetland acreage reported has been revised and changed due to a small loss in wetland acres associated with removing one meander due to bedrock on Reach 1A near station 18+00.

- Section 1.5 Project Timeline & Table 2: This section notes that the Mitigation Plan was approved by the IRT in August of 2021. The IRT approval letter is dated July 30, 2021. Please update this section and the table accordingly.
  RESPONSE: Changes have been made as requested.
- Section 1.6 Design Change Deviations: In the report text, please note that the partial conservation easement release of 0.028-acre was recorded in Cleveland County on May 15, 2023, and include the final recorded document in Appendix E.
  RESPONSE: This language has been added as requested and the final recorded document is included in Appendix E.

- Section 1.6 Design Change Deviations & Table 1: Although minor, please explain the differences between the designed reach lengths (mitigation plan) and as-built reach lengths. Please also explain the differences between the designed wetland acreages (mitigation plan) and as-built wetland acreages. Wetland acreage typically remains the same between the design and as-built stage.
  RESPONSE: The discrepancy between reach lengths exists because the design is based on stream centerline whereas the As-Built survey data represents the thalweg which is not necessarily the centerline of the channel. As-built stream length may also change depending on where the survey data begins and if the end station of the survey is measured to the top of the near bank at a confluence or if the stationing ends in the center of the channel. Wetland acreage was slightly reduced near Station 18+00 on Reach 1A due to the presence of bedrock which eliminated a meander from the original design thereby cutting off a portion of wetland which would have existed on the right floodplain on the inside bend of the design meander.

- Section 1.6 Design Change Deviations: In this section, please also note and discuss any monitoring device location changes from the IRT approved mitigation plan.
  RESPONSE: These changes have been noted as requested.

- CCPV Figures/ Figure 3B: Please update the conservation easement shown on the CCPV maps to reflect the 0.028-acre partial conservation easement release recorded on 5/15/23. Figure 3B shows fencing located within the conservation easement.
  RESPONSE: All figures have been updated as requested.

- General/ Section 1.5; Project Crest Gauge: As discussed on other Baker projects in monitoring, please 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.
  RESPONSE: Installation of the crest gauge occurred prior to the discussion of the change in methodology mentioned above; however, the crest gauge will be relocated during MY1 to an in-stream location such that the monitoring graph will show the thalweg, water pressure line and the established bankfull elevation to accurately show when flow events reach the bankfull stage elevation. This discussion is included in Section 1.6 Design Change Deviations.

- Appendix E: Please review the Appendix and remove any duplicate IRT emails or communication. IRT approval of the crossing change/ bridge replacement is included for use in the Appendix. DMS also recommends updating the Appendix and providing the communication documents in chronological order to avoid confusion.
  RESPONSE: These changes have been made as requested.

- Appendix F_Record Drawings: This Appendix cover sheet should be labeled "Record Drawing Plan Sheets". The cover sheet on the plan set should also be labeled "Record Drawings".
  RESPONSE: These changes have been made as requested.

- Appendix F_Record Drawings_Sheet 2F: The Record Drawing detail sheets provided include a detail from a crossing that was eliminated from the project and does not include the bridge crossing detail as installed on the site. Please include the final bridge crossing detail in the revised Record Drawings.
  RESPONSE: The Flat Bed Rail Car Bridge Application detail has been included on Sheet No. 2D.

- Appendix F_Record Drawings_Sheet 1A & Section 1.6 Design Change Deviations: Please review the vegetation selection portion of sheet 1A and confirm that there were no planting substitutions or changes from the IRT approved mitigation plan. Any project planting substitutions or changes from the IRT approved mitigation plan should be shown in "red" on the project's final Record Drawings. Eliminated species should have a line drawn through them and added and/or substituted species should be shown in "red" to detail the change. Any planting substitutions or changes from the IRT approved mitigation plan should also be detailed in the report text of Section 1.6 Design Change Deviations.
  RESPONSE: This has been reviewed and substitutions and changes are noted on sheet 1A and discussed in Section 1.6. Two species were eliminated (*Halesia carolina* and *Magnolia tripetala)* due to unavailability. 125 additional *Carpinus caroliniana* were substituted from

the *Magnolia tripetala* and 125 additional *Asimina triloba* were substituted for the *Halesia carolina.* Both substituted species are included on the original IRT approved species list.

- Appendix F_Record Drawings: Numerous instances of resolved fencing encroachment are detailed in the project's Record Drawings. Please confirm that there is currently no project fencing installed within the project's conservation easement.
  RESPONSE: There is currently no fencing installed within the project's conservation easement, which was confirmed by DMS staff during the May 30, 2023 site visit.

- Appendix F_Record Drawings_Sheet 5: The sheet notes that "*Rip rap was extended outside of the conservation easement in agreement with the landowner.*" While this does not appear to be a major issue based on a May 30, 2023 DMS site visit, Baker should make every effort to design and install all BMP infrastructure within the established conservation easement of DMS projects.
  RESPONSE: This consideration will be implemented when possible on future projects containing BMP infrastructure.

DMS conducted a field visit on May 30, 2023. No additional comments were generated based on the site visit. The DMS Boundary Inspection Report is attached for your review. The only action item noted is:

- Continue to monitor the site boundary and maintain compliance throughout the monitoring period.
  RESPONSE: Site boundaries and compliance will be monitored throughout the life of the project.

Digital Deliverable Comments:

- Please provide a .PDF of the standalone PLS sealed project as-built drawings in the revised digital submittal.
  RESPONSE: The PLS sealed project as-built drawings have been included as requested.

- Please provide a revised shapefile for the thalweg to include the reach_ segment names and credit ratio applied in the attribute data for those features (attribute table submitted pasted below for clarification of missing data).
  RESPONSE: The revised shapefiles have been included and reach_segment names, and credit ratios have been included in the attributes table for both thalweg and wetland features.

- For all future submissions, the names of all assets (stream and wetland) submitted must follow the same naming convention in the ESRI attribute tables as the segment name displayed in the credits and quantities table, and all monitoring stations, to include random vegetation plots, must have a name or station number in the attribute data to serve as a unique identifier for that station.

RESPONSE: Future submissions will follow this convention and the submitted electronic files have been updated as needed to match the tables and to identify monitoring features.

Digital Deliverable Comments:

- None

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 As-Built/MY0 Report UT to Magness Creek Mitigation Project

DEQ NORTH CAROLINA Department of Environmental Quality
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

TABLE OF CONTENTS

APPENDICES

1.0 PROJECT SUMMARY

1.1 Project Description

Michael Baker Engineering, Inc. (Michael Baker) restored 3,200.750 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' (DMS) 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 origin 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 (contracted for 3,000) along with 1.879 wetland mitigation credits (contracted for 1.7), and the site will be protected by an 11.632 acre permanent conservation easement (Appendix B).

1.2 Goals and Objectives

To address the observed stressors, the goals of this project include:

- Reconnect stream reaches to their floodplains,
- Restore or improve hydrology to adjacent hydric soils and riparian wetlands,
- Improve stream stability,
- Improve aquatic habitat,
- Reestablish forested riparian buffers, and
- Permanently protect the project in a conservation easement.

To accomplish these goals, the following objectives were identified:

- To raise channel beds and/or excavate sloping vegetated floodplains appropriate for stream type by utilizing a Priority I Restoration approach or an Enhancement Level I approach.
- To raise adjacent channel beds and remove drainage ditches to raise groundwater tables within the buffer.
- 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.

- Construct an appropriate channel morphology to all streams increasing the number and depth 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.
- Establish riparian buffers at a 50-foot minimum width along all stream reaches, planted with native tree and shrub species.
- Establish a permanent conservation easement restricting land use in perpetuity. This will prevent site disturbance and allow the project to mature and stabilize.

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 (October 2020), and the Annual Monitoring Report Format, Data Requirements, and Content Guidance (October 2020), 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 noted.

1.4 Mitigation Component Summary

The project involved restoration or enhancement of 3 reaches, all unnamed tributaries of Magness Creek: Reach 1A, Reach 1B and UT2. All reaches have been historically impacted through loss of riparian vegetation, channelization, and agricultural activities (most recently livestock). A Priority Level I Restoration approach on Reach 1A and 1B was implemented to restore the stream and its buffer functions. A channel of appropriate dimensions was constructed and was raised to reconnect the reach to its historic floodplain as a C4-type stream. This will promote more frequent overbank flooding thus reducing erosive energies during storm events greater than bankfull discharge and will also improve adjacent groundwater hydrology. Numerous in-stream structures were installed along the reach to promote bank stability, improve habitat, and provide grade control. A full 50-ft riparian buffer of native species was planted and invasive plant species were treated after construction. The reach also contains wetland areas on both banks which are now protected within the conservation easement. Livestock have been excluded from the conservation easement by cattle fencing. An Enhancement Level I approach was selected for UT2. This involved establishing a riparian buffer, the rebuilding of new channel dimensions in sections of the reach and the installation in stream structures.

Reach 1 is the main UT to Magness Creek comprising the project and is denoted as a "blue-line" stream on the USGS Topographic Map (Lawndale Quadrangle, Figure 2). The upstream portion of this reach is referred to as Reach 1A, with the reach below the proposed crossing designated as Reach 1B. The additional tributaries UT1, UT2, and UT3 were identified in the field flowing from east of the project, onto the left bank of Reach 1. DWR stream forms were completed for all stream reaches in the project area and Reach 1 and UT2 were identified as perennial systems. The IRT did not accept the intermittent streams of UT1 or UT3 as available for mitigation credit.

Reach 1 had been straightened and dredged in the past for agricultural use and livestock had full access to the stream at this project site. As a result, Reach 1 had deeply incised channels and long sections of very steep, eroding banks as well as long sections of overly wide channel. The resulting incision and sediment loss had significantly impacted channel bed features. Reach UT2 had significant degradation from livestock access with bare banks, significant sedimentation, and the channel had cut down to the elevation of the significantly incised receiving stream (Reach 1). Additionally, all the reaches lack appropriate riparian buffers, with either sections of absent or narrow buffers or buffers lacking any subcanopy / understory or herbaceous layers due to livestock grazing pressure. Invasive species on the project include Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), and trifoliate orange (*Poncirus trifoliate*) found

scattered throughout the buffer. Thus, given the level of degradation observed, all reaches rated as 'Low' in the NC-SAM assessment.

Additionally, the project involved a wetland mitigation component consisting of two separate approaches: restoration by re-establishment and restoration by rehabilitation. The wetland re-establishment on site totals 1.817 acres and involved the restoration of appropriate wetland hydrology to hydric soils not previously located within an existing jurisdictional wetland. This was accomplished by: connecting adjacent stream channels to their relic floodplains through Priority I stream restoration, planting a native wetland vegetation community, and removing invasive species.

Wetland rehabilitation consist of 0.035 acres in size and was accomplished by restoring most of the historic natural functions to heavily degraded but still existing jurisdictional wetlands. The degradation consisted of clear impacts to both hydrology and vegetation functions. The wetlands were adjacent to incised streams and were heavily impacted by cattle. By correcting these impacts, the rehabilitation approach will result in significant improvements to both the wetland hydrology and vegetation functions within the existing wetland.

1.5 Project Timeline

The UT to Magness Creek Mitigation Project was instituted in June 2018. The Mitigation Plan was approved by the IRT in July of 2021. Project construction was initiated in February 2022 and completed in August 2022. Planting of live stakes and bareroot stems was completed by the first week of March 2023 and Monitoring Year 1 is on schedule for 2023 as shown in Table 2. The As-Built survey was completed in January of 2023. All 14 cross-sections and 1 crest gauge, 1 flow gauge, and 4 groundwater wells were installed in October 2022. The 6 permanent and 2 random vegetation plots were installed in March of 2023. All wells, crest gauges, and the flow gauges are continuous logging Win-Situ Rugged TROLL gauges. CE pins were located, and the CE boundary was marked in April 2023.

1.6 Design Change Deviations

The installation of a crossing on the mainstem UT to Magness Creek required two significant design changes that were communicated to and approved by the DMS and IRT. The first change was related to the type of crossing, we originally designed a culverted crossing; however, at the time of construction it was difficult to obtain culverts and those available were very expensive. In working with our contractor, an option for making the crossing a bridged crossing using a flatbed rail car deck. The request for making this modification was submitted to the IRT by email on October 22, 2021 and approved. The second modification that was required was a change in the location of the conservation easement line on the right bank, downstream of the crossing. During construction of the crossing and fencing of the easement it became obvious that the crossing was going to open into a steep hill side that would limit utilization of the crossing. By moving the CE line toward the stream in this area space was created for a farm vehicle to travel to the crossing along a flatter access path, just outside of the easement fence and then turn across the crossing. This change required a release of 0.028 acres of the established conservation easement. This requested change was made to the IRT on December 13, 2022, and was approved by email to DMS on December 19, 2022. The partial conservation easement release of 0.028-acre was recorded in Cleveland County on May 15, 2023. Documentation of the modifications described here are provided in Appendix E.

During construction one unplanned deviation from the plans was required due to field conditions. At approximately Station 17+26 of the site plans the channel was planned to meander to the left valley and have another pool and meander between 17+74 and 18+05, before transitioning to the right and into another meander at 18+53. When grading of the channel began around station 17+26 and into that bank, we discovered that there was a large outcropping of bedrock along the entire length of the channel between the constructed Stations 17+26 and 18+35. Because of the height/elevation of this bedrock we could not

excavate into the left bank and maintain the planned profile elevations. The channel was made relatively straight through this section to the next meander. Bedrock outcroppings were incorporated into the channel as drop type structures. The channel was also made a couple of feet wider in anticipation of the bedrock causing this response. In the months since construction was completed in this area, a mid-channel bar has developed were we made it wider. We will continue to monitor this and make adjustments as needed, using hand tools to narrow the channel in this area, since the added width does not appear necessary. The straightening of the channel cut off a small portion of wetland which was designed to exist on the right floodplain inside a meander; however, due to this alteration the wetland area on the right floodplain was reduced by 0.039 acres.

Continuous stage recorders were installed as flow/crest gauges on Reach 1A and UT2. The crest gauge on Reach 1A was originally installed at bankfull elevation of the right floodplain; however, this gauge will be relocated during MY1 to an in-stream location such that the monitoring graph will show the thalweg, water pressure line and the established bankfull elevation to accurately show when flow events reach the bankfull stage elevation.

Two proposed bare-root species were not available at the time of planting: *Magnolia tripetala* (Umbrella Tree) and *Halesia carolina* (Carolina Silverbell). 125 additional stems of Carpinus caroliniana were substituted for the Magnolia and 125 additional stems of *Asimina triloba* (Pawpaw). The additional planted stems are both species on the approved IRT mitigation plan planting list.

APPENDIX A

Background Tables and Figures

Table 1. Project Mitigation Assets and Components

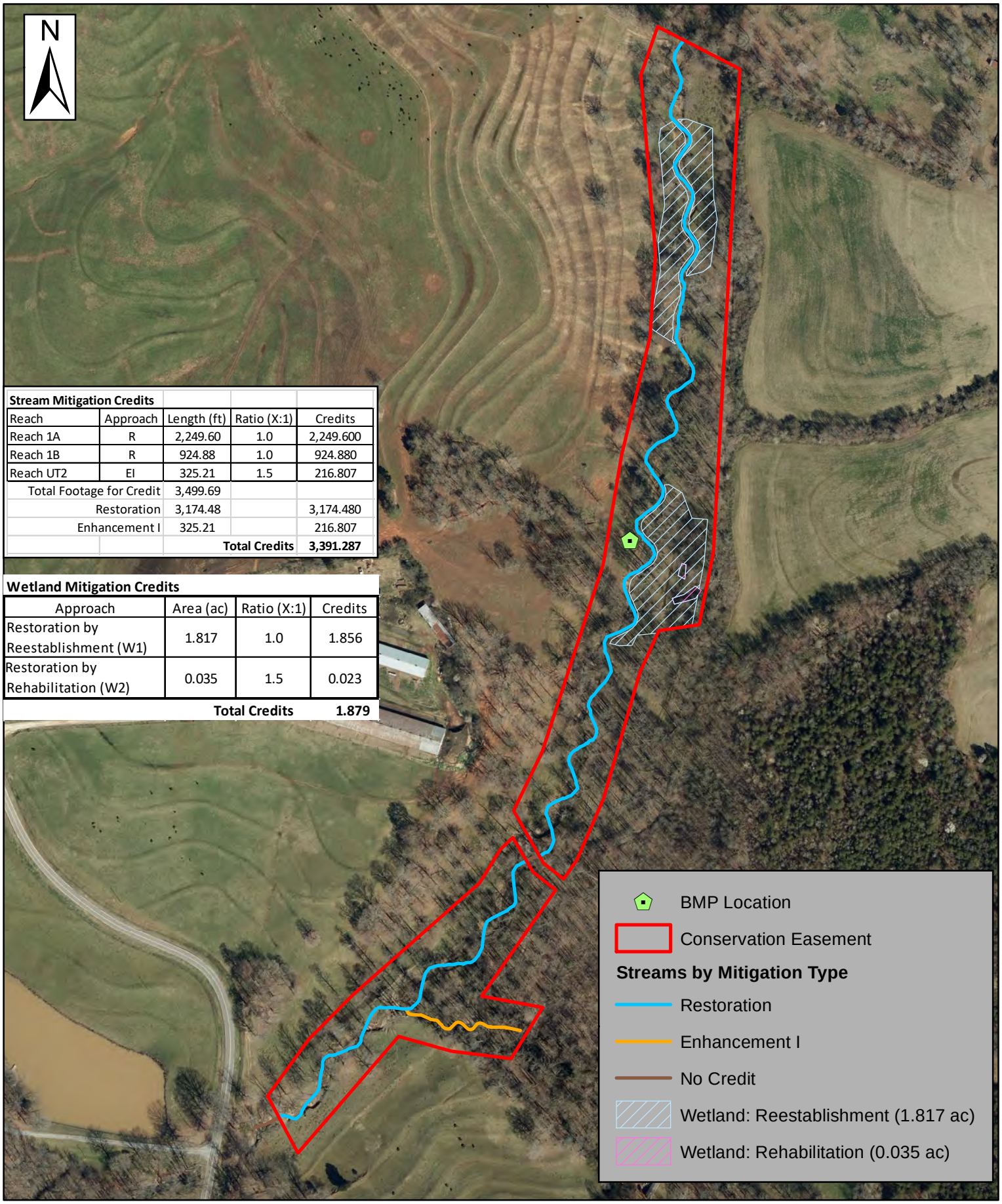
UT to Magness Creek Mitigation Project - NCDMS Project No. 100081

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	2249.60	2257.03	Warm	R	1.0	2,249.600
Reach 1B	924.88	943.72	Warm	R	1.0	924.880
Reach UT2	325.21	289.34	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 Summantions 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**



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	1.856
Restoration by Rehabilitation (W2)	0.035	1.5	0.023
		Total Credits	**1.879**

Michael Baker INTERNATIONAL

0 125 250 500 Feet

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

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

Elapsed Time Since grading complete:	**7 months**
Elapsed Time Since planting complete:	**1.5 month**
Number of Reporting Years[1]:	**0**

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

[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

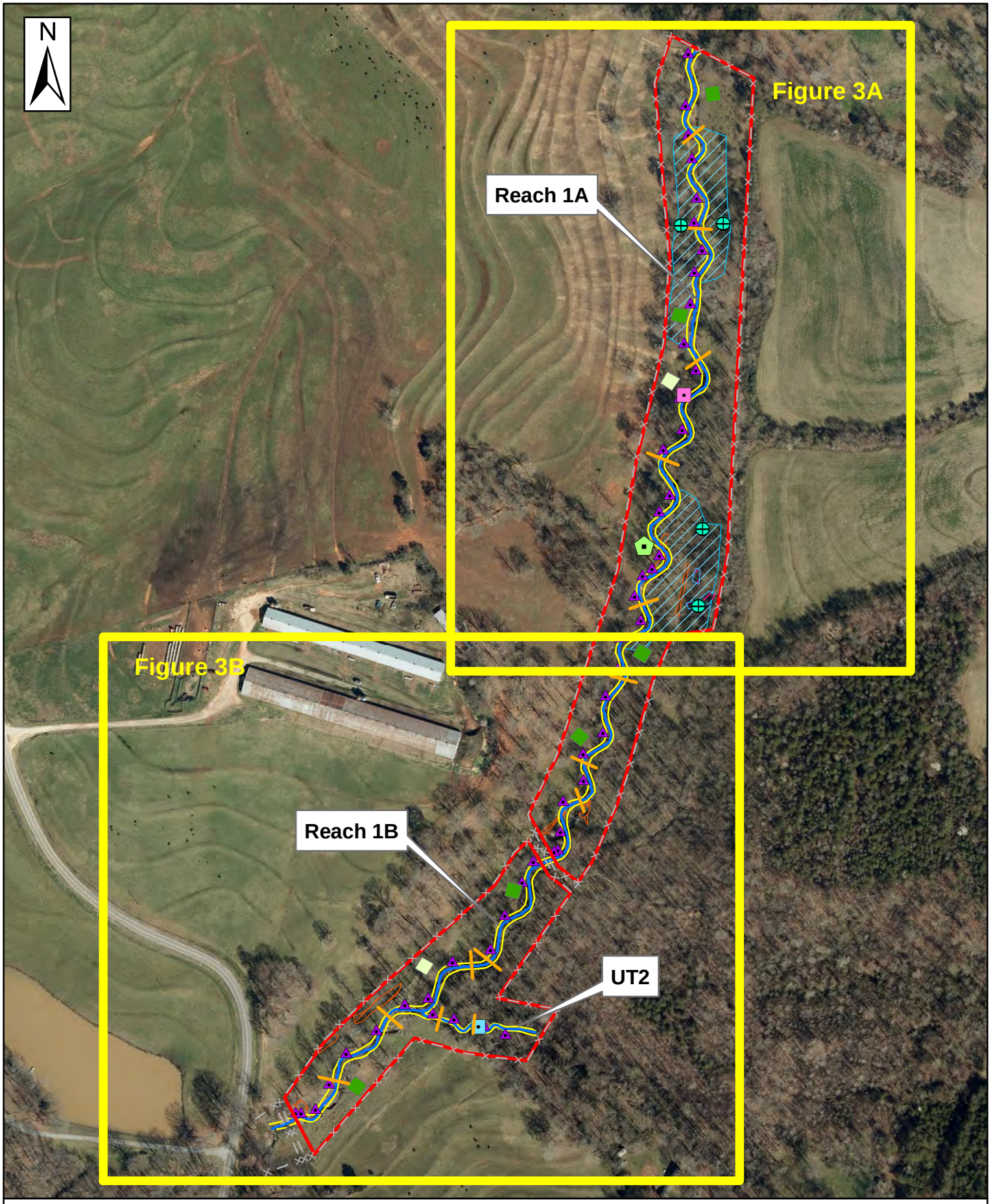
Designer	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 Contact: Katie McKeithan, Tel. 919-481-5703
Construction Contractor	
KBS Earthworks, Inc.	5616 Coble Church Rd Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Survey Contractor	
Kee Mapping and Surveying	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)	1.856	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

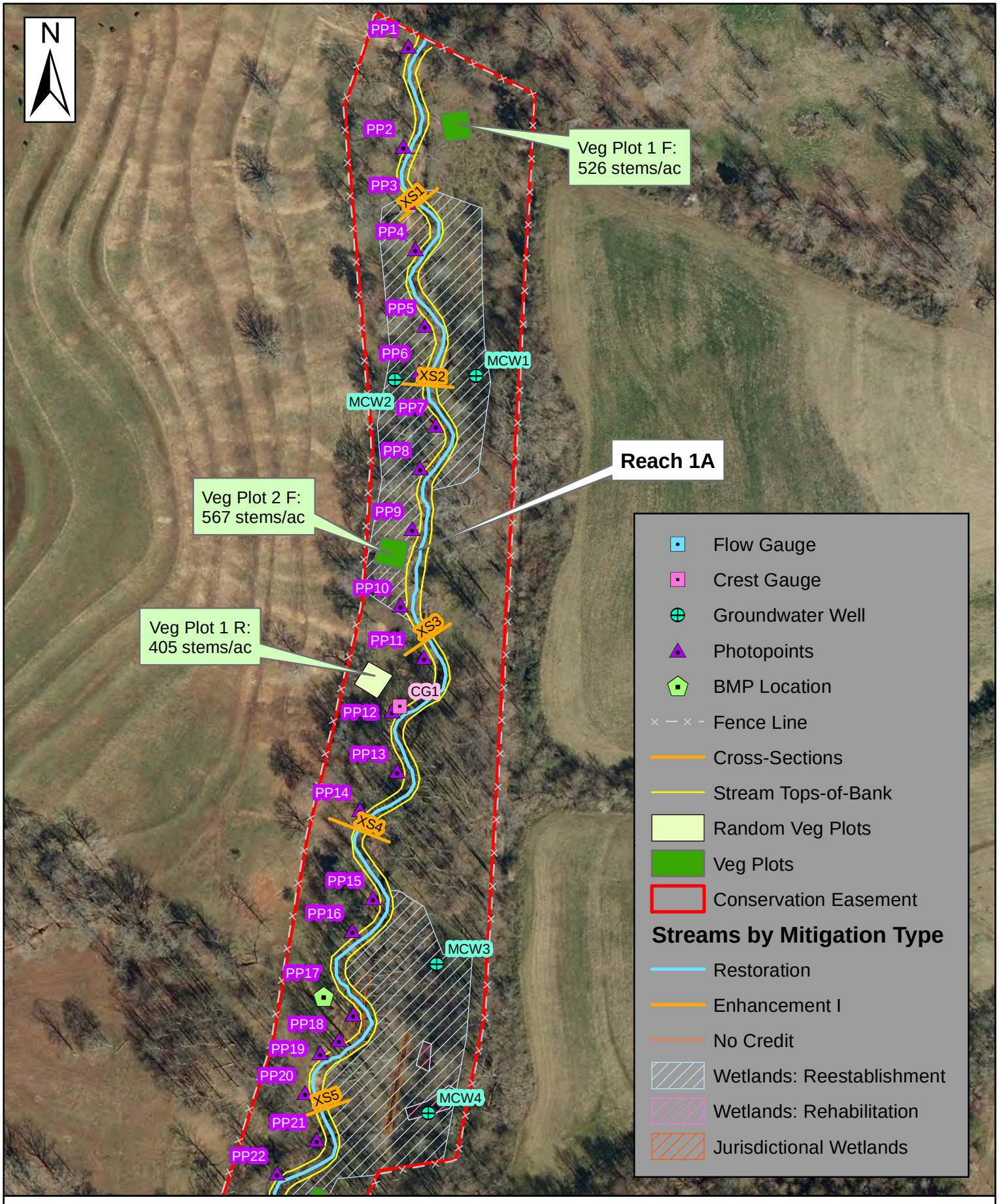
Visual Assessment Data



Michael Baker INTERNATIONAL

0 150 300 600 Feet

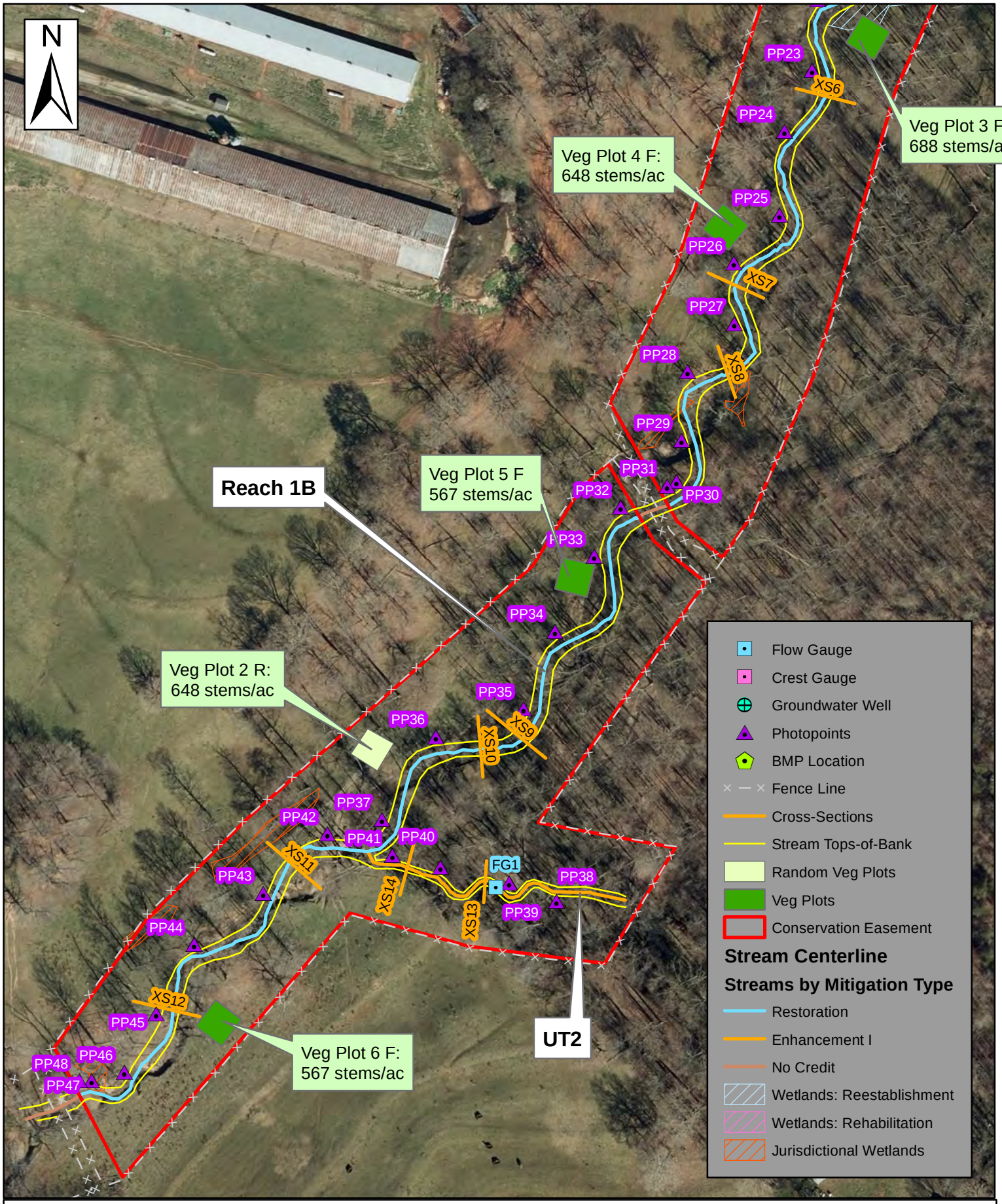
Overview Map: Current Condition Plan View (CCPV)
UT to Magness Creek Mitigation Project
Cleveland County, NC



Michael Baker INTERNATIONAL

0 75 150 300 Feet

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



Michael Baker INTERNATIONAL

0 75 150 300 Feet

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

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-1: Reach 1A, Facing Upstream, Station 11+25- Begin Reach 1A

PP-2: Reach 1A, Facing Upstream, Station 12+50

PP-3: Reach 1A, Facing Upstream, Station 13+15

PP-4: Reach 1A, Facing Upstream, Station 13+80

PP-5: Reach 1A, Facing Upstream, Station 14+80

PP-6: Reach 1A, Facing Upstream, Station 15+70

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-7: Reach 1A, Facing Upstream, Station 16+30

PP-8: Reach 1A, Facing Upstream, Station 17+00

PP-9: Reach 1A, Facing Upstream, Station 17+70

PP-10: Reach 1A, Facing Upstream, Station 18+50

PP-11: Reach 1A, Facing Upstream, Station 19+15

PP-12: Reach 1A, Facing Upstream, Station 20+20

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-13: Reach 1A, Facing Upstream, Station 21+00

PP-14: Reach 1A, Facing Upstream, Station 21+90

PP-15: Reach 1A, Facing Upstream, Station 22+90

PP-16: Reach 1A, Facing Upstream, Station 23+60

PP-17: Reach 1A, Facing Upstream, Station 24+60

PP-18: Reach 1A, Facing Upstream, Station 25+30

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-19: Right Floodplain BMP, Reach 1A Station 25+40

PP-20: Reach 1A, Facing Upstream, Station 26+00

PP-21: Reach 1A, Facing Upstream, Station 26+60

PP-22: Reach 1A, Facing Upstream, Station 27+45

PP-23: Reach 1A, Facing Upstream, Station 28+20

PP-24: Reach 1A, Facing Upstream, Station 28+90

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-25: Reach 1A, Facing Upstream, Station 29+70

PP-26: Reach 1A, Facing Upstream, Station 30+60

PP-27: Reach 1A, Facing Upstream, Station 31+30

PP-28: Reach 1A, Facing Upstream, Station 32+30

PP-29: Reach 1A, Facing Upstream, Station 32+90

PP-30: Reach 1A, Facing Upstream, Station 33+50

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-31: End of Reach 1A, Facing Downstream, Station 33+55 at Crossing

PP-32: Begin Reach 1B, Facing Upstream, Station 33+90 at Crossing

PP-33: Reach 1B, Facing Upstream, Station 34+40

PP-34: Reach 1B, Facing Upstream, Station 35+60

PP-35: Reach 1B, Facing Upstream, Station 36+50

PP-36: Reach 1B, Facing Upstream, Station 37+70

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-37: Reach 1B, Facing Upstream, Station 38+50

PP-38: Begin UT2, Facing Upstream, Station 10+90

PP-39: UT2, Facing Upstream, Station 11+60

PP-40: UT2, Facing Upstream, Station 12+25

PP-41: UT2, Facing Upstream, Station 12+80- End UT2

PP-42: Reach 1B, Facing Upstream, Confluence with UT2, Station 39+30

UT to Magness Creek: As-Built Stream Station Photo-Points
NCDMS Project No. #100081 – Photos taken March 8, 2023

PP-43: Reach 1B, Facing Upstream, Station 40+00

PP-44: Reach 1B, Facing Upstream, Station 41+20

PP-45: Reach 1B, Facing Upstream, Station 42+00

PP-46: Reach 1B, Facing Upstream, Station 42+90

PP-47: Reach 1B, Facing Upstream, Station 43+05

'P-48: Reach 1B, Facing Downstream at project terminus, Station 43+10

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

Vegetation Plot #1. Taken February 14, 2023

Vegetation Plot #2. Taken March 23, 2023

Vegetation Plot #3. Taken March 23, 2023

Vegetation Plot #4. Taken March 23, 2023

Vegetation Plot #5. Taken February 14, 2023

Vegetation Plot #6. Taken February 14, 2023

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

Random Vegetation Plot - RVP1.
Taken March 23, 2023

Random Vegetation Plot - RVP2.
Taken February 14, 2023

UT to Magness Creek: As-Built Monitoring Device Photo Log

Groundwater Well MCW1. Photo taken January 24, 2023

Groundwater Well MCW2: Photo taken January 24, 2023

Groundwater Well MCW3: Photo taken January 27, 2023

Groundwater Well MCW4: Photo taken January 27, 2023

Crest Gauge CG1. Mainstem: Photo taken January 27, 2023

Flow Gauge FG1. UT 2: Photo taken January 27, 2023

APPENDIX C

Vegetation Plot Data

Table 5. 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	2023-03-23
Date of Current Survey	2023-03-23
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	1					1	
	Betula nigra	river birch	Tree	FACW	3	3			1	1	4	4	2	2			1	3
	Carpinus caroliniana	American hornbeam	Tree	FAC	1	1	1	1	1	1			2	2	1	1	1	
	Celtis laevigata	sugarberry	Tree	FACW	2	2			1	1	1	1			2	2		3
	Cephalanthus occidentalis	common buttonbush	Shrub	OBL			1	1	2	2								
	Cercis canadensis	eastern redbud	Tree	FACU			1	1	1	1								
	Cornus amomum	silky dogwood	Shrub	FACW														1
	Diospyros virginiana	common persimmon	Tree	FAC			1	1					1	1				1
	Fraxinus americana	white ash	Tree	FACU														1
	Fraxinus pennsylvanica	green ash	Tree	FACW	1	1			3	3			3	3	1	1		
	Hamamelis virginiana	American witchhazel	Tree	FACU			2	2			1	1					1	
	Nyssa sylvatica	blackgum	Tree	FAC					1	1	1	1						
	Platanus occidentalis	American sycamore	Tree	FACW	4	4	4	4	4	4	4	4	2	2	6	6	1	1
	Quercus michauxii	swamp chestnut oak	Tree	FACW							1	1			1	1	2	1
	Quercus nigra	water oak	Tree	FAC	1	1	2	2			3	3	1	1			1	
	Quercus palustris	pin oak	Tree	FACW					1	1							2	
	Quercus phellos	willow oak	Tree	FAC	1	1	1	1					2	2	2	2		1
	Quercus sp.												1	1				
	Ulmus americana	American elm	Tree	FACW					2	2					1	1		4
Sum	Performance Standard				13	13	14	14	17	17	16	16	14	14	14	14	10	16
Mitigation Plan Performance Standard	Current Year Stem Count					13		14		17		16		14		14	10	16
	Stems/Acre					526		567		688		648		567		567	405	648
	Species Count					7		9		10		8		8		7	8	9
	Dominant Species Composition (%)					31		29		24		25		21		43	20	25
	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					13		14		17		16		14		14	10	16
	Stems/Acre					526		567		688		648		567		567	405	648
	Species Count					7		9		10		8		8		7	8	9
	Dominant Species Composition (%)					31		29		24		25		21		43	20	25
	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												
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												
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												
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 Measurement and
Geomorphology Data

Table 6. 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	-----	-----	9.4	-----	11.9	14.4	-----	12.5	-----	-----	10.3	11.5	11.3	13.2
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	53.9	59.6	59.7	65.0
BF Mean Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.9	-----	-----	1.0	1.1	1.1	1.2
BF Max Depth (ft)	-----	0.90-0.44	-----	-----	0.8	-----	1.0	1.2	-----	0.9	-----	-----	1.4	1.7	1.6	2.4
BF Cross-sectional Area (ft^2)	-----	10.2-12.6	-----	-----	10.5	-----	12.1	13.7	-----	11.0	-----	-----	11.8	12.5	12.3	13.5
Width/Depth Ratio	-----	12.58-65.9	-----	-----	8.1	-----	11.7	15.2	-----	14.2	-----	-----	8.3	9.8	9.2	12.6
Entrenchment Ratio	-----	1.96-1.07	-----	-----	1.8	-----	2.5	3.2	-----	3.2	-----	-----	4.9	5.2	5.2	5.4
Bank Height Ratio	-----	3.09-6.25	-----	-----	1.0	-----	2.1	3.3	-----	1.0	-----	-----	1.0	1.0	1.0	1.0
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	31.8	39.0	40.9	49.7
Riffle Slope (ft/ft)	-----	.0124-.0076	-----	-----	-----	0.0110	-----	-----	-----	0.0110	-----	-----	0.0032	0.0080	0.0077	0.0137
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	20.7	35.0	38.3	59.5
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----					52.7	84.3	81.8	101.5
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----		2.5			1.6	2.2	2.4	3.4
Additional Reach Parameters																
Drainage Area (SM)	-----	0.392-0.458	-----	-----	0.4	-----	0.7	1.0	0.4	-----	0.4	0.5	----	0.392-0.458	----	----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Rosgen Classification	-----	B4c	-----	-----	-----	B4/C4	-----	-----	-----	C4	-----	-----	----	C4	----	----
BF Velocity (fps)	-----	2.7-2.9	-----	-----	2.5	-----	2.6	2.7	-----	2.5	-----	-----	----	----	----	----
BF Discharge (cfs)	-----	26.9-36.0	-----	-----	26.9	-----	32.0	37.0	-----	27.0	-----	-----	----	----	----	----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Channel Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Sinuosity	-----	1.14-1.23	-----	-----	-----	1.2	-----	-----	-----	1.2	-----	-----	----	1.2	----	----

Table 6. 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	-----	-----	9.4	-----	11.9	14.4	-----	14.5	-----	-----	12.4	13.3	13.3	14.2
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	60.2	63.9	63.9	67.6
BF Mean Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.0	1.0	1.0	1.0
BF Max Depth (ft)	-----	.90-.44	-----	-----	0.8	-----	1.0	1.2	-----	1.0	-----	-----	1.5	1.6	1.6	1.6
BF Cross-sectional Area (ft²)	-----	10.2-12.6	-----	-----	10.5	-----	12.1	13.7	-----	13.8	-----	-----	12.6	13.3	13.3	14.0
Width/Depth Ratio	-----	12.58-65.9	-----	-----	8.1	-----	11.7	15.2	-----	15.2	-----	-----	12.2	13.2	13.2	14.3
Entrenchment Ratio	-----	1.96-1.07	-----	-----	1.8	-----	2.5	3.2	-----	2.8	-----	-----	4.8	4.8	4.8	4.9
Bank Height Ratio	-----	3.09-6.25	-----	-----	1.0	-----	2.1	3.3	-----	1.0	-----	-----	1.0	1.0	1.0	1.0
Profile																
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	41.2	46.7	47.0	50.6
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)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	29.4	36.0	39.4	52.5
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	37.9	79.6	76.2	117.3
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.0	-----	-----	2.9	3.6	3.6	4.3
Additional Reach Parameters																
Drainage Area (SM)	-----	0.6	-----	-----	0.4	-----	0.7	1.0	0.6	-----	0.6	0.6	----	0.6	----	----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Rosgen Classification	-----	C4	-----	-----	-----	B4/C4	-----	-----	-----	C4	-----	-----	----	C4	----	----
BF Velocity (fps)	-----	2.7-2.9	-----	-----	2.5	-----	2.6	2.7	-----	2.7	-----	-----	----	----	----	----
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	-----	-----	-----	1.2	-----	-----	-----	1.2	-----	-----	----	1.2	----	----

Table 6. 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)	-----	5.1	-----	-----	5.7	-----	7.6	9.4	-----	8.0	-----	-----	----	8.3	----	----
Floodprone Width (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	42.7	----	----
BF Mean Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	0.5	----	----
BF Max Depth (ft)	-----	0.3	-----	-----	0.5	-----	0.8	1.2	-----	0.5	-----	-----	----	0.8	----	----
BF Cross-sectional Area (ft²)	-----	1.6	-----	-----	2.7	-----	6.8	10.9	-----	2.7	-----	-----	----	3.8	----	----
Width/Depth Ratio	-----	15.8	-----	-----	8.1	-----	10.2	12.3	-----	12.3	-----	-----	----	18.5	----	----
Entrenchment Ratio	-----	1.3	-----	-----	1.8	-----	2.0	2.2	-----	2.2	-----	-----	----	0.0	----	----
Bank Height Ratio	-----	7.6	-----	-----	1.0	-----	2.1	3.2	-----	1.0	-----	-----	----	1.0	----	----
d50 (mm)	-----	2.4	-----	-----	-----	-----	-----	-----	-----	2.4	-----	-----	----	----	----	----
Profile	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Riffle Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.9	15.2	18.2	30.8
Riffle Slope (ft/ft)	-----	0.0206	-----	-----	-----	-----	-----	-----	-----	0.0100	-----	-----	0.0000	0.0115	0.0103	0.0234
Pool Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.6	12.2	14.0	21.3
Pool to Pool Spacing (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	19.8	33.2	32.0	44.1
Pool Max Depth (ft)	-----	-----	-----	-----	-----	-----	-----	-----		1.3	-----		1.1	1.4	1.4	1.7
Additional Reach Parameters	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Drainage Area (SM)	-----	0.0	-----	-----	31.0	-----	153.0	275.0	-----	31.0	-----	-----	----	----	----	----
Impervious cover estimate (%)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Rosgen Classification	-----	F4	-----	-----	-----	B4/B4	-----	-----	-----	B4	-----	-----	----	B4	----	----
BF Velocity (fps)	-----	3.2	-----	-----	1.9	-----	2.3	2.6	-----	1.9	-----	-----	----	----	----	----
BF Discharge (cfs)	-----	5.2	-----	-----	5.2	-----	16.8	28.5	-----	5.2	-----	-----	----	----	----	----
Valley Length	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Channel Length (ft)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----	----
Sinuosity	-----	1.2	-----	-----	-----	1.2	-----	-----	-----	1.2	-----	-----	----	1.2	----	----

Table 7. 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-Bankfull[1] Area	882.63							880.76							877.33							875.10						
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00							--							1.00							--						
Thalweg Elevation	880.21							878.35							877.33							872.23						
LTOB[2] Elevation	882.63							880.76							877.33							875.10						
LTOB[2] Max Depth (ft)	2.42							2.41							1.40							2.87						
LTOB[2] Cross Sectional Area (ft[2])	12.75							20.41							11.86							21.05						

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-Bankfull[1] Area	871.86							869.61							865.67							863.58						
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00							--							--							1.00						
Thalweg Elevation	870.41							866.23							862.29							861.92						
LTOB[2] Elevation	871.86							869.61							865.67							863.58						
LTOB[2] Max Depth (ft)	1.45							3.38							3.38							1.66						
LTOB[2] Cross Sectional Area (ft[2])	13.46							24.61							28.66							11.76						

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-Bankfull[1] Area	857.17							856.56							854.31							851.25						
Bank Height Ratio_Based on AB Bankfull[1] Area	--							1.00							--							1.00						
Thalweg Elevation	853.76							854.93							854.93							849.77						
LTOB[2] Elevation	857.17							856.56							854.31							851.25						
LTOB[2] Max Depth (ft)	3.41							1.63							2.69							1.48						
LTOB[2] Cross Sectional Area (ft[2])	30.50							12.63							20.93							14.00						

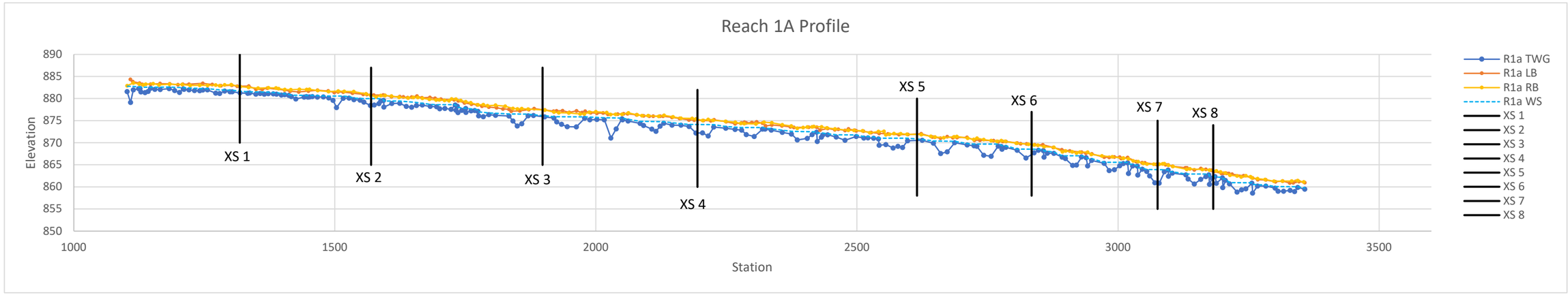
Stream Reach	UT2													
	Cross-section X-13 (Riffle)							Cross-section X-14 (Pool)						
	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	855.36							856.97						
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00							--			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

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.

Figure 4. Longitudinal Profiles



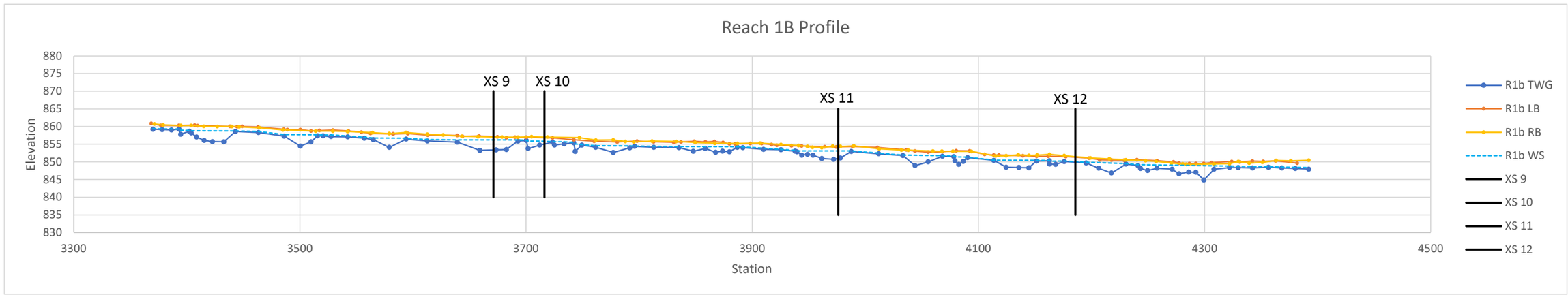
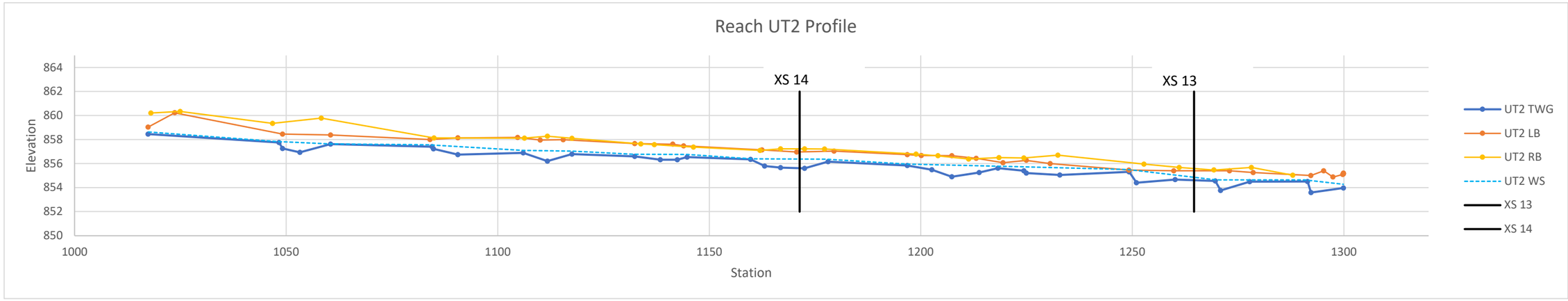


Figure 4. Longitudinal Profiles



Permanent Cross-Section 1

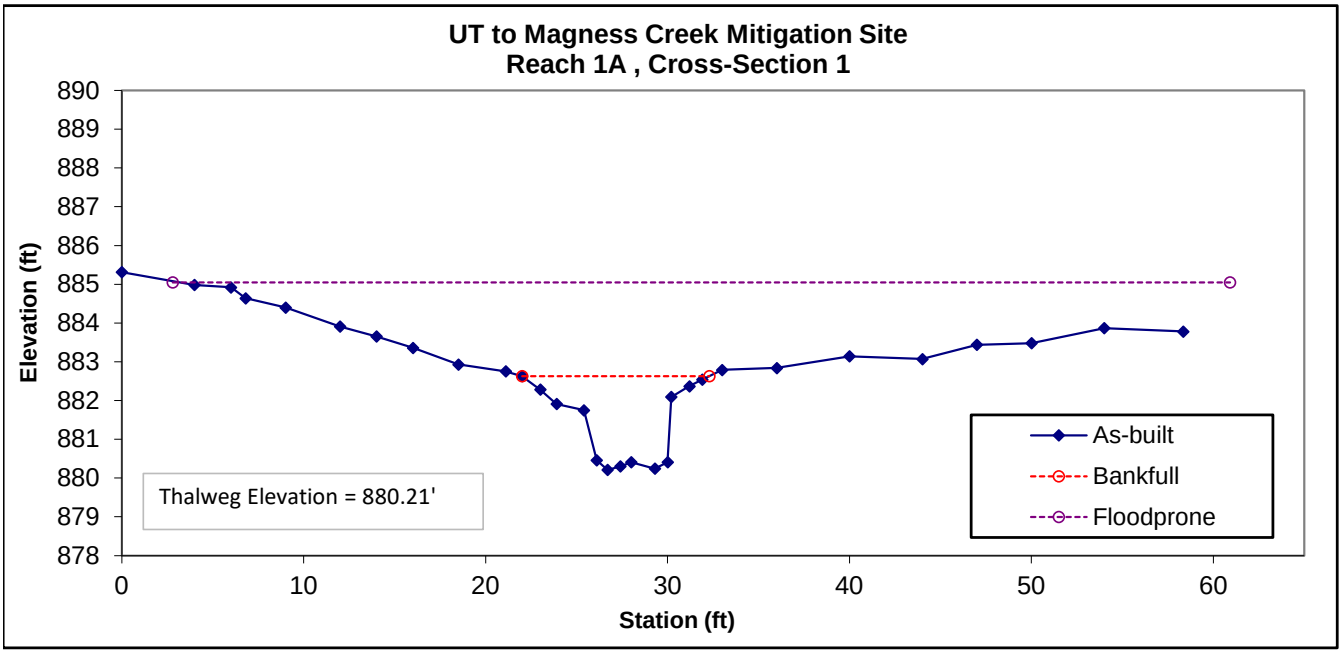
(As-built Survey Data Collected: January 27, 2023)

Restoration

Looking at the Right Bank

Looking at the Left Bank

Feature	Stream Type	BKF Area	BKF Width	BKF Depth	Max BKF Depth	W/D	BH Ratio	ER	BKF Elev	TOB Elev
Riffle	C4	12.75	10.30	1.24	2.42	8.31	1.0	5.36	882.63	882.63



Permanent Cross-Section 2

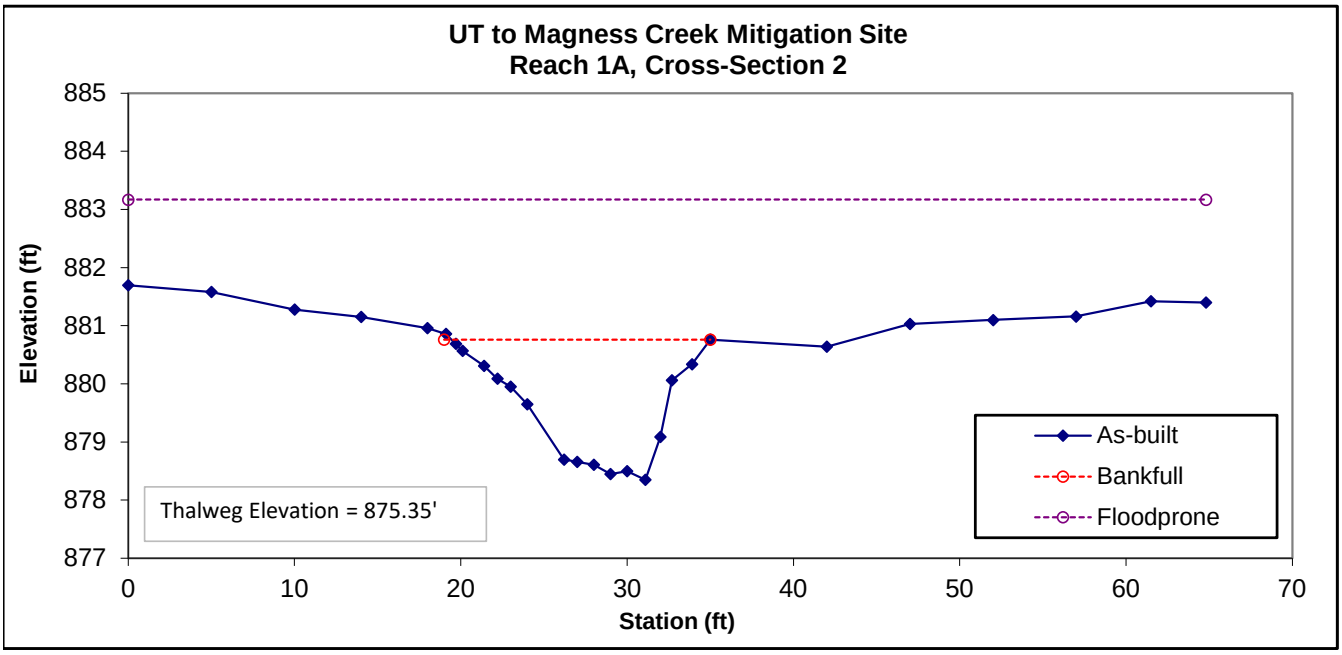
(As-built Survey Data Collected: January 27, 2023)

Restoration

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	TOB Elev
Pool	C4	20.41	16.55	1.23	2.41	13.46	--	--	880.76	880.76



Permanent Cross-Section 3

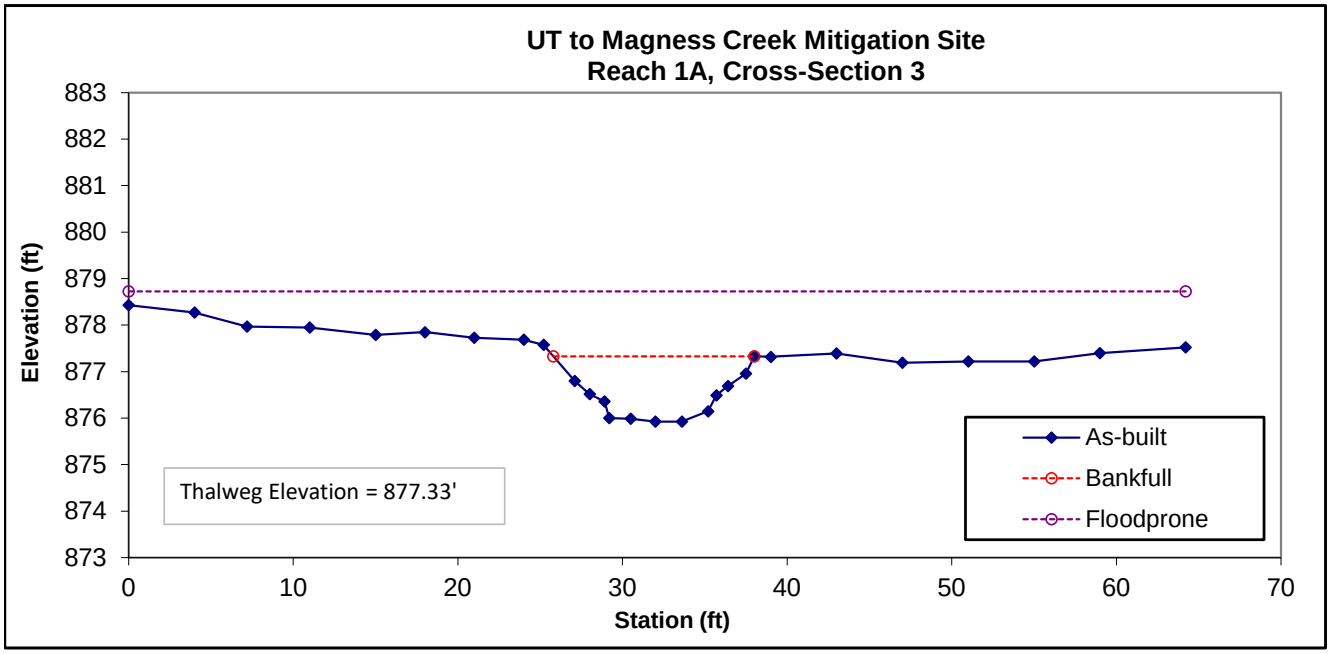
(As-built Survey Data Collected: January 27, 2023)

Restoration

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	TOB Elev
Riffle	C4	11.86	12.19	0.97	1.40	12.57	1.0	5.27	877.33	877.33



Permanent Cross-Section 4

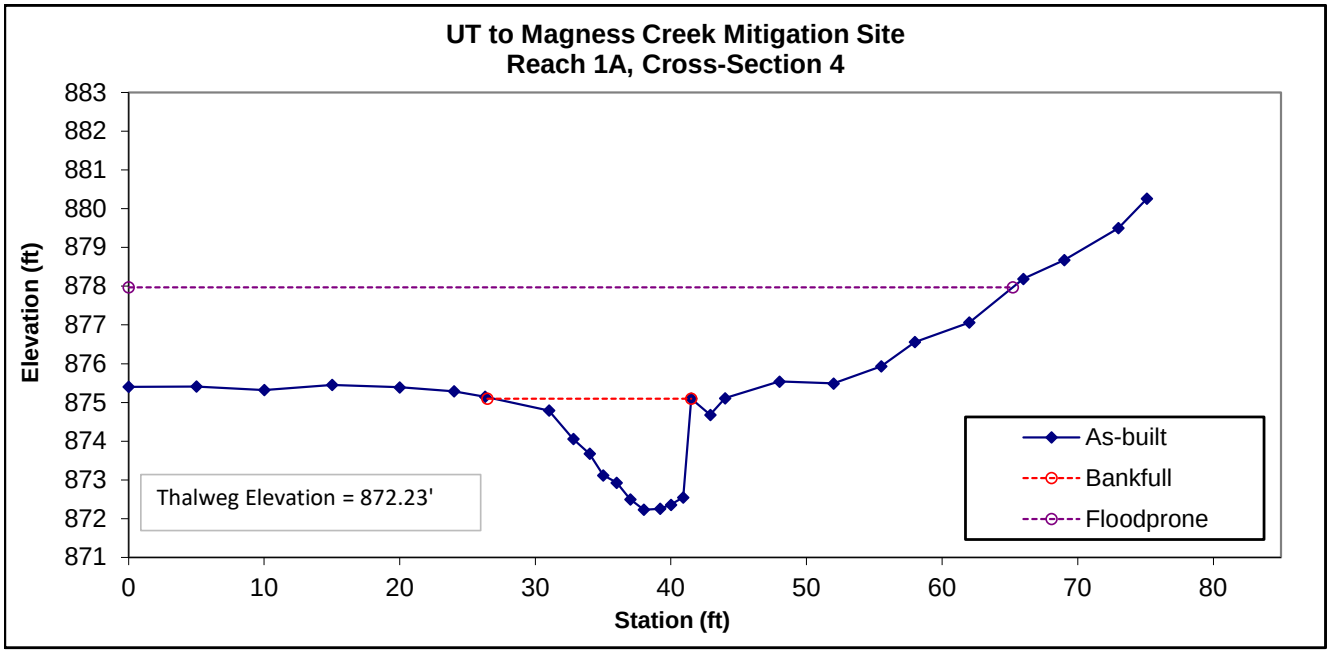
(As-built Survey Data Collected: January 27, 2023)

Restoration

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	TOB Elev
Pool	C4	21.05	15.05	1.4	2.87	10.75	--	--	875.1	875.1



Permanent Cross-Section 5

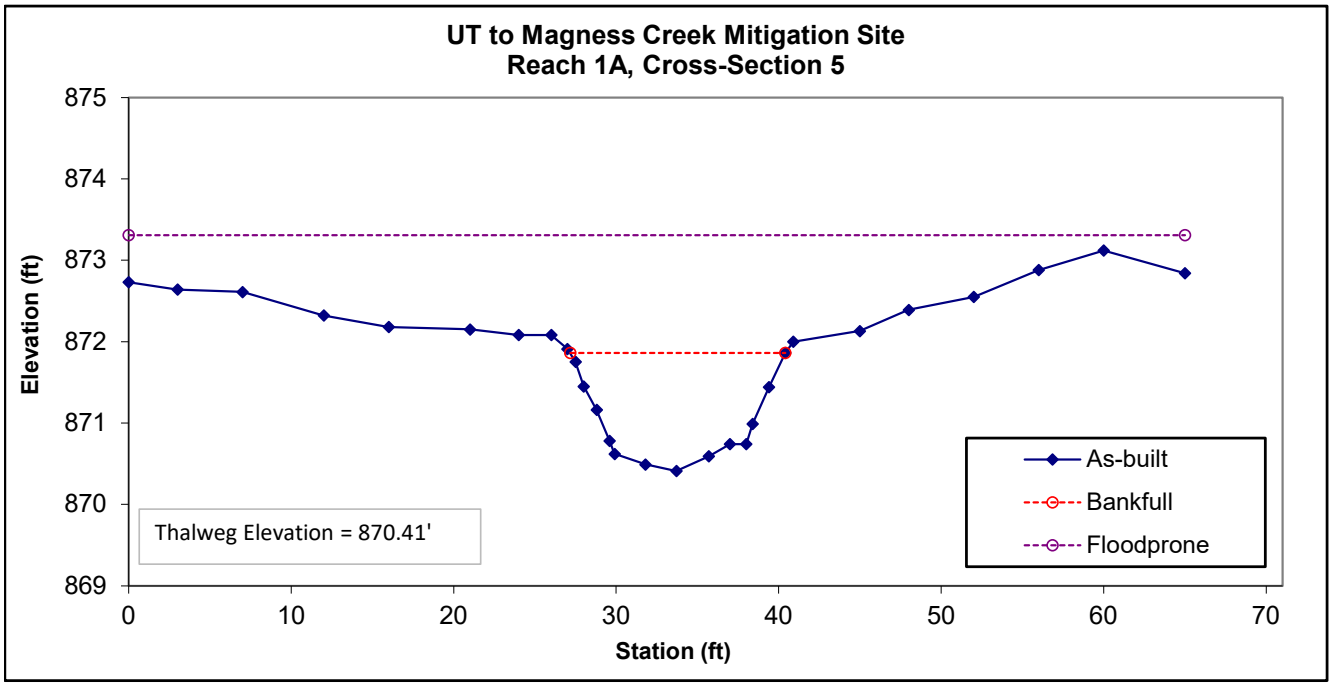
(As-built Survey Data Collected: March 23, 2023)

Restoration

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	TOB Elev
Riffle	C4	13.46	13.24	1.02	1.45	9.13	1.0	4.9	871.86	871.86



Permanent Cross-Section 6

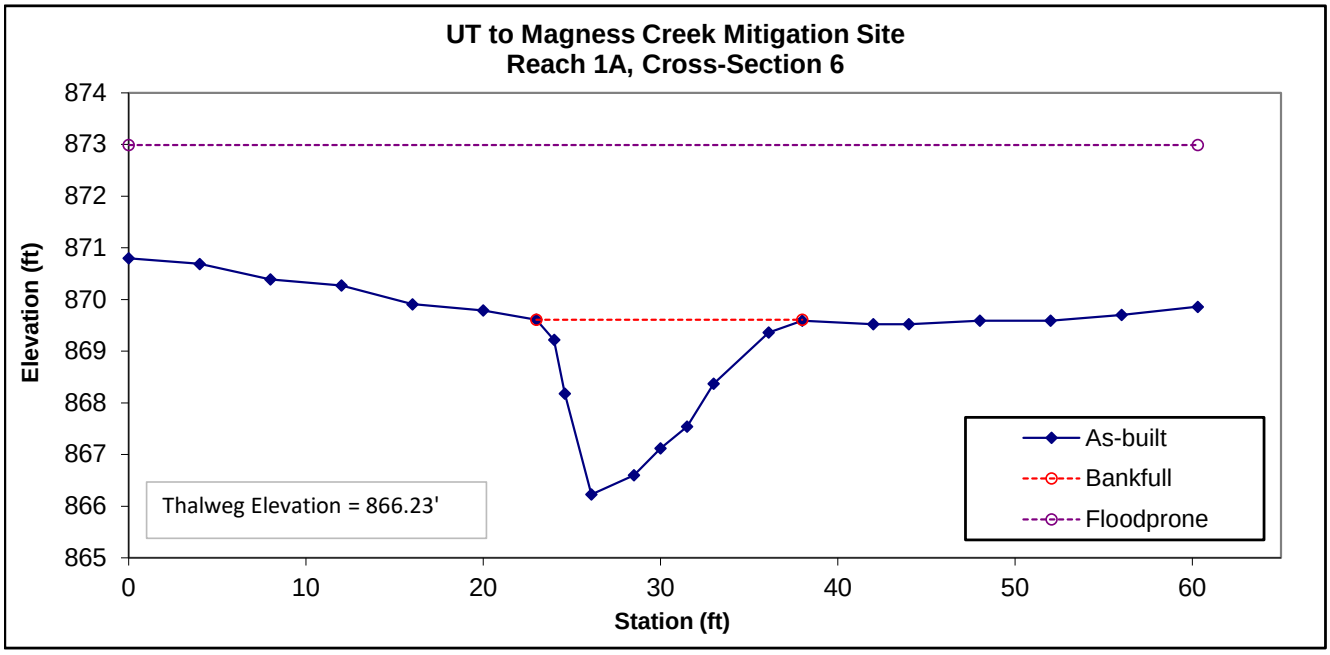
(As-built Survey Data Collected: March 23, 2023)

Restoration

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	TOB Elev
Pool	C4	24.61	15.0	1.64	3.38	9.15	--	--	869.61	869.61



Permanent Cross-Section 7

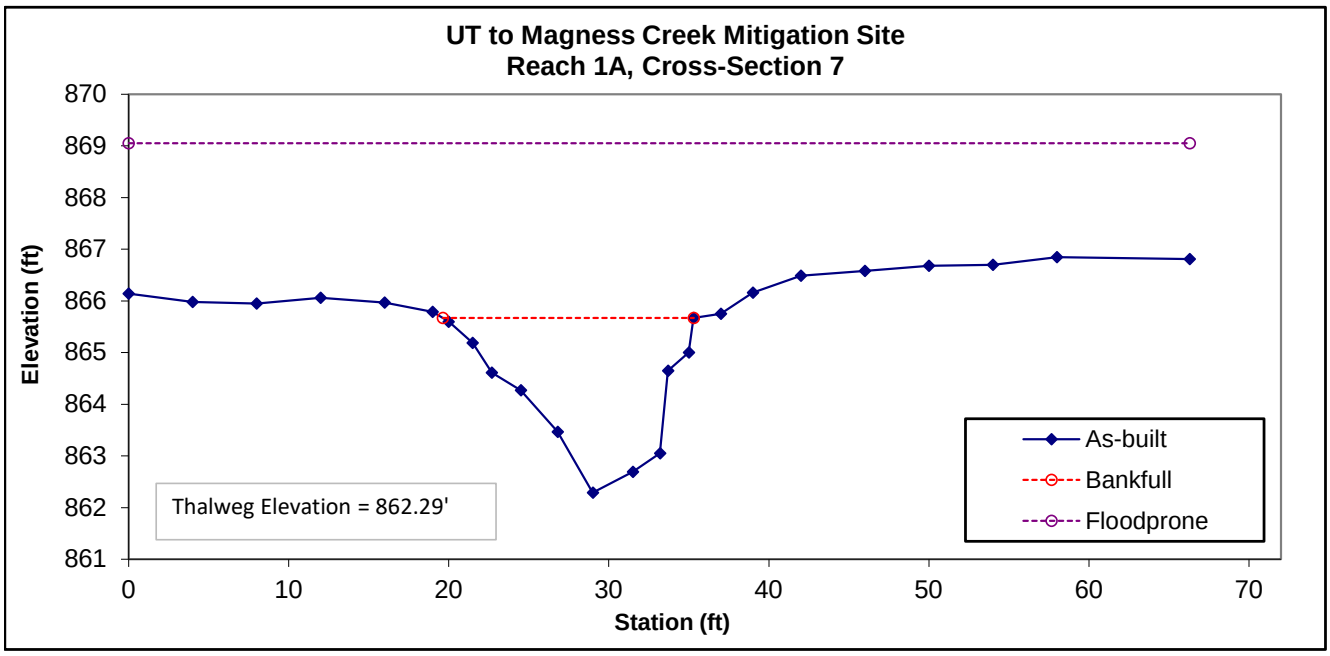
(As-built Survey Data Collected: March 23, 2023)

Restoration

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	TOB Elev
Pool	C4	28.66	15.67	1.83	3.38	8.56	--	--	865.67	865.67



Permanent Cross-Section 8

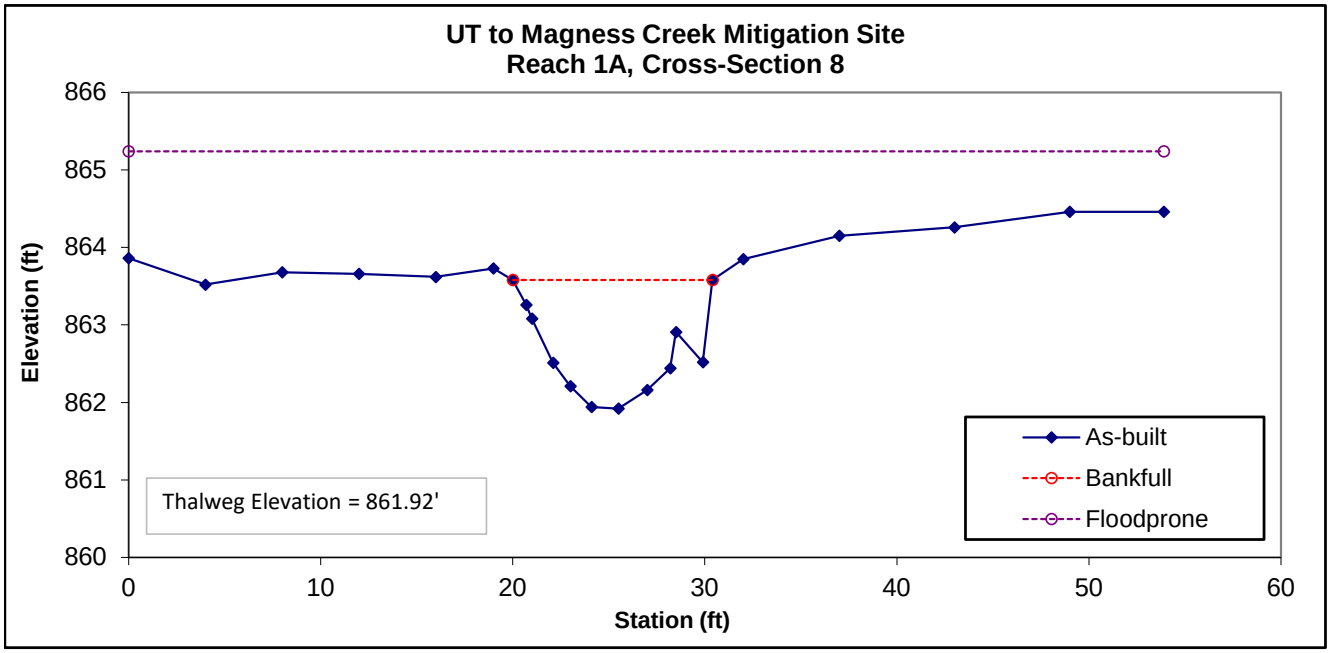
(As-built Survey Data Collected: March 23, 2023)

Restoration

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	TOB Elev
Riffle	C4	11.76	10.40	1.13	1.66	9.20	1.0	5.18	863.58	863.58



Permanent Cross-Section 9

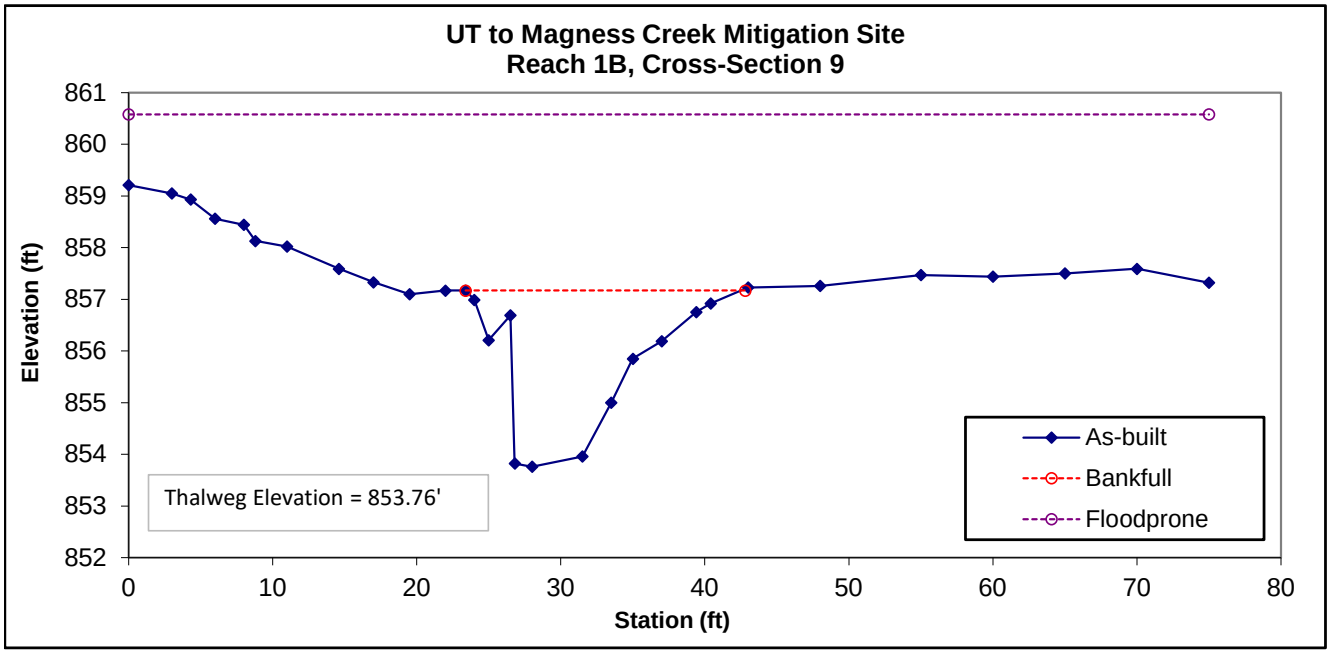
(As-built Survey Data Collected: February 14, 2023)

Restoration

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	TOB Elev
Pool	C4	30.5	19.4	1.57	3.41	12.36	--	--	857.17	857.17



Permanent Cross-Section 10

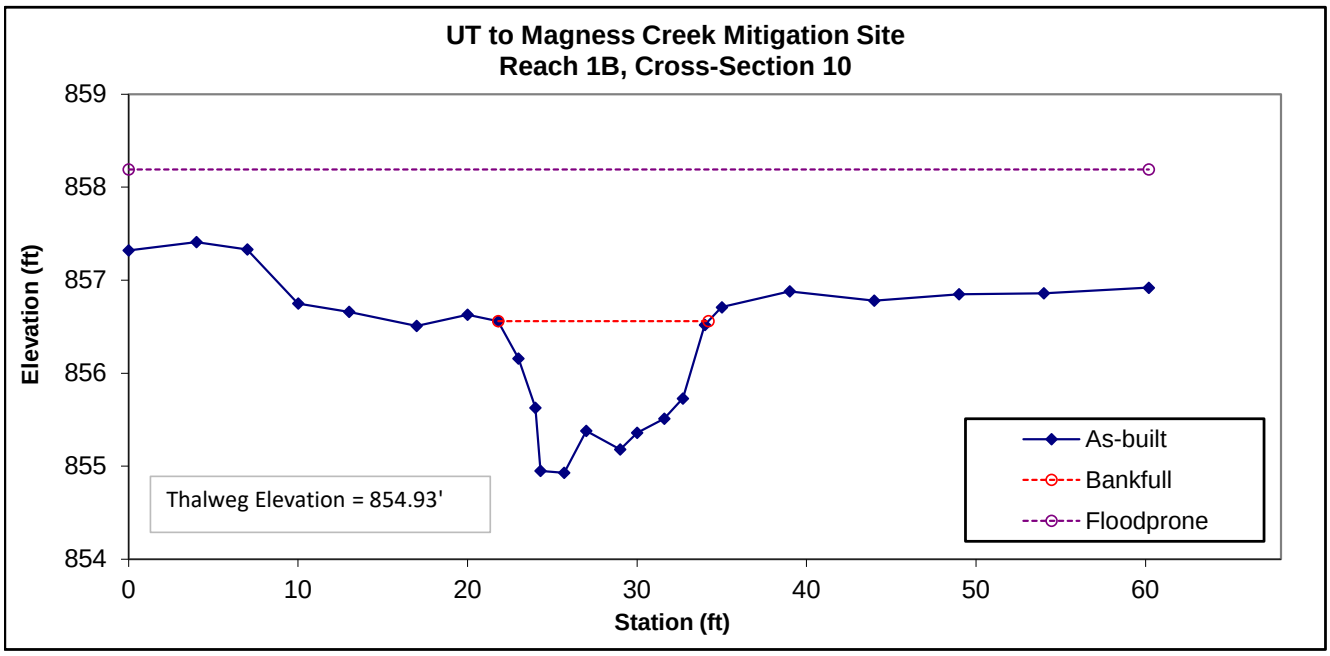
(As-built Survey Data Collected: February 14, 2023)

Restoration

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	TOB Elev
Riffle	C4	12.63	12.41	1.02	1.63	12.17	1.0	4.9	856.56	856.56



Permanent Cross-Section 11

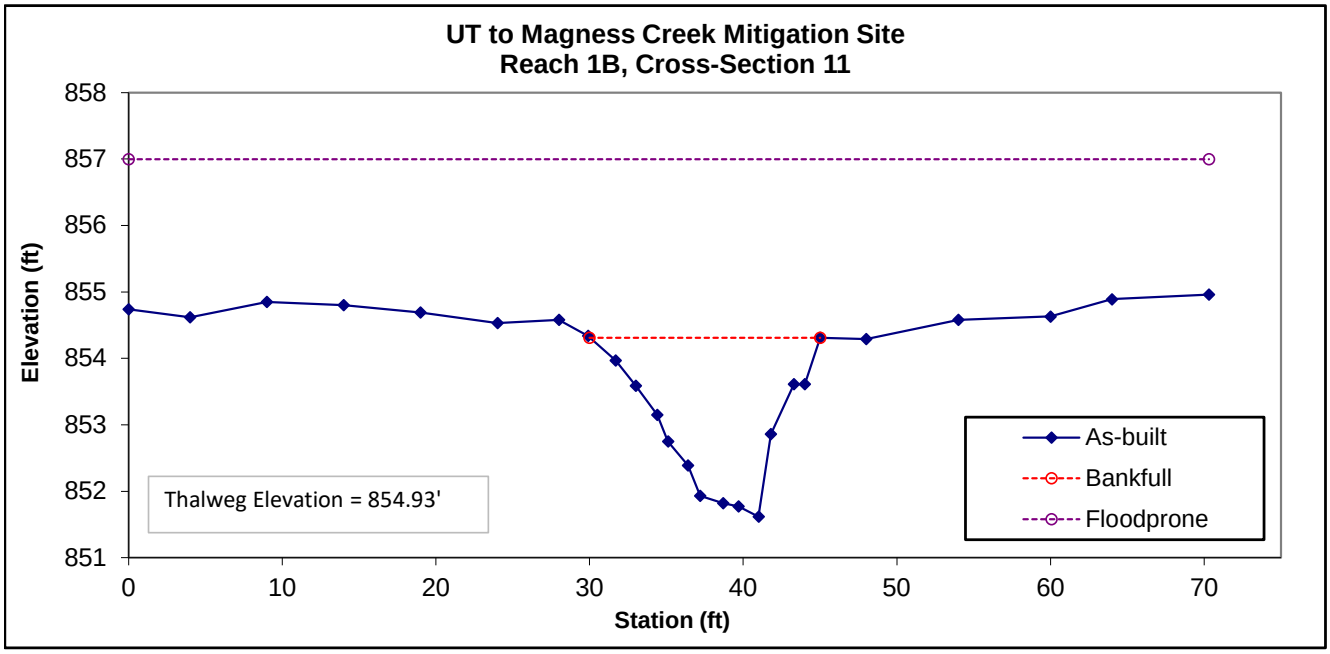
(As-built Survey Data Collected: February 14, 2023)

Restoration

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	TOB Elev
Pool	C4	20.93	15.02	1.14	2.69	16.11	--	--	854.31	854.31



Permanent Cross-Section 12

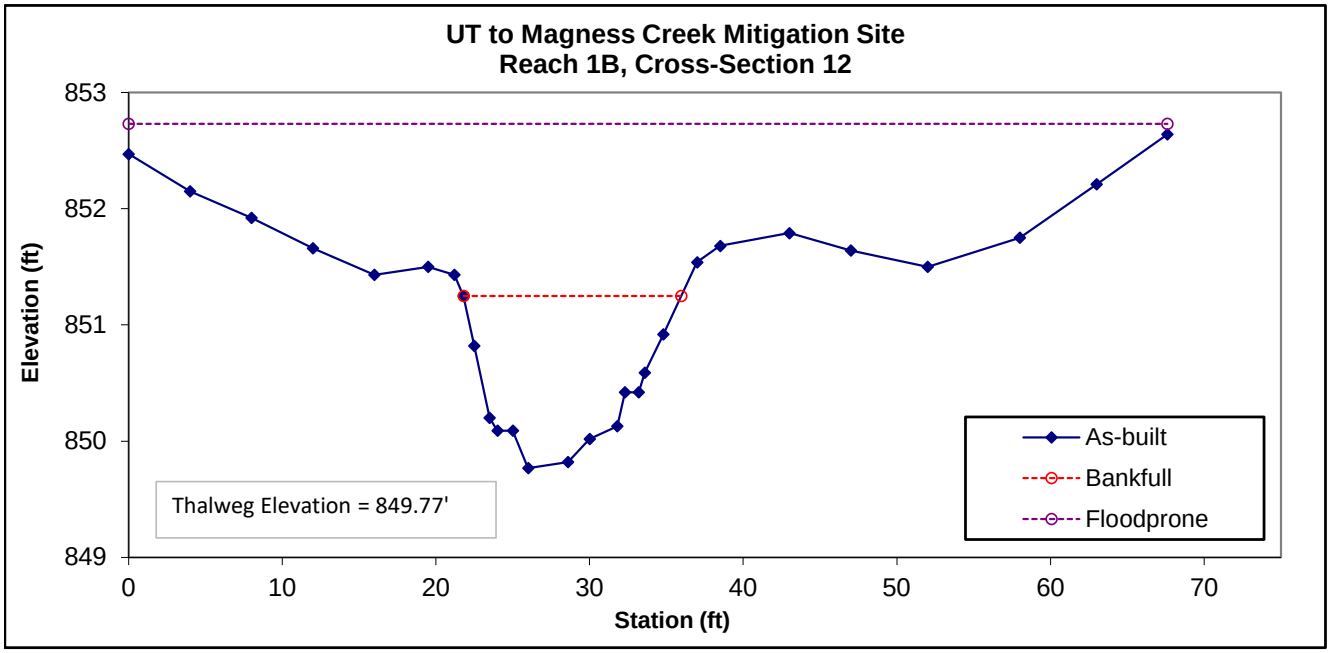
(As-built Survey Data Collected: February 14, 2023)

Restoration

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	TOB Elev
Riffle	C4	14.00	14.17	0.99	1.48	14.31	1.0	4.77	851.25	851.25



Permanent Cross-Section 13

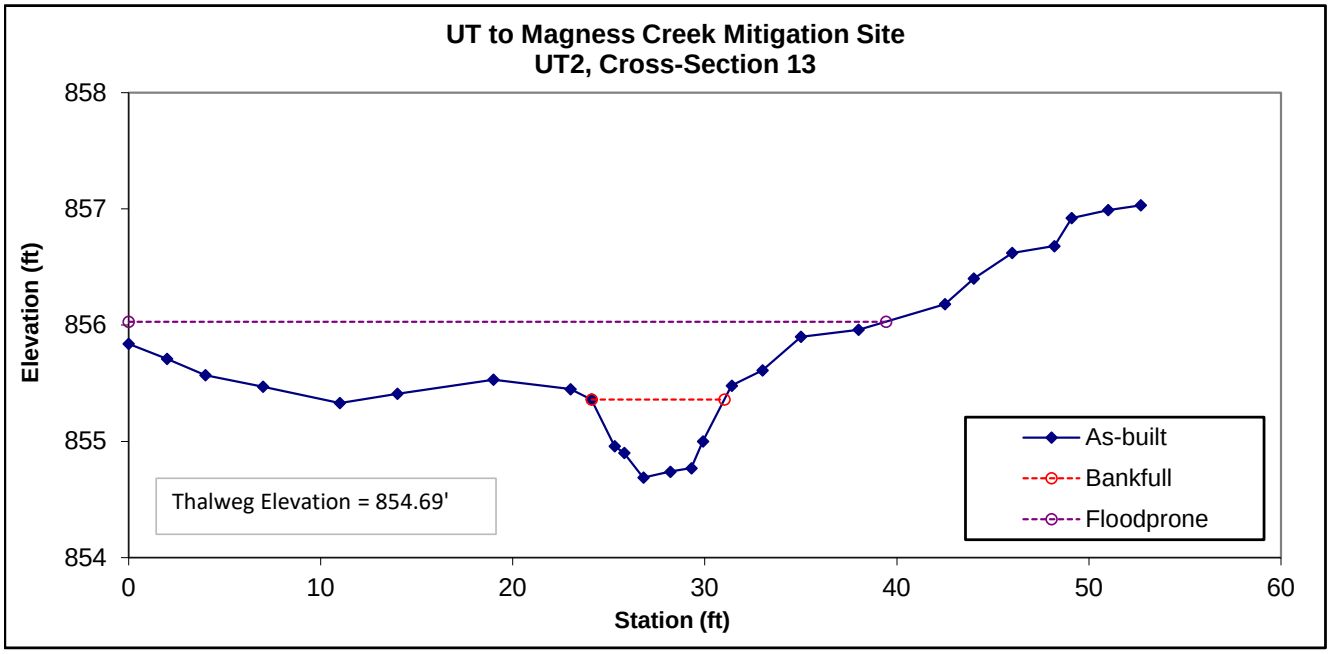
(As-built Survey Data Collected: February 14, 2023)

Enhancement I

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	TOB Elev
Riffle	B4	3.08	6.92	0.44	0.67	15.73	1.0	5.7	855.36	855.36



Permanent Cross-Section 14

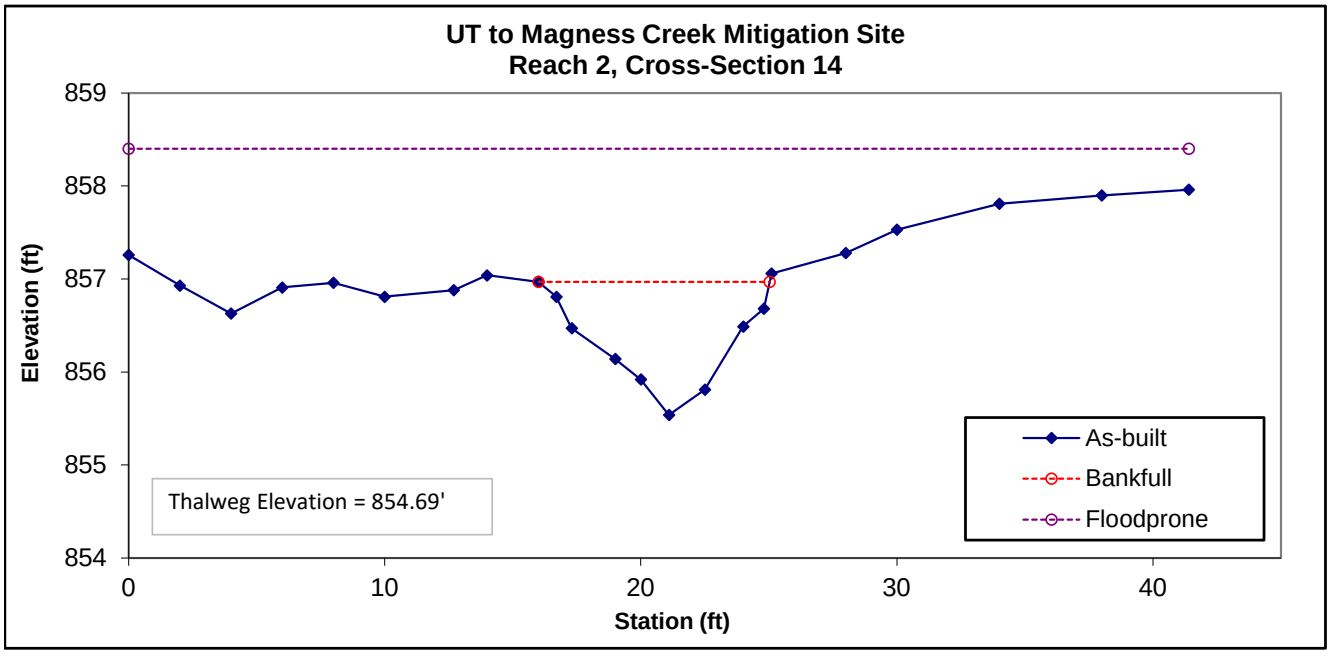
(As-built Survey Data Collected: February 14, 2023)

Enhancement I

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	TOB Elev
Pool	B4	7.07	9.03	0.78	1.43	11.58	--	--	856.97	856.97



APPENDIX E

Communication on Design Changes and Recorded Easement

Michael Baker
INTERNATIONAL

We Make a Difference

October 21, 2021

Paul Wiesner, W. Region Sup.
Division of Mitigation Services
5 Ravenscroft Drive
Asheville, NC 28801

Subject: Modification to the planned stream crossing at Station 33+52 of the UT to Magness Creek Stream Mitigation Project, Cleveland County, NC.
DEQ Contract # 7604; DMS #100081; M. Baker Project #167680

Dear Paul,

As you know we have prepared stream restoration plans for the UT to Magness Creek Stream Mitigation Project in Cleveland County. We submitted a Mitigation Plan along with design plan sheets, for DMS and IRT approval. These plans were approved by the IRT in a letter from the USACE dated July 30, 2021. While coordinating and planning construction of this site with our restoration contractor, it became apparent that we had an opportunity to use a bridge crossing at Station 33+52 rather than the culverted crossing that was proposed and approved. I have included a copy of the modified sheet 2D that includes a new detail called "Flat Bed Rail Car Bridge Application" and sheet 8 which shows the planview of the crossing modification. I have also attached a couple of photos that show a similar installation at our Russell Gap Restoration Project.

We believe that a bridged crossing of the UT to Magness Creek is a preferred stream crossing method. It is not typically utilized due to the high cost; however, in this case the ability to use an old flat bed, rail car to produce a crossing that will only need to allow livestock access across the stream, was comparable in cost to the proposed culvert crossing. A bridged crossing will allow the stream channel to be continuous, maintaining stable cross-sectional dimensions and the floodplain through the crossing. This type crossing involves less maintenance due to debris collecting at the crossing and provides no problems for aquatic species passage. For these reasons we believe this is a better plan and are glad that we could make improvements to our plans even after they were approved by DMS and the IRT. I am asking for DMS and IRT concurrence on this modification to our plans for this restoration site.

Thank you,

Micky Clemmons

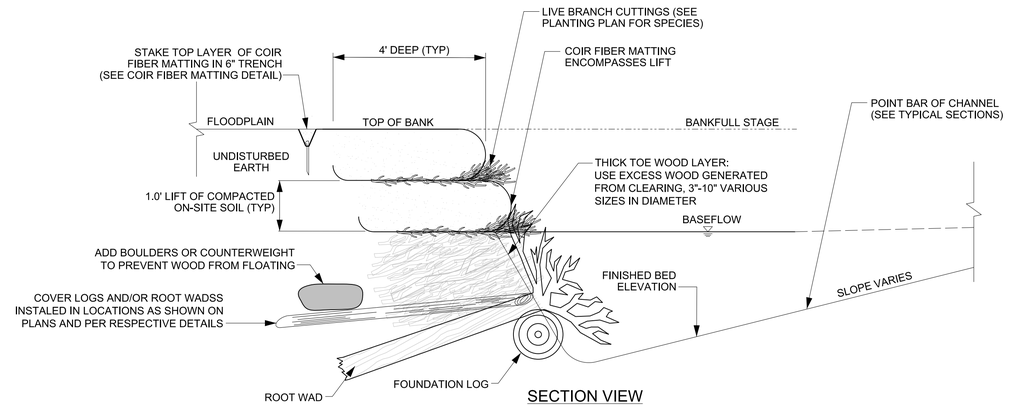
Micky Clemmons,
Project Manager
Michael Baker Eng.

Attached: Plan sheet 2D, 8 and 2 photos

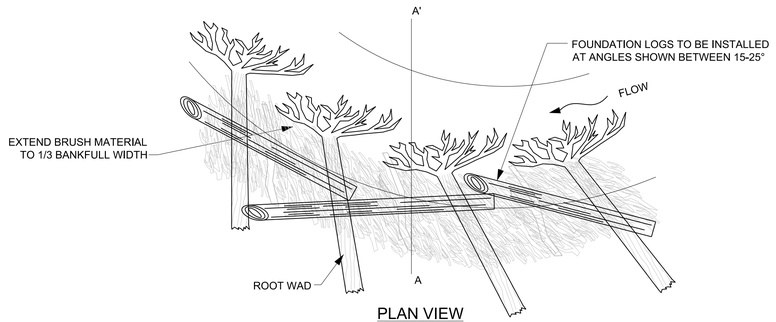
Michael Baker Engineering, Inc.
797 Haywood Road, Suite 201, Asheville NC 28806
MBAKERINTL.COM
Office: 828.412.6100 | Fax: 828.350.1409

2/26/03

GEOLIFT WITH LIVE BRUSH, LOGS AND ROOT WADS



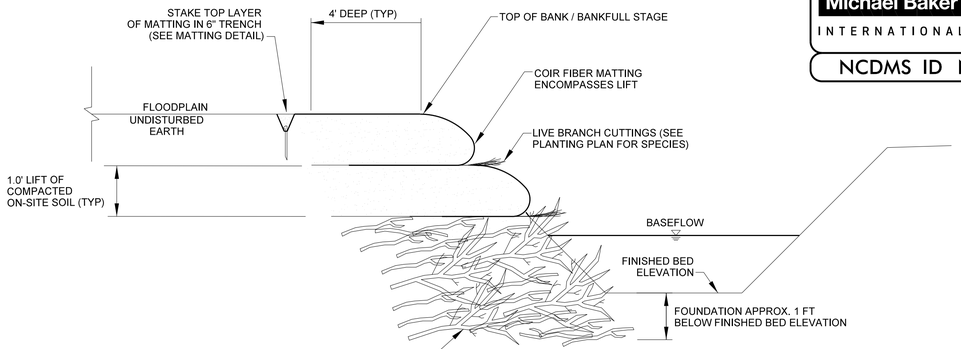
SECTION VIEW



PLAN VIEW

GEOLIFT WITH BRUSH TOE

NOTES:
1. LIVE BRANCH CUTTINGS SHALL BE THE SAME SPECIES AS THE LIVE STAKES AND SHALL BE INSTALLED DURING VEGETATION DORMANCY.
2. LIVE BRANCH CUTTINGS SHALL BE INSTALLED AT A DENSITY OF 20-30 CUTTINGS PER LINEAR FOOT AND A MAXIMUM DIAMETER OF 2.5 INCHES.
3. NUMBER OF SOIL LIFTS MAY VARY. IN GENERAL LIFTS SHALL EXTEND TO THE TOP OF BANK OR BANKFULL STAGE.



NOTES:
1. WHEN GEOLIFTS ARE BUILT ABOVE ROOT WAD CLUSTER, USE LARGE STONE BACKFILL BEHIND ROOT MASS TO BUILT FOUNDATION.
2. CLASS I STONE MAY BE USED AT THE DIRECTION OF THE ENGINEER TO BUILD THE FOUNDATION IN LIEU OF BRUSH MATERIAL.

PROJECT REFERENCE NO.	SHEET NO.
167680	2D

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN N WATKINS

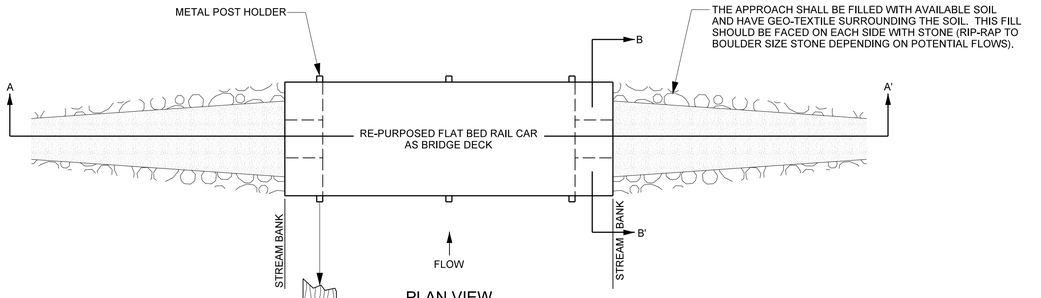
APPROVED BY:

DATE:

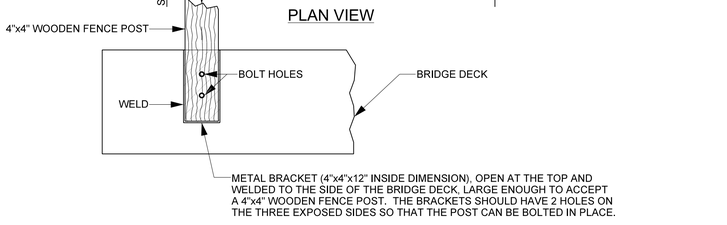
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

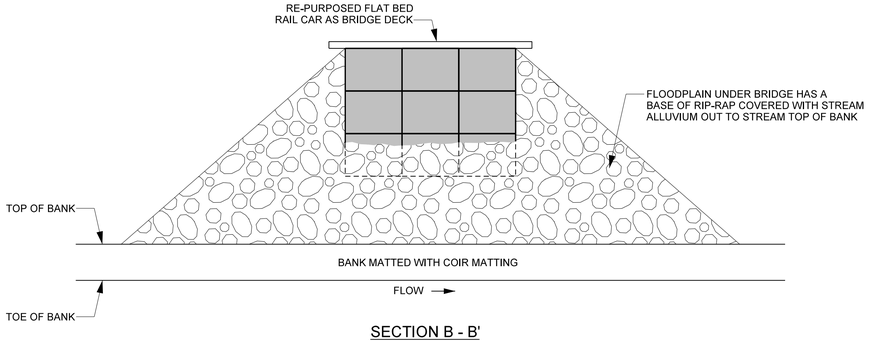
FLAT BED RAIL CAR BRIDGE APPLICATION



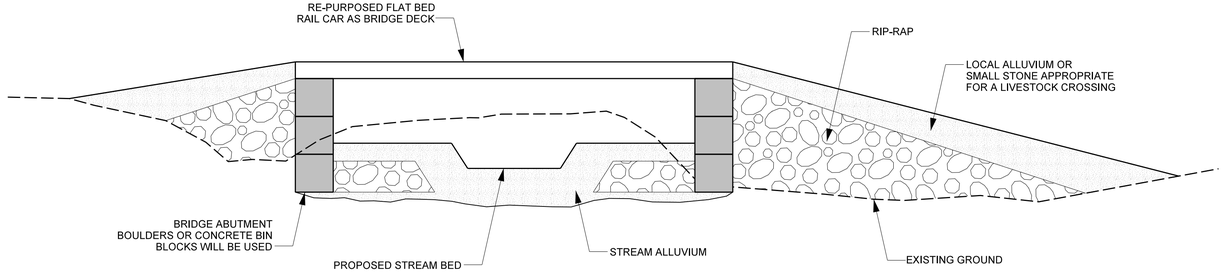
PLAN VIEW



NOTES:
1. GENERALLY, CONSTRUCTION SHOULD BE FROM THE CENTER OF THE CHANNEL OUT TO THE BRIDGE SUPPORTING STRUCTURE AND APPROACHES.
2. THE STREAM CHANNEL THROUGH THE BRIDGE OPENING SHOULD BE CONSTRUCTED AND THE BANKS MATTED BEFORE THE STONE IS PLACED FOR STABILIZING THE CROSSING OR BLOCKS/BOULDERS ARE PLACED TO SUPPORT THE BRIDGE DECK.
3. ABUTMENTS SHOULD BE CONSTRUCTED FROM THE CONCRETE BIN BLOCKS OR LARGE BOULDERS (ENGINEER APPROVED).
4. BLOCKS OR BOULDERS SHOULD EXTEND BELOW SCOUR DEPTH. FOOTERS SHALL BE AT LEAST 2' BELOW THE EXISTING BED.
5. GEO-TEXTILE FABRIC SHALL BE PLACED BETWEEN SURFACE STONE AND SOIL USED IN THE BRIDGE APPROACHES.
6. BOULDERS AND OTHER STONE SHALL BE BACKFILLED AND COMPACTED. VOID SPACE BETWEEN FABRIC AND STONE SURFACE MATERIAL SHALL BE MINIMIZED.
7. GEO-TEXTILE FABRIC SHOULD BE PLACED BEHIND BOULDERS/STONE, BURIED BELOW STONE DEPTH AND EXTENDED INTO THE BANK.
8. THE CUBE FENCE POST HOLDERS SHOULD BE ATTACHED BY WELDING PRIOR TO PLACING THE DECK IN PLACE.



SECTION B - B'



SECTION A - A'

10/21/2021
K:\Projects\167680_UT to Magness C:\Design\Plans\167680_PSH_02D.dgn
mcdaniel

Clemmons, Micky

From: Wiesner, Paul <paul.wiesner@ncdenr.gov>
Sent: Friday, October 22, 2021 5:06 PM
To: Davis, Erin B; Kim Browning; Haywood, Casey M CIV (USA); Tugwell, Todd J CIV USARMY CESAW (US)
Cc: Clemmons, Micky; McKeithan, Katie; King, Scott
Subject: EXTERNAL: Minor Construction Plan Modification Request: UT to Magness Creek Mitigation Project (DMS#100081) - (SAW-2018-01759) (DWR#20181275) - Broad 03050105_Cleveland County
Attachments: UT Magness_100081_Crossing Update Request (Baker)_Oct. 2021.pdf

Casey, Erin, Kim, and Todd;

The UT to Magness Creek project in Cleveland County is scheduled to begin construction in mid-November/ early December 2021.

DMS and Baker are requesting that the IRT review a modification that Baker is planning for the originally proposed, culverted, stream crossing on UT to Magness Creek. Baker is now planning to use a bridge crossing. The proposed bridge crossing modification is located outside of the conservation easement and will not have an effect on the project credits. Fence posts and fencing will be attached to the bridge to limit livestock access to the bridge when crossing so they will not have access the creek.

Attached is a letter from Baker making the request, a copy of the modified plan sheet pages (2E & 8) and a couple of photos of this type crossing from the Russell Gap Mitigation Project (DMS#100003).

Please review the attached information and let us know if you foresee any issue with this proposed project crossing modification. If acceptable, Baker will capture this update in the post construction MY0 Record Drawings which will be forwarded to the IRT for review once project construction and planting are complete.

Project information is as follows:
UT to Magness Creek
DMS Project # 100081
Institution Date: 6/19/2018
RFP # 16-007400 (Issued: 12/7/2017)
Broad River Basin
Cataloging Unit 03050105
Cleveland County, North Carolina
USACE Action ID: SAW-2018-01759
DWR# 20181275

IRT Approved Mitigation Plan Credits:
3,391.287 SMU (warm)
1.879 WMU (riparian)

Full Delivery Provider: Michael Baker International – Contact: Scott King, LSS, PWS, scott.king@mbakerintl.com (919) 481-5731 & Micky Clemmons, mclemmons@mbakerintl.com (828) 734-7445

NCDEQ - DMS Project Manager: Paul Wiesner, paul.wiesner@ncdenr.gov, (828) 273-1673

Michael Baker
INTERNATIONAL

We Make a Difference

To: Kim Isenhour (for IRT)

From: Micky Clemmons, Project Manager, Michael Baker Engineering Inc.

CC: Paul Wiesner, DMS; Melonie Allen, DMS; Jeff Horton, DMS

Date: December 13, 2022

Re: We are requesting that the Interagency Review Team review Michael Baker International's need for a partial release (.028 Acres) to the Deed of Conservation Easement established pursuit to the UT to Magness Creek Stream Restoration Project and shown on a Conservation Easement Plat recorded in Cleveland County, NC on 12/11/20, (Book 43, Page 180 – 182). UT to Magness Creek Mitigation Project (DMS#100081) - (SAW-2018-01759) (DWR#20181275) - Broad 03050105_Cleveland County

---

Ms. Isenhour,

I am writing to request that the Inter-Agency Review Team (IRT) review and approve a modification that became necessary during construction of the bridged crossing and fencing at our UT to Magness Creek Stream Mitigation Project. We had to make an unforeseen modification that will result in a needed partial release of a small area of the conservation easement (CE). When we were installing the crossing, and while we had the conservation easement line staked out, it became obvious that the crossing was going to open into a steep hill side that would limit its utilization and create an unsafe situation. The landowner felt he would not be able to use the crossing because the steep hill created a risk that a wheeled vehicle could turn over while trying to use it. The stream crossing does not allow turning upstream or downstream to avoid the hill because the opening, as planned, opened where it started sloping. The total straight-line width of the stream crossing at this point is approximately 184' and this was the limit of our surveyed width. Because of this we did not recognize the increase in slope at the crossing opening during planning and certainly not at the time the conservation easement area was established.

To address this concern and ensure that we did not effectively landlock a part of the Yarboro property, we had to make a modification to the CE alignment on the downstream side of the crossing, along the left bank. By moving the CE line toward the stream in this area we were able to create space for a farm vehicle to turn left out of the crossing and access a flat path that is just on the outside of the easement fence. The movement of the line and new alignment still maintains an easement width that on average is greater than 50 feet over the 135 feet of the altered CE line, but there is a small length (~60') of the altered easement line that is slightly less. On average the width along this 60' length is 48.5 feet, primarily along a meander in the stream. The average buffer width along the remaining ~75' that was altered, is 62 feet. The area that will need to be released from the conservation easement is 0.028 Acres. That is 0.2% of the total 11.66 Acre CE area that was established for this project.

Michael Baker Engineering, Inc.
797 Haywood Road, Suite 201, Asheville NC 28806
MBAKERINTL.COM
Office: 828.412.6100 | Fax: 828.350.1409

Michael Baker
INTERNATIONAL

We Make a Difference

If the partial release is approved there will be less than 1% of the stream length with buffers less than the 50-foot minimum. In the IRT approved mitigation plan, additional credit was not generated by utilizing wider buffer widths. For these reasons, we do not believe that this release should have any negative consequences on the expected credits from this project. This CE modification and the need for a release will be completely documented in the MY0 as-built report, as well as any communication with the Division of Mitigation Services and the IRT.

The modification of the line and the area that needs to be released are shown in the figures that are attached. There is a map (Figure 1) that shows the crossing opening and the CE area to be released, in grey hatching. The original CE line is shown on the outside of the area and the New Line is pointed out on the inside of the area. The fence along the downstream side of the crossing is shown as new because the length of this line changed; however, it continues to have the same bearing as the original line. There are also multiple photos (Figure 2) of the crossing, the CE fence (indicating where the CE line is), and the area that will need to be released. Individual photo captions indicate what is being shown.

Please contact me if you have any questions regarding this request or if you need any additional information. We will pursue this partial release upon the IRT's review and approval.

Thank You,

Micky Clemmons

Micky Clemmons, Project Manager
Michael Baker Engineering, Inc.

Attachments: Figure 1. Conservation Easement Area to be released
Figure 2. Photos of CE Release Area

Clemmons, Micky

From: Bowers, Todd <bowers.todd@epa.gov>
Sent: Tuesday, December 13, 2022 3:41 PM
To: Isenhour, Kimberly T CIV USARMY CESAW (USA); Tugwell, Todd J CIV USARMY CESAW (USA); Haywood, Casey M CIV USARMY CESAW (USA); Munzer, Olivia; travis.wilson@ncwildlife.org; erin.davis@ncdenr.gov
Subject: [Non-DoD Source] RE: Modification Request: UT to Magness Creek Mitigation Project (SAW-2018-01759) Cleveland County

Follow Up Flag: Follow up
Flag Status: Flagged

Kim,

I have no concerns with the conservation easement modification request at the UT to Magness Creek site. I agree that the original CE boundary would have created an unsafe or too steep approach to the crossing and that the new line provides a much better slope and angle to approach the crossing. I also concur with the request that credit adjustment is not necessary at this time.

Best Regards,
Todd B.

Todd Allen Bowers
US EPA Region 4 Oceans, Wetlands and Streams Protection Branch
61 Forsyth St. SW
Atlanta, GA 30303
919.523.2637 cell/telework
404.562.9225 office
Bowers.todd@epa.gov

"Do unto those downstream as you would have those upstream do unto you."
? Wendell Berry

-----Original Message-----
From: Isenhour, Kimberly T CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Sent: Tuesday, December 13, 2022 2:14 PM
To: Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>; Haywood, Casey M CIV USARMY CESAW (USA) <Casey.M.Haywood@usace.army.mil>; Bowers, Todd <bowers.todd@epa.gov>; Munzer, Olivia <olivia.munzer@ncwildlife.org>; travis.wilson@ncwildlife.org; erin.davis@ncdenr.gov
Subject: Modification Request: UT to Magness Creek Mitigation Project (SAW-2018-01759) Cleveland County

Team,
DMS and Baker are requesting approval of a minor conservation easement modification for the UT to Magness Creek site. If you recall, they adjusted this crossing to a bridge during construction, which the IRT agreed with, but the alignment appears to have caused some concerns for the landowner due to steep surrounding areas. Baker had to remove a small portion of the buffer (0.028 ac) to allow for a turn lane for the landowner. This will only impact 60 linear

feet of the buffer, which will have 48.5 ft buffer width. There is still an average buffer width greater than 50 ft over the 135 ' of altered easement line. Please let me know if you have any concerns with this easement modification by Dec 28, 2022. The attachment has a full explanation and photos.
Thanks
Kim

SAW-2018-01759/ (DMS#100081) (DWR#20181275) - Broad 03050105

Kim Isenhour
Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers l 919.946.5107

-----Original Message-----
From: Clemmons, Micky <Mclemmons@mbakerintl.com>
Sent: Tuesday, December 13, 2022 11:35 AM
To: Isenhour, Kimberly T CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Cc: Paul Wiesner <paul.wiesner@ncdenr.gov>; Melonie.Allen@ncdenr.gov; Jeff Horton <jeffrey.horton@ncdenr.gov>; McKeithan, Katie <Katie.McKeithan@mbakerintl.com>; Clemmons, Micky <Mclemmons@mbakerintl.com>; York, Jason <Jason.York@mbakerintl.com>
Subject: [URL Verdict: Neutral][Non-DoD Source] Request for review of partial CE release at the UT to Magness Stream Restoration Project_100081

Kim,

I have attached a letter requesting that the IRT review and approve a CE modification that we had to do at the bridged crossing of our UT to Magness Creek Stream Restoration Project. The letter explains the circumstances of this modification, the results, and how it will have a minimal impact to project crediting, while at the same time having significant results for safe utilization of the crossing. We are asking that the IRT review this information and approve of this action; we will pursue the partial release upon the IRT's review and notification of approval.

Thank you for your consideration,

Micky

Micky Clemmons | Project Manager - Ecosystem Restoration
797 Haywood Road, Suite 201 | Asheville, NC 28806 | [O] 828-412-6100 | [M] (828) 734-7445
mclemmons@mbakerintl.com |
Blockedhttps://gcc02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.mbakerintl.com%2F&data=05%7C01%7Cbowers.todd%40epa.gov%7Caa0f61d5bd024add899f08dadd3f0fd1%7C88b378b367484867acf976aacbeca6a7%7C0%7C0%7C638065560190514402%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=yob4HT8CBdghdAHX%2Boc3gS1ymA%2BWKwQ9U1fRtTnemDY%3D&reserved=0
<Blockedhttps://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.mbakerintl.com%2F&data=05%7C01%7Cbowers.todd%40epa.gov%7Caa0f61d5bd024add899f08dadd3f0fd1%7C88b378b367484867acf976aacbeca6a7%7C0%7C0%7C638065560190514402%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=FbRtIlkCNRAcrIw4Gy%2FYf%2F7gMSB3qmeIGvzUpTjUTBw%3D&reserved=0>
<Blockedhttps://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fmbakerintl.com%2Fmedia%2F5024%2Fs21_f_061907_icons.jpg&data=05%7C01%7Cbowers.todd%40epa.gov%7Caa0f61d5bd024add899f08dadd3f0fd1%7C88b378b367484867acf976aacbeca6a7%7C0%7C0%7C638065560190514402%7CUnknown%7CTWFpbGZsb3d8eyJWIjoi

Figure 1. Conservation Easement Area needing to be released.

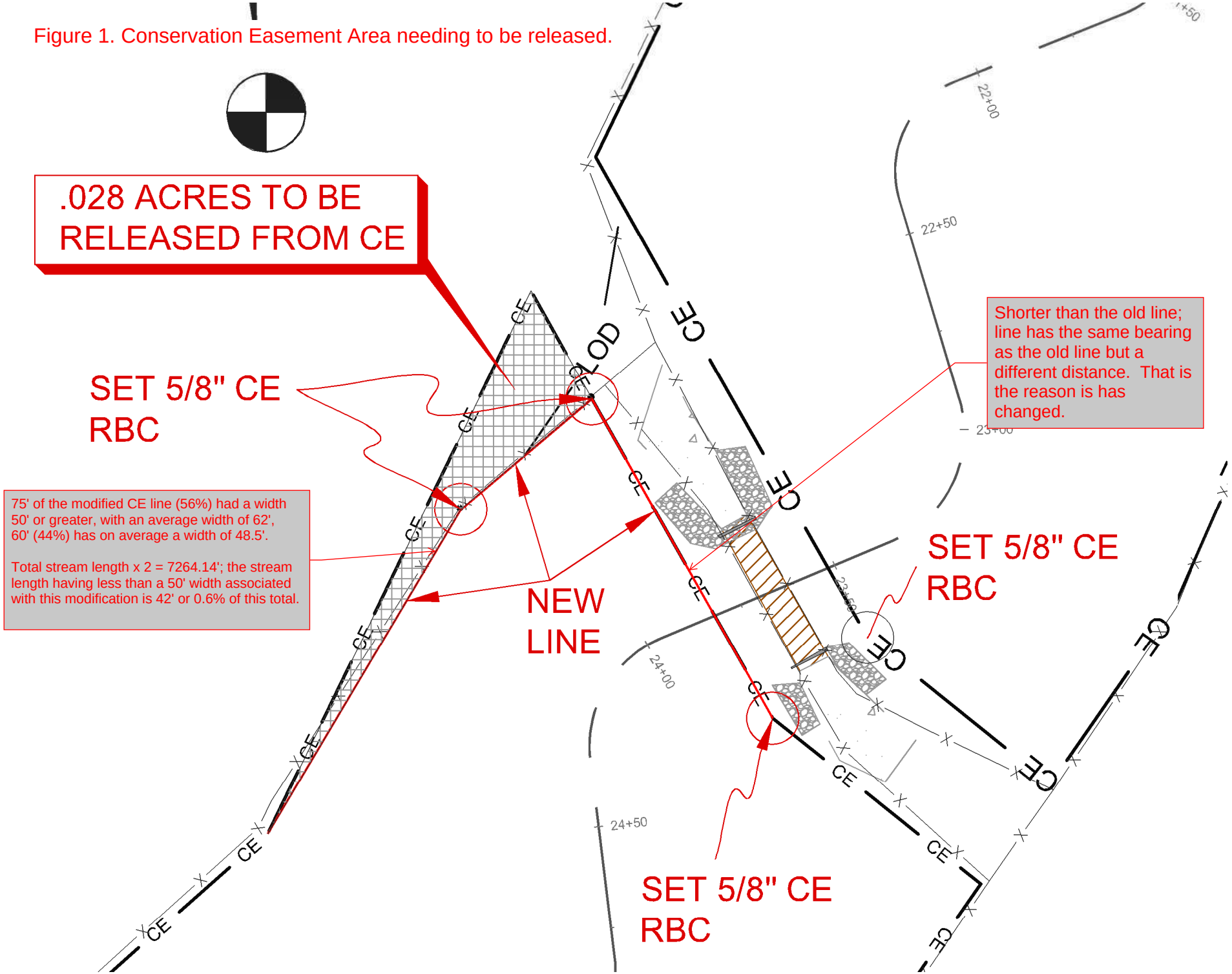


Figure 2. Photos of CE release area at UT to Magness stream crossing
NCDMS Project No. #100081

Photo from the hilltop on the right bank, above the crossing, showing the steep drop to the crossing.

Photo down stream of the crossing on the right bank showing the flatter area outside of the fence, that allows for movement by landowner along the hill slope outside of the easement.

Photo view upstream along fence to the crossing, shows flatter travel area next to fence verses steeper hill if the fence had continued along the original CE line, shown in red.

Photo view downstream along the original CE line past the crossing, shows the steep hill at the original opening had that line (shown in red) been followed.

Photo view upstream along fence to the new crossing, shows flatter area that allows access to the crossing and room for a vehicle to turn back downstream outside of the easement.

Photo view from the opening of the stream crossing. The post on the far-right edge of the photo shows where the opening on the left would have been had the left side not been moved off the hill slope.

Figure 2. Photos of CE release area at UT to Magness stream crossing
NCDMS Project No. #100081

Photo shows the bridge stream crossing and the hill slope that the crossing would have opened into had we not made an adjustment to the CE line going downstream from the crossing. The redline indicates approximately where the original CE line was established. The original line was almost 80 feet from the stream top of bank now it is approximately 50 feet from top of bank.

Photo down the hill to the stream crossing.

Photo across the bridge stream crossing toward the left bank.

Right bank within the easement, downstream of the crossing. This area narrowed from the original CE to allow access to the bridged crossing. Buffer width is still approximately 50 feet.

UT to Magness Creek restored downstream of the new bridged stream crossing.

Figure 2. Photos of CE release area at UT to Magness stream crossing
NCDMS Project No. #100081

Photo is from the end of the bridge toward the opening of the crossing on the right bank. The area on the left side of the photo shows the riparian area remaining after the CE line was moved, necessitating the release of a small area (.028 A) from the established conservation easement area.

Panoramic Photo view upstream along fence to the crossing, shows flatter travel area outside of the fence and the riparian area between the new CE alignment and the restored stream channel.

From: Rice, Blane <blane.rice@doa.nc.gov>
Sent: Tuesday, March 7, 2023 11:09 AM
To: Clemmons, Micky <Mclemmons@mbakerintl.com>
Cc: Wiesner, Paul <paul.wiesner@ncdenr.gov>; Horton, Jeffrey <jeffrey.horton@ncdenr.gov>; Allen, Melonie <melonie.allen@ncdenr.gov>; McKeithan, Katie <Katie.McKeithan@mbakerintl.com>
Subject: RE: [External] RE: EXTERNAL: 100081 UT to Magness Stream Restoration Project Partial Release

Hello Micky,
It checks out. I have received the necessary approvals and we are moving forward.
No need to worry, I got this from here and should have it done within the next week.
I hope your surgery goes well. This is one less thing to be concerned about.
Thanks,

NC DOA
Department of Administration

Blane Rice
Mitigation Services/Review Appraiser

(919) 787-5757
blane.rice@doa.nc.gov
State Property Office
116 West Jones Street
Raleigh, NC 27603

CERTIFICATE OF SURVEY AND ACCURACY:

I, HAMPTON JAMES LARK, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION FROM DEED DESCRIPTION(S) RECORDED IN DB: 1069, PG: 439, DB: 16-D, PG: 143, DB: 1105, PG: 2421, DB: 1810, PG: 2076, DB: 1828, PG: 1292 AND PB: 43, PGS: 180-182, THAT THE BOUNDARIES NOT SURVEYED ARE INDICATED AS DRAWN FROM INFORMATION AS REFERENCED; THAT THE RATIO OF PRECISION AS CALCULATED IS GREATER THAN 1:10,000; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED.

I ALSO HEREBY CERTIFY THAT THIS PLAT IS OF ONE OF THE FOLLOWING: GS 47-30 F(11) D; THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY, OR OTHER EXEMPTION OR EXCEPTION TO THE DEFINITION OF SUBDIVISION.

WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER & SEAL THIS 8TH DAY OF MARCH, 2023.

NORTH CAROLINA PROFESSIONAL SEAL L-2865 LAND SURVEYOR HAMPTON JAMES LARK

HAMPTON JAMES LARK PLS L-2865

CLEVELAND COUNTY, NORTH CAROLINA

THIS PLAT DOES NOT CREATE A SUBDIVISION OF PROPERTY IN CLEVELAND COUNTY. THE PURPOSE OF THIS SURVEY IS TO IDENTIFY THE CONSERVATION EASEMENT AREAS ONLY. NO TRANSFER OF PROPERTY IS TAKING PLACE.

I, Donna Miller, REVIEW OFFICER FOR CLEVELAND COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED, MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

Donna Miller 3-17-23
REVIEW OFFICER DATE

CERTIFICATE OF OWNERSHIP AND DEDICATION

I (WE) CERTIFY THAT I AM (WE ARE) ALL OF THE OWNER(S) OF THE PROPERTY SHOWN AND DESCRIBED HEREON, WHICH PROPERTY IS LOCATED IN THE JURISDICTION OF CLEVELAND COUNTY AND THAT I/WE HEREBY ADOPT THIS PLAN WITH MY/OUR FREE CONSENT.

Robert E. Yarboro 3/17/23
ROBERT E. YARBORO DATE

Kay Dixon Yarboro 3/17/23
KAY DIXON YARBORO DATE

Doc No: 200085088
Recorded: 03/17/2023 12:34:13 PM
Fee Amt: $21.00 Page 1 of 1
Cleveland County North Carolina
Betsy S. Harnage, Register of Deeds
BK 47 PG 99 - 99 (1)

GRID TIE INFORMATION PER PB: 43 PGS: 180-182

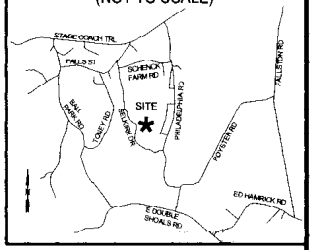
CONTROL POINT	CONTROL POINT
RBCC "KEE" (503)	RBCC "KEE" (502)
STATE PLANE COORDINATES	STATE PLANE COORDINATES
N: 612135.16'	N: 613828.20'
E: 1245413.08'	E: 1246311.21'
CF: 0.99983850	CF: 0.99983715

*CONTROL POINT #503 BEING LOCATED S 27°56'43" W A GRID DISTANCE OF 1916.51' FROM CONTROL POINT #501.

LINE	BEARING	DISTANCE
L1	N 49°44'10" E	41.73'

GRID NORTH NAD 83(2011) PER PB: 43 PGS: 180-182

VICINITY MAP
(NOT TO SCALE)



5/8" RBC (36) POB
RELEASE AREA
N: 612051.65'
E: 1246316.70'
(LOCATED S 84°43'11" E 907.47' FROM CONTROL POINT #503)

PORTION OF CONSERVATION EASEMENT AREA D TO BE RELEASED
DB: 1828 PG: 1292
PB: 43 PGS: 180-182
0.03 ACRE

CE AREA C
PB: 43 PG: 182

APPARENT GAP BETWEEN THE ROBERT & KAY YARBORO PROPERTIES & THE PROPERTY OF CEDAR LAKE FARM, LLC AS DESCRIBED IN DB: 1567 PG: 1352 (TRACT 4)

ROBERT E. YARBORO & WIFE,
KAY DIXON YARBORO
PIN: 2641-52-9135
(FORMERLY PIN: 2641-41-9802)
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

REMAINING PORTION OF CONSERVATION EASEMENT AREA D
DB: 1828 PG: 1292
PB: 43 PGS: 180-182
2.56 ACRES

CEDAR LAKE FARM, LLC
PIN: 2641-72-1337
DB: 1587 PG: 1352 (TRACT 4)

ROBERT E. YARBORO & WIFE,
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

SELKIRK DRIVE
SR 1885 (FORMERLY SR 1803)
19' ASPHALT
(SEE NOTE #7)

CE AREA E
PB: 43 PG: 182

ROY P. SHARPE & WIFE,
DRUSILLA D. SHARPE
PIN: 2641-71-0003
DB: 1632 PG: 190

ROBERT E. YARBORO & WIFE,
KAY DIXON YARBORO
PIN: 2641-60-0979
DB: 1105 PG: 2421 &
DB: 1810 PG: 2076

14" PINE STUMP (31)
TERMINUS OF 9TH CALL.
DB: 16-D PG: 143 (TRACT NO. 1)
TERMINUS OF 2ND CALL.
DB: 1810 PG: 2076

DUKE ENERGY UTILITY LINE
(SEE NOTE #6)

SFHA (ZONE AE) PER FIRM MAP NO. 3710264100J

FORMER LOCATION OF CENTERLINE OF SR 1803 PER DB: 1105 PG: 2421

5' x 7' CMP

N 48°35'47" E 374.16'
N 44°53'06" E 142.50'
N 35°45'35" E 155.51'
N 57°49'10" E 125.84'
N 15°23'50" E 86.96'
N 08°34'49" E 217.78'
S 26°21'04" W 102.23'
S 57°49'10" W 369.16' (TOTAL)
N 64°17'08" W 260.82'
S 34°51'09" W 291.03'
S 31°12'40" W 520.48'
S 31°12'40" W 134.72'
S 79°34'20" E 138.42'
S 51°24'35" E 65.33'
S 29°11'14" E 120.66' (TOTAL)
N 25°51'07" E 148.32'
N 30°32'35" E 63.22'
(357.35')
(11.81')
FLOW
BRIDGE

CONSERVATION EASEMENT CORNER-NC DMS CAP (TYPICAL)

CONSERVATION EASEMENT CORNER		
#	NORTHING	EASTING
22	611469.85	1246764.79
23	611596.24	1246955.81
24	611697.21	1245386.37
25	611944.67	1246237.03
26	612078.15	1246301.70
27	611973.16	1246301.15
28	611932.41	1246412.22
29	611883.39	1246245.81
30	611868.54	1246382.04
31	611853.32	1246312.23
35	611944.67	1246237.03
36	612051.65	1246316.70

SURVEYOR'S NOTES

1. ALL DISTANCES AND COORDINATES ARE GROUND MEASUREMENTS IN US SURVEY FEET UNLESS OTHERWISE NOTED.
2. AREAS CALCULATED BY THE COORDINATE METHOD.
3. PROPERTY SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS AND RESTRICTIONS THAT ARE RECORDED, UNRECORDED, WRITTEN AND UNWRITTEN.
4. CLEVELAND COUNTY GIS WEBSITE USED TO IDENTIFY ADJOINING PROPERTY OWNERS.
5. THE PROFESSIONAL SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS, RIGHT OF WAYS, ENCUMBRANCES, RESTRICTIVE COVENANTS, CORRECT OWNERSHIP OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE. A NC LICENSED ATTORNEY SHOULD BE CONSULTED.
6. THE TYPICAL RIGHT OF WAY WIDTH REQUIRED FOR OVERHEAD DISTRIBUTION POWER LINES OF ANY VOLTAGE IS NORMALLY A 30 FOOT WIDE CORRIDOR (15 FEET ON EACH SIDE) PER DUKE ENERGY. REFERENCE IS MADE TO DB: 6-J PG: 472 AND DB: 6-Q PG: 137, IN WHICH NO WIDTH IS GIVEN.
7. ALTHOUGH NO DEED WAS FOUND GRANTING A RIGHT OF WAY FOR SELKIRK DRIVE, SR 1885 (FORMERLY SR 1803), TO THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, MONUMENTATION WAS FOUND INDICATING THAT THE DEPARTMENT IS CLAIMING A 60 FOOT WIDE RIGHT OF WAY. IT IS ADVISABLE, THEREFORE, TO PLAN FOR NO IMPROVEMENTS CLOSER THAN THIRTY FEET FROM THE PRESENT ROAD CENTERLINE.
8. UTILITIES WERE LOCATED BASED ON VISIBLE ABOVE GROUND STRUCTURES. THEREFORE THE LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE OR MAY BE PRESENT AND NOT SHOWN HEREON. CALL 1-800-632-4949 BEFORE DIGGING.
9. FIELD WORK FOR THE CONSERVATION EASEMENT RELEASE WAS CONDUCTED ON 10/05/22.
10. BY GRAPHIC DETERMINATION, A PORTION OF THE SUBJECT PROPERTY APPEARS TO LIE WITHIN A SPECIAL FLOOD HAZARD AREA (SFHA) AS DETERMINED BY THE FIRM MAP# 3710264100J DATED 02/20/2008.
11. PROPERTY IS ZONED RESIDENTIAL (R) AS DEFINED BY THE CLEVELAND COUNTY, NC UNIFIED DEVELOPMENT CODE.

LEGEND:

●	UNMARKED POINT
⌖	NCDOT CONCRETE RIGHT OF WAY MONUMENT
Ⓐ	SET 5/8" RY 30" REBAR W/ 3-1/4" DIAMETER ALUMINUM CE CAP
○	SET 5/8" BY 30" REBAR W/ 3-1/4" 3-1/4" DIAMETER ALUMINUM CE CAP PER PB: 43 PG: 182
◎	SET 5/8" REBAR W/ "KEE" CAP PER PB: 43 PG: 182
△	MAG NAIL SET PER PB: 43 PG: 182
⊛	TREE (AS NOTED)
⊛	TREE STUMP
WM	WATER METER
⋈	WATER VALVE
●	UTILITY POLE
(#)	CONSERVATION EASEMENT CORNER NUMBER
	CONSERVATION EASEMENT (CE)
	EXISTING CE AREA TO BE RELEASED
	GAP AREA
	STREAM/WATER
	RIP RAP
	GRAVEL
	ASPHALT
CE	CONSERVATION EASEMENT
	BOUNDARY LINE
	BOUNDARY LINE NOT SURVEYED
	INTERIOR DEED LINE
	ADJOINING DEED LINES
	UTILITY RIGHT OF WAY (R/W) TYPICAL
SFHA	SPECIAL FLOOD HAZARD AREA
x x	FENCE
OW	OVERHEAD WIRE
	TIE LINE ONLY
PB	PLAT BOOK
DB	DEED BOOK
PG	PAGE
RBR	REBAR
RBC	REBAR WITH ID CAP
RBCC	REBAR WITH ID CAP SET IN CONCRETE
POB	POINT OF BEGINNING
IP	IRON PIPE
NAD	NORTH AMERICAN DATUM 1983
SPC	STATE PLANE COORDINATES
CF	COMBINED FACTOR
CMP	CORRUGATED METAL PIPE

SURVEY OF PARTIAL RELEASE OF CONSERVATION EASEMENT FOR: THE STATE OF NORTH CAROLINA, DIVISION OF MITIGATION SERVICES

"UT TO MAGNESS CREEK"

SPO FILE NO. 23-CR DMS SITE ID NO. 100081

PARCEL IDENTIFICATION #: 2641-52-9135

CURRENT OWNERS LISTED AS:
ROBERT E. YARBORO & WIFE, KAY DIXON YARBORO
SITE ADDRESS: 2810 SELKIRK DRIVE, LAWNDALE, NC 28090

DEED REFERENCES: DB: 16-D PG: 143, DB: 1069 PG: 439 & DB: 1828 PG: 1292
CLEVELAND COUNTY, NORTH CAROLINA

SURVEY BY: KP,NH DRAWN BY: NH CHECKED BY: HJL
SURVEY DATE: 03/08/23 JOB #190545-CE MOD
REVISION: DATE:

0' 60' 120' 180'
ONE INCH = SIXTY FEET

SHEET SIZE: 18X24" SCALE: 1"=60'

Kee MAPPING & SURVEYING
P.O. Box 2566
Asheville, NC 28802
(828) 575-9021
www.keemap.com
License # C-3039

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	8

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M. McKETHAN

APPROVED BY:

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

END UT to MAGNESS
REACH 1A STA. 33+51.77

INSTALL BARBED WIRE FENCE (TYP.)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

ROCK VANE (TYP.)

LOG STEP (TYP.)

33+00

ROCK DOUBLE DROP CROSS VANE (TYP.)

34+00

35+00

LOG VANE (TYP.)

BRUSH TOE WITH MATTING AND DOUBLE LIVE STAKES (TYP.)

INSTALL 16' GATE

CONSTRUCTED RIFFLE (TYP.)

GEOLIFT WITH LIVE BRUSH, LOGS AND ROOT WADS (TYP.)

36+00

37+00

38+00

MATCH LINE – SEE SHEET 11

MATCH LINE STA. 32+40.00 SEE SHEET 8

MATCH LINE STA. 38+00.00 SEE SHEET 9

NAD 83

GEOLIFT WITH BRUSH TOE (TYP.)

BEGIN UT to MAGNESS
REACH 1B STA. 33+81.98

LOG AND ROCK STEP- POOL (TYP.)

FLAT BED RAIL CAR BRIDGE APPLICATION (SEE DETAIL SHEET 2D)

INSTALL 4' GATE

INSTALL 16' GATE

INSTALL 4' GATE

INSTALL BARBED WIRE FENCE (TYP.)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

CONTROL POINT
5/8" RBCC (303)
GROUND COORDINATES
N: 611887.74'
E: 1246151.64'
ELEV: 861.98'

FILL EXISTING CHANNEL

CHANNEL PLUG

WETLAND RE-ESTABLISHMENT

WETLAND REHABILITATION

UT TO MAGNESS CREEK PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)

24 LF - 81" W x 59" H CMP ARCHED CULVERT
INV. IN 859.33'
INV. OUT 859.08'

PI=32+41.00 EL=861.28'
PI=32+50.00 EL=861.10'
PI=32+60.00 EL=860.60'
PI=32+92.00 EL=859.96'
PI=33+35.00 EL=859.85'
PI=33+87.00 EL=859.30'
PI=33+93.00 EL=858.80'
PI=34+33.67 EL=858.73'
PI=34+82.13 EL=857.80'
PI=35+11.65 EL=857.76'
PI=35+59.84 EL=857.00'
PI=35+81.06 EL=857.00'
PI=36+35.98 EL=856.23'
PI=36+81.89 EL=856.18'
PI=36+90.00 EL=855.98'
PI=36+98.00 EL=855.78'
PI=37+13.00 EL=855.58'
PI=37+21.00 EL=855.38'
PI=37+31.00 EL=856.18'
PI=37+39.00 EL=855.00'
PI=37+50.29 EL=854.80'
PI=37+85.00 EL=854.75'

PI=32+53.00 EL=859.80'
PI=32+97.00 EL=858.66'
PI=33+30.00 EL=858.66'
PI=33+89.00 EL=858.00'
PI=33+95.00 EL=857.50'
PI=34+28.67 EL=857.50'
PI=34+87.13 EL=856.50'
PI=35+06.65 EL=856.50'
PI=35+64.84 EL=855.70'
PI=35+76.06 EL=855.70'
PI=36+40.98 EL=854.93'
PI=36+76.89 EL=854.93'
PI=36+92.00 EL=854.98'
PI=37+15.00 EL=854.58'
PI=37+33.00 EL=854.18'
PI=37+55.29 EL=853.50'
PI=37+80.00 EL=853.50'

DESIGN BANKFULL

DESIGN THALWEG

EXISTING GROUND

END UT to MAGNESS
REACH 1A
STA. 33+51.77
EL = 859.56'

BEGIN UT to MAGNESS
REACH 1B
STA. 33+81.98
EL = 859.08'

870
860
850
840

33+00 34+00 35+00 36+00 37+00 38+00

10/21/2021
N:\Projects\167680\UT to Magness C-\Design\Plans\167680_PSH_08.dgn

APPENDIX F

Record Drawing Plan Sheets

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	167680	1	18

NORTH CAROLINA
DIVISION OF MITIGATION SERVICES

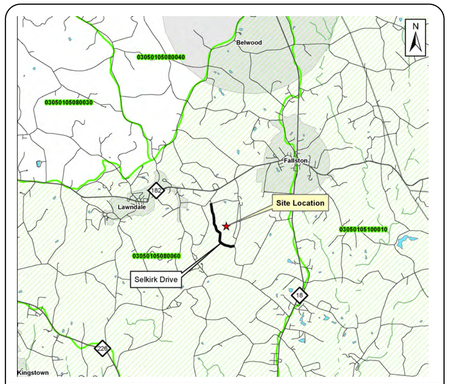
CLEVELAND COUNTY

LOCATION: FROM LAWNDALE, TAKE NC–182 1.9 MILES EAST TO FALL STREET ON LEFT, GO .28 MILES TO SELKIRK ROAD ON LEFT, TRAVEL .87 MILES SOUTH AND SITE IS EAST OF SELKIRK ROAD AT CULVERT.

TYPE OF WORK: RECORD DRAWINGS

UT to MAGNESS CREEK

PROJECT: 167680



VICINITY MAP

INDEX OF SHEETS

NCDMS ID NO. 100081

GRAPHIC SCALES

20 0 20 40
PLANS

20 0 20 40
PROFILE (HORIZONTAL)

5 0 5 10
PROFILE (VERTICAL)

AS–BUILT MITIGATION SUMMARY

STREAM: REACH	STREAM RESTORATION (Ft.)	STREAM ENHANCEMENT I (Ft.)	RATIO	CREDIT
1A	2,257.03	0	1:1	2,257.03
1B	943.72	0	1:1	943.72
UT2	0	289.34	1.5:1	192.89
		TOTAL STREAM CREDITS		3,393.64

WETLAND: APPROACH	AREA (Ac.)	RATIO	CREDIT
RESTORATION BY RE–ESTABLISHMENT	1.817	1:1	1.817
RESTORATION BY REHABILITATION	0.035	1.5:1	0.023
	TOTAL WETLAND CREDITS		1.840

PREPARED FOR THE OFFICE OF:

NCDEQ – NC DMS
217 WEST JONES STREET, SUITE 3000A
RALEIGH, NC 27603

CONTACT: PAUL WIESNER
PROJECT MANAGER

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

LETTING DATE:

KATHLEEN M. MCKEITHAN, PE
PROJECT ENGINEER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

6/12/2023

DocuSigned by:
Kathleen M McKeithan
24E8ADEA181473...
P.E.
SIGNATURE:

2/26/03

STREAM CONVENTIONAL SYMBOLS
SUPERCEDES SHEET 1-B

- ROCK J-HOOK
- GRADE CONTROL ROCK J-HOOK
- ROCK VANE
- OUTLET PROTECTION
- ROCK CROSS VANE
- ROCK DOUBLE DROP ROCK CROSS VANE
- SINGLE WING DEFLECTOR
- DOUBLE WING DEFLECTOR
- TEMPORARY SILT CHECK
- ROOT WAD
- LOG J-HOOK
- GRADE CONTROL LOG J-HOOK
- LOG VANE
- LOG STEP
- LOG CROSS VANE
- LOG AND ROCK STEP POOL
- BOULDER STEP
- CONSTRUCTED RIFFLE
- BOULDER CLUSTER
- ROCK STEP POOL
- JURISDICTIONAL WETLAND BOUNDARY (WLB)
- SAFETY FENCE (S)
- TAPE FENCE (TF)
- 100 YEAR FLOOD PLAIN (FP)
- CONSERVATION EASEMENT (CE)
- EXISTING MAJOR CONTOUR (435)
- EXISTING MINOR CONTOUR
- LIMITS OF DISTURBANCE
- PROPERTY LINE
- FOOT BRIDGE
- TEMPORARY STREAM CROSSING
- PERMANENT STREAM CROSSING
- CHANNEL PLUG
- CHANNEL FILL
- BRUSH TOE WITH MATTING AND DOUBLE LIVE STAKES
- GEOLIFT WITH BRUSH TOE
- GEOLIFT WITH LIVE BRUSH, LOGS, AND ROOT WADS
- NON-CREDITED JURISDICTIONAL WETLANDS
- WETLAND RE-ESTABLISHMENT
- WETLAND ENHANCEMENT
- TRANSPLANTED VEGETATION
- TREE REMOVAL
- TREE PROTECTION
- MONITORING WELL
- RAIN GAUGE
- CREST GAUGE
- IN STREAM FLOW GAUGE

**NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

STANDARD SPECIFICATIONS

NORTH CAROLINA
EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL
MARCH 2009 (REV 2013)

- 6.06 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE
- 6.24 RIPARIAN AREA SEEDING
- 6.60 TEMPORARY SEDIMENT TRAP
- 6.62 TEMPORARY SILT FENCE
- 6.63 TEMPORARY ROCK DAM
- 6.70 TEMPORARY STREAM CROSSING

PROJECT REFERENCE NO.	SHEET NO.
167680	1-A

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E840F4181473...

APPROVED BY:

6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL IN-STREAM STRUCTURES USING A TRACK HOE WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS (4'x3'x2'), LOGS AND ROOTWADS.
2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.
3. CONSTRUCTION IS SCHEDULED FOR THE SUMMER OF 2021.
4. CONTRACTOR SHOULD CALL NORTH CAROLINA "ONE-CALL" BEFORE EXCAVATION STARTS. (1-800-632-4949)
5. BOULDER SIZES FOR IN-STREAM STRUCTURES SHALL BE A MINIMUM OF 4'x3'x2' AND CAN BE CHANGED PER DIRECTION OF THE ENGINEER.
6. ALL ON-SITE ALLUVIUM SHALL BE HARVESTED AND STOCKPILED PRIOR TO FILLING ABANDONED CHANNELS.
7. TOPSOIL SHALL BE EXCAVATED TO A DEPTH OF 8" AND STOCKPILED SEPARATELY FROM UNDERCUT SOIL. 6" OF TOPSOIL SHALL BE PLACED ON ALL BANKFULL BENCHES AND AS DIRECTED BY THE ENGINEER.
8. ALL DISTURBED EMBANKMENTS SHALL BE MATTED WITH COIR FIBER MATTING OR AS DIRECTED BY THE ENGINEER.
9. ALL STREAM BANKS SHALL BE LIVE STAKED.
10. UNLESS THE ALIGNMENT IS BEING ALTERED, THE EXISTING CHANNEL DIMENSIONS ARE TO REMAIN UNLESS OTHERWISE NOTED.
11. CONTRACTOR WILL ENSURE THAT FENCING IS INSTALLED ON OR OUTSIDE THE CONSERVATION EASEMENT AS SHOWN ON THE PLANS BUT NO MORE THAN 1' OUTSIDE.
12. WHERE PROPOSED FENCE CROSSES EXISTING STREAMS, THE CONTRACTOR SHALL UTILIZE A SECTION OF BREAK AWAY FENCE, A FLOOD GATE, OR ELECTRIFIED CHAINS AS DIRECTED BY THE ENGINEER.

VEGETATION SELECTION

Proposed Bare-Root and Live Stake Species
UT to Magness Creek Mitigation Project - NCDMS Project No. 100081

Botanical Name	Common Name	% Planted by Species	Wetland Tolerance
All Buffer Plantings at 680 stems/acre using 8' X 8' spacing			
General Riparian Zone – Overstory/Canopy Species			
Liriodendron tulipifera	Tulip Poplar	15%	FACU
Betula nigra	River Birch	15%	FACW
Platanus occidentalis	Sycamore	15%	FACW
Quercus phellos	Willow Oak	10%	FAC
Celtis laevigata	Sugarberry	10%	FACW
Quercus nigra	Water Oak	5%	FAC
Fraxinus pennsylvanica	Green Ash	5%	FACW
Diospyros virginiana	Persimmon	5%	FAC
Ulmus americana	American Elm	5%	FACW
General Riparian Zone – Understory/Shrub Species			
Carpinus caroliniana	American Hornbeam	~~5%~~ 7.5%	FAC
Lindera benzoin	Spicebush	2.5%	FAC
Asimina triloba	Pawpaw	~~2.5%~~ 5%	FAC
~~*Magnolia tripetala*~~	~~Umbrella Tree~~	~~2.5%~~	~~FACU~~
~~*Halesia carolina*~~	~~Carolina Silverbell~~	~~2.5%~~	~~FAC~~

REDLINED SPECIES UNAVAILABLE

Wetland Zone – Overstory/Canopy Species			
Betula nigra	River Birch	15%	FACW
Platanus occidentalis	Sycamore	15%	FACW
Quercus michauxii	Swamp Chestnut Oak	15%	FACW
Quercus palustris	Pin Oak	10%	FACW
Quercus phellos	Willow Oak	10%	FAC
Nyssa sylvatica	Blackgum	5%	FAC
Acer negundo	Box Elder	5%	FAC
Fraxinus pennsylvanica	Green Ash	5%	FACW
Ulmus americana	American Elm	5%	FACW
Wetland Zone – Understory/Shrub Species			
Alnus serrulata	Tag Alder	5%	OBL
Ilex verticillata	Winterberry	2.5%	FACW
Cephalanthus occidentalis	Buttonbush	2.5%	OBL
Cornus amomum	Silky Dogwood	2.5%	FACW
Aronia arbutifolia	Red Chokeberry	2.5%	FACW
Streambank Live Stake Plantings			
Salix sericea	Silky Willow	25%	OBL
Sambucus canadensis	Elderberry	20%	FACW
Cephalanthus occidentalis	Buttonbush	10%	OBL
Cornus amomum	Silky Dogwood	20%	FACW
Salix nigra	Black Willow	25%	OBL

Proposed Permanent Seed Mixture
UT to Magness Creek Mitigation Project – NCDMS Project No. 100081

Botanical Name	Common Name	% Planted by Species	Density (lbs/ac)	Wetland Tolerance
Agrostis perennans	Autumn Bentgrass	10%	1.5	FACW
Elymus virginicus	Virginia Wildrye	15%	2.25	FACW
Panicum virgatum	Switchgrass	15%	2.25	FAC
Tripsacum dactyloides	Eastern Gamma Grass	5%	0.75	FACW
Polygonum pennsylvanicum	Pennsylvania Smartweed	5%	0.75	FACW
Schizachyrium scoparium	Little Blue Stem	5%	0.75	FACU
Juncus effusus	Soft Rush	5%	0.75	FACW
Bidens frondosa (or aristosa)	Beggars Tick	5%	0.75	FACW
Coreopsis lanceolata	Lance-Leaved Tick Seed	10%	1.5	FACU
Dichanthelium clandestinum	Tioga Deer Tongue	10%	1.5	FAC
Andropogon gerardii	Big Blue Stem	5%	0.75	FAC
Sorghastrum nutans	Indian Grass	5%	0.75	FACU
Monarda punctata	Spotted Beebalm	5%	0.75	FACU
	Total	**100%**	**15**	

Note: Final species selection may change due to refinement of site conditions or to availability at the time of planting. If species substitution is required, the planting Contractor will submit a revised planting list to Baker for approval prior to the procurement of plant stock.

6/6/2023
K:\Projects\167680_UT to Magness C:\Design\As-Built\Plans\167680_ASB-PSH_01A.dgn
mgre

2/26/03

PROJECT REFERENCE NO.	SHEET NO.
167680	1-B
NCDMS ID NO. 100081	

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M McKEITHAN

DocuSigned by: Kathleen M McKeithan 247E840F4484473...

APPROVED BY:

6/12/2023

DATE:

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite Marker — RW
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

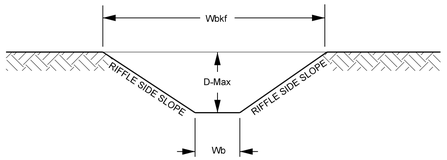
- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

4/21/2023
M:\Projects\167680.UT to Magness C:\Design\As-Built\Plans\167680.ASB-PSH_01B.dgn
mcrabtree

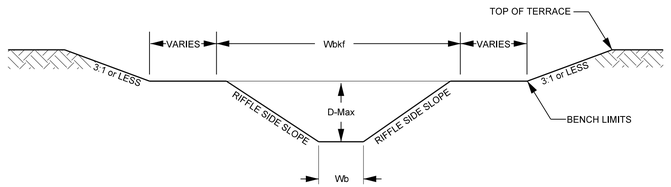
revised 02/02/00

2/26/03

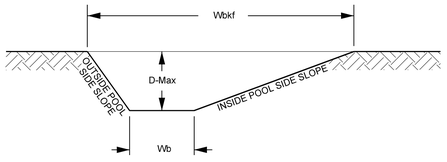
TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS



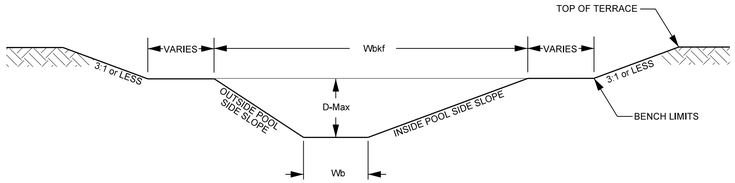
RIFFLE



RIFFLE WITH BANKFULL BENCH



POOL



POOL WITH BANKFULL BENCH

	UT to MAGNESS REACH 1A 11+02.17 to 33+53.65		UT to MAGNESS REACH 1B 33+79.06 to 43+06.86		UT2	
	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL
WIDTH OF BANKFULL (Wbkf)	12.5	18.0	14.5	20.0	6.3	8.0
AVERAGE DEPTH	0.9	1.4	1.0	1.8	0.5	0.9
MAXIMUM DETPH (Dmax)	1.2	2.5	1.3	3.0	0.6	1.3
WIDTH TO DEPTH RATIO (bkf W/D)	14.2	13.1	15.2	11.3	12.5	9.1
BANKFULL AREA (Abkf)	11.0	24.7	13.8	35.3	2.7	7.0
BOTTOM WIDTH (Wb)	8.3	1.8	10.0	3.5	4.2	2.8
RIFFLE SIDE SLOPE (X:1)	2.0	N/A	2.0	N/A	2.0	N/A
INSIDE POOL SIDE SLOPE	N/A	4.0	N/A	4.0	N/A	2.0
OUTSIDE POOL SIDE SLOPE	N/A	1.5	N/A	1.5	N/A	2.0

PROJECT REFERENCE NO.	SHEET NO.
167680	2

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E84DF4181473...

APPROVED BY:

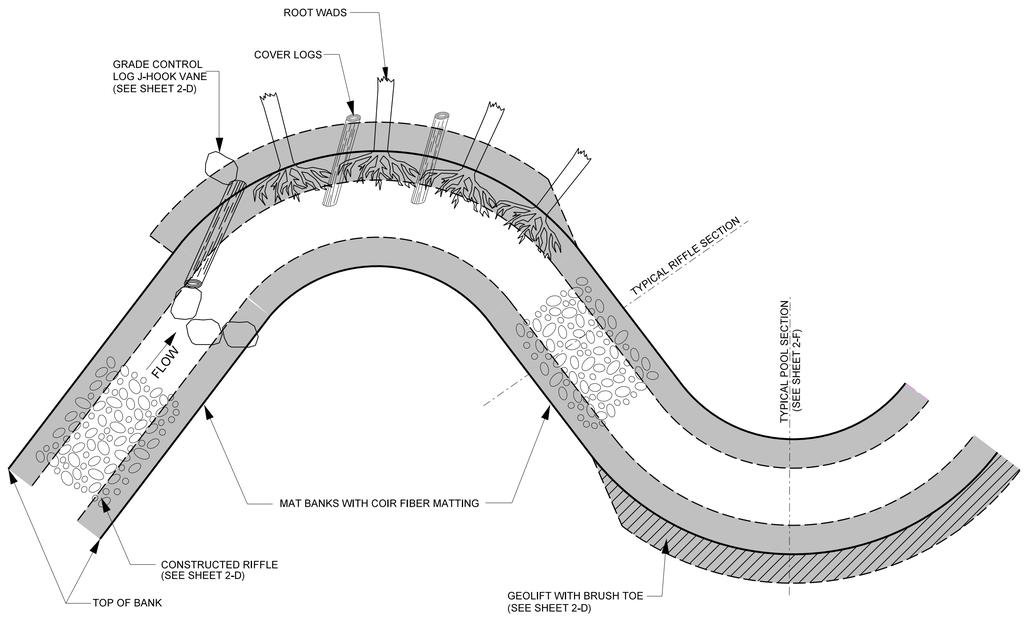
6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

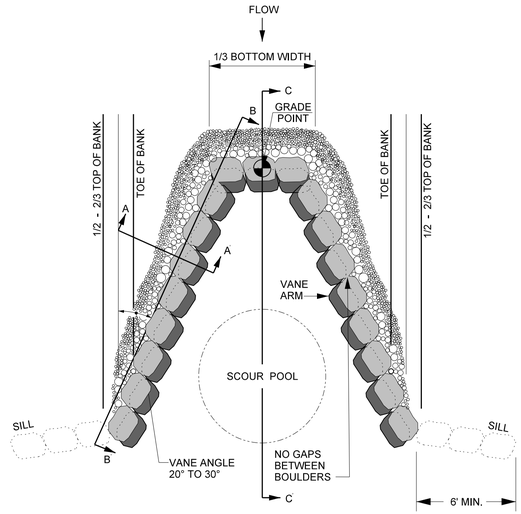
TYPICAL STRUCTURE PLACEMENT



STRUCTURE NOTES:

1. GENERALLY CONSTRUCTED RIFFLES, ROOT WADS, LOG VANES AND COIR FIBER MATTING WILL BE INSTALLED IN THE LOCATION AND SEQUENCE AS SHOWN.
2. ANY CHANGES TO NUMBER OR LOCATION OF STRUCTURES DURING CONSTRUCTION MUST BE APPROVED BY THE DESIGN ENGINEER.
3. COIR FIBER MATTING TO BE INSTALLED ON ALL RESTORED STREAMBANKS, FLOODPLAIN BENCHING, AND TERRACE SLOPES AS DESCRIBED IN THE TECHNICAL SPECIFICATIONS.
4. ROOTWADS MAY BE REPLACED WITH GEOLIFT.

ROCK CROSS VANE

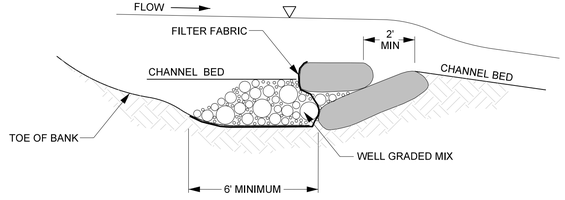


PLAN VIEW

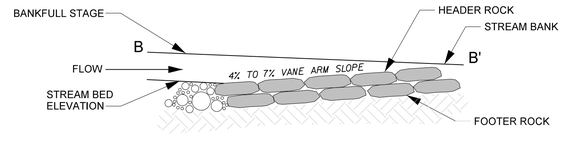
REACH	VANE LENGTH	BOULDER SIZE
REACH 1A	11.3'	2'x3'x4'
REACH 1B	14.0'	2'x3'x4'
UT2	N/A	N/A

NOTES FOR ALL VANE STRUCTURES:

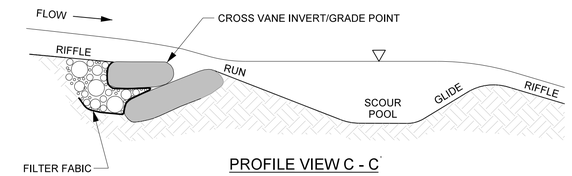
1. INSTALL FILTER FABRIC FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
2. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK.
3. CONSTRUCT ANGLE AND SLOPE SPECIFICATIONS AS SHOWN.
4. BACKFILL VANE ARMS AND INVERT WITH A WELL GRADED MIX OF CLASS B, A, AND #57 STONE.
5. ON-SITE ALLUVIUM SHALL BE INCORPORATED INTO THE STONE BACKFILL WHERE AVAILABLE.
6. BOULDER SILL MUST BE A MINIMUM OF 6'.
7. BOULDERS FOR REACH 1A AND REACH 1B MUST BE AT LEAST 2'x3'x4'; WHILE BOULDERS FOR UT2 SHOULD BE 1'x2'x3'.



SECTION A - A'



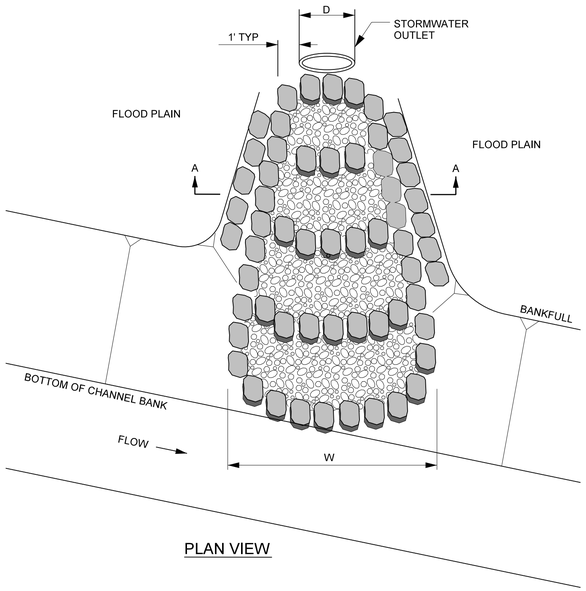
PROFILE VIEW B - B'
VANE ARM



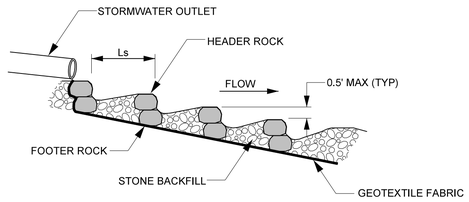
PROFILE VIEW C - C'

2/26/03

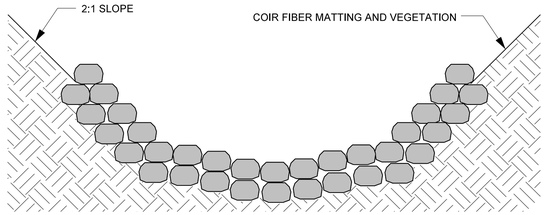
OUTLET PROTECTION



PLAN VIEW

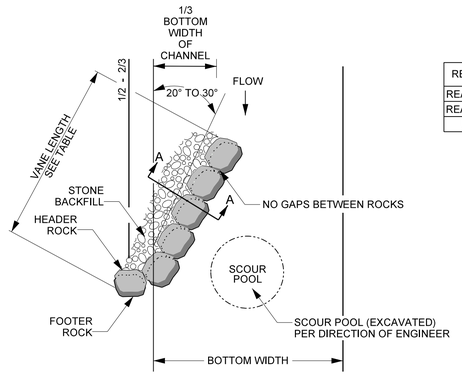


PROFILE VIEW



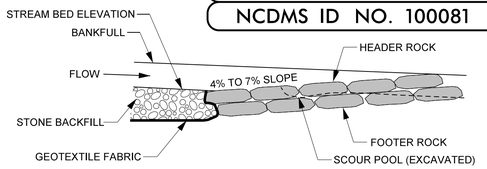
CROSS SECTION A - A

ROCK VANE

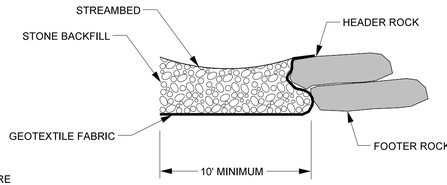


PLAN VIEW

REACH	VANE LENGTH	BOULDER SIZE
REACH 1A	11.3'	2'x3'x4'
REACH 1B	14.0'	2'x3'x4'
UT2	N/A	N/A



PROFILE VIEW



SECTION A - A

NOTES FOR ALL VANE STRUCTURES:

1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT 2/3 TO 3/4 TIMES THE BANKFULL STAGE.
9. ALL REACHES, BOULDER SIZE 1' x 2' x 3' TO 2' x 2' x 4'.

PROJECT REFERENCE NO.	SHEET NO.
167680	2A

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E840DF4181473...

APPROVED BY:

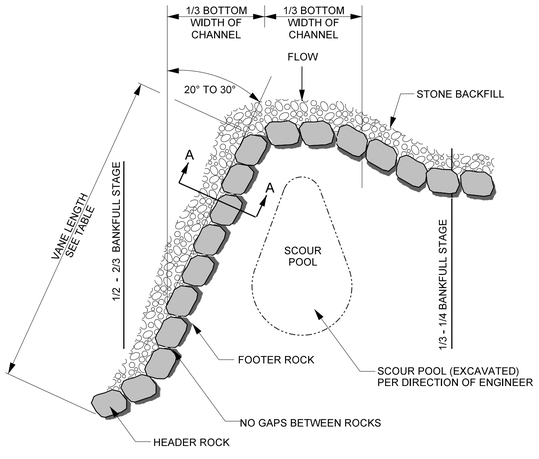
6/12/2023

DATE:

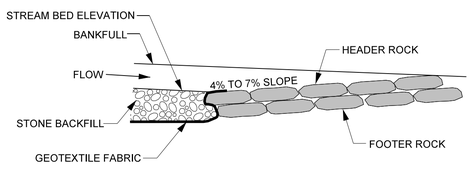
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

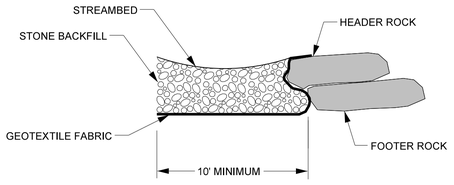
GRADE CONTROL ROCK J-HOOK VANE



PLAN VIEW



PROFILE VIEW



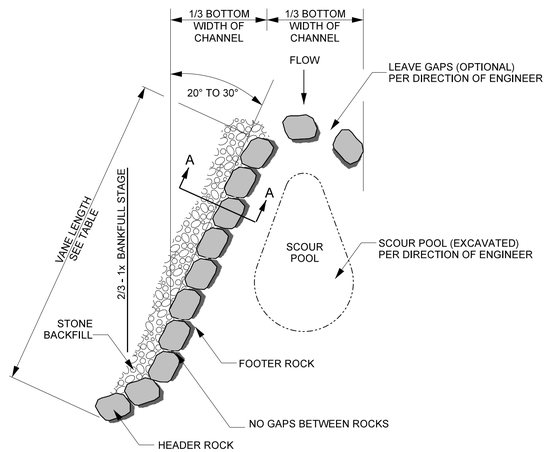
SECTION A - A

NOTES FOR ALL VANE STRUCTURES:

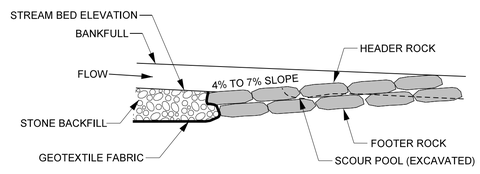
1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT THE BANKFULL ELEVATION.
9. REACH 1A AND 1B, BOULDER SIZE 2' x 3' x 4'.

REACH	VANE LENGTH	BOULDER SIZE
REACH 1A	11.3'	2'x3'x4'
REACH 1B	14.0'	2'x3'x4'
UT2	N/A	N/A

ROCK J-HOOK VANE

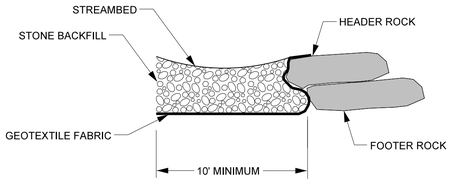


PLAN VIEW



PROFILE VIEW

REACH	VANE LENGTH	BOULDER SIZE
REACH 1A	11.3'	2'x3'x4'
REACH 1B	14.0'	2'x3'x4'
UT2	N/A	N/A



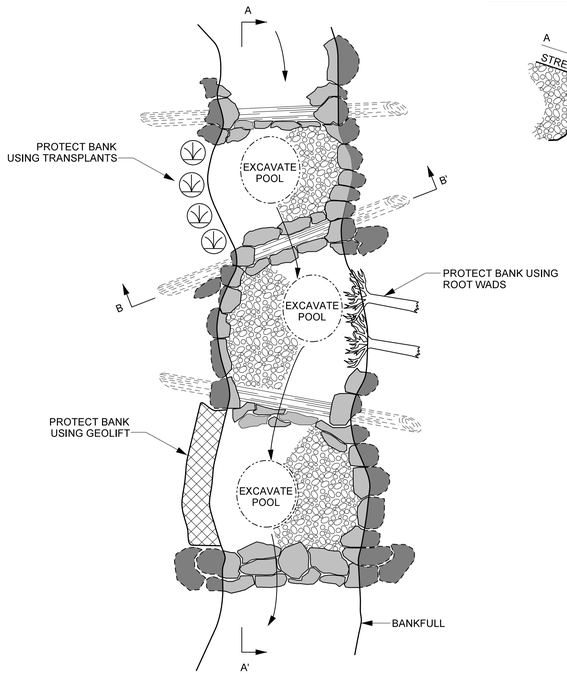
SECTION A - A

NOTES FOR ALL VANE STRUCTURES:

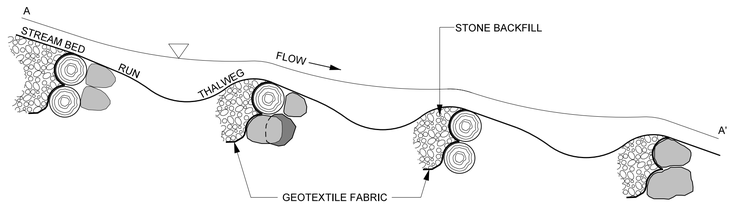
1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT THE BANKFULL ELEVATION.
9. REACH 1A AND 1B, BOULDER SIZE 2' x 3' x 4'.

2/26/03

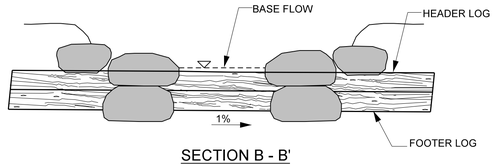
LOG AND ROCK STEP / POOL



PLAN VIEW



SECTION A - A'



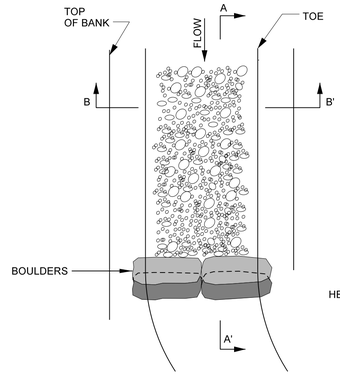
SECTION B - B'

REACH	BOULDER SIZE
REACH 1A	2'x3'x4'
REACH 1B	2'x3'x4'
UT2	1'x2'x3'

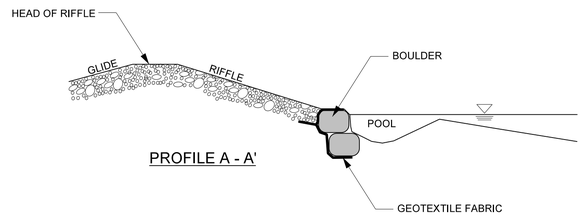
NOTES:

1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
2. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
3. GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
4. BOULDERS SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
5. TRANSPLANTS CAN BE USED INSTEAD OF BOUDERS, PER DIRECTION OF ENGINEER.
6. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

BOULDER STEP



PLAN VIEW



PROFILE A - A'

NOTES:

1. FOOTERS SHALL BE INSTALLED SUCH THAT 1/4 TO 1/3 OF THE LENGTH IS DOWNSTREAM OF THE HEADER.
2. SOIL SHALL BE WELL COMPACTED AROUND BURIED PORTION OF FOOTERS WITH THE BUCKET OF EXCAVATOR.
3. INSTALL NON-WOVEN FILTER FABRIC UNDERNEATH FOOTER BOULDERS.
4. UNDERCUT THE RIFFLE ELEVATION 12 INCHES TO ALLOW FOR A LAYER OF STONE.
5. INSTALL EROSION CONTROL MATTING ALONG COMPLETED BANKS SUCH THAT THE EROSION CONTROL MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
6. FILL TRENCH WITH GRADED MIX OF CLASS A, CLASS B, AND #57 STONE TO THE BED ELEVATION OF THE CHANNEL.
7. BOULDER STEPS MUST BE EXTENDED TO A MINIMUM OF 2' INTO THE BANK. USE SILL BOULDERS IF NECESSARY.
8. THALWEG AND STEP INVERT WILL BE CONCAVE AND SHAPED PER DIRECTION OF THE DESIGNER.

REACH	BOULDER SIZE
REACH 1A	2'x3'x4'
REACH 1B	2'x3'x4'
UT2	1'x2'x3'

PROJECT REFERENCE NO.	SHEET NO.
167680	2B

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E840F4181473...

APPROVED BY:

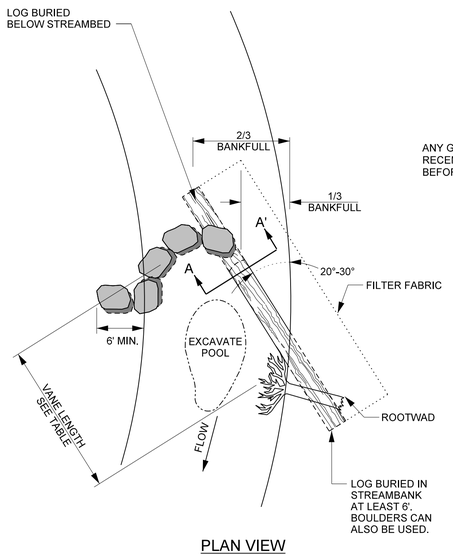
6/12/2023

DATE:

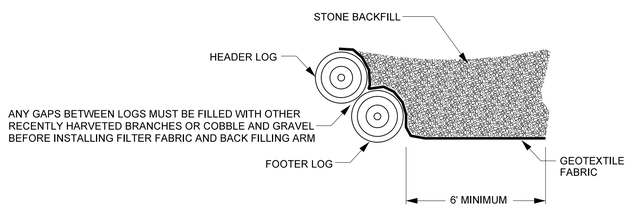
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

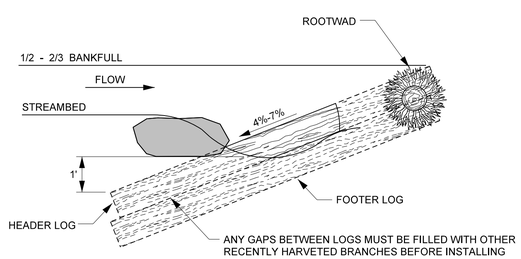
GRADE CONTROL LOG J-HOOK VANE



PLAN VIEW



SECTION A - A'



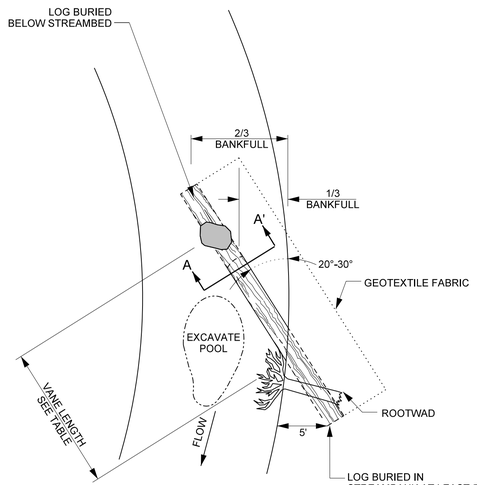
PROFILE VIEW

NOTES:

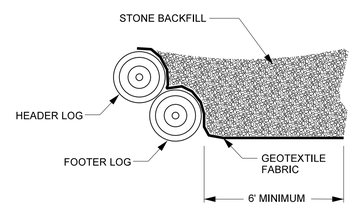
1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, RECENTLY HARVESTED, AND FOOTERED.
2. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
4. ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK, SEE ROOTWAD DETAIL.
5. BOULDERS SHOULD BE PLACED ON TOP OF HEADER LOG FOR ACHORING.
6. HEADER BOULDERS TO BE PLACED 0.5 TO 0.75 FEET APART.
7. FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
8. TRANSPLANTS OR BOULDERS CAN BE USED INSTEAD OF ROOWADS, PER DIRECTION OF ENGINEER.
9. BOULDER SILL MUST BE A MINIMUM OF 6'.
10. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

REACH	VANE LENGTH	BOULDER SIZE
REACH 1A	11.3'	2'x3'x4'
REACH 1B	14.0'	2'x3'x4'
UT2	N/A	N/A

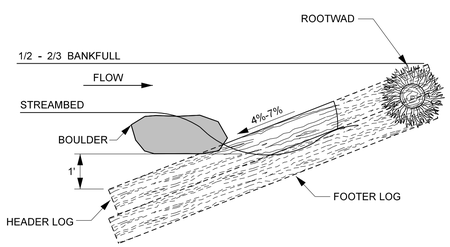
LOG VANE



PLAN VIEW



SECTION A - A'



PROFILE VIEW

NOTES:

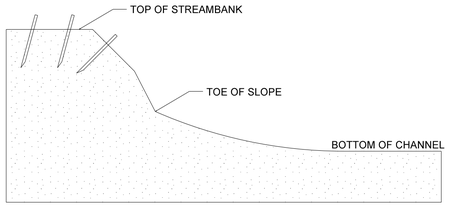
1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
4. ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK, SEE ROOTWAD DETAIL.
5. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
6. GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
7. TRANSPLANTS CAN BE USED INSTEAD OF ROOTWADS, PER DIRECTION OF ENGINEER.
8. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION OF THE TOP OF THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE.

REACH	VANE LENGTH	BOULDER SIZE
REACH 1A	11.3'	2'x3'x4'
REACH 1B	14.0'	2'x3'x4'
UT2	N/A	N/A

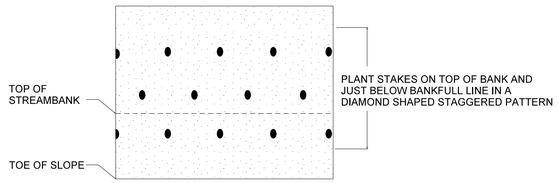
4/21/2023
N:\Projects\167680_UT to Magness C:\Design\As-Built\Plans\167680_ASB-PSH_02B.dgn
MP_DEFAULT

2/26/03

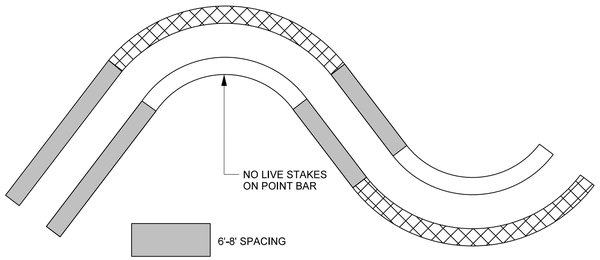
LIVE STAKING



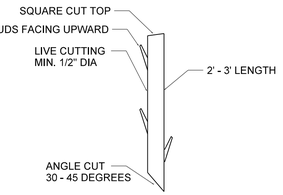
CROSS SECTION VIEW



PLAN VIEW



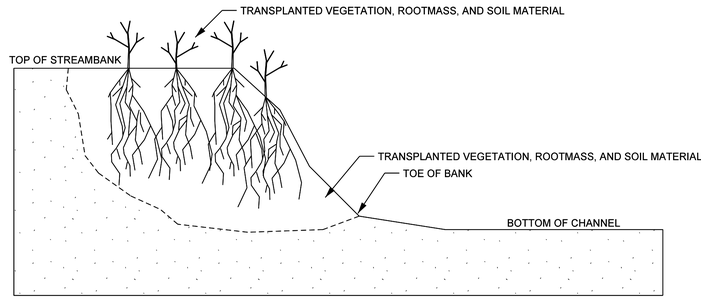
PLAN VIEW



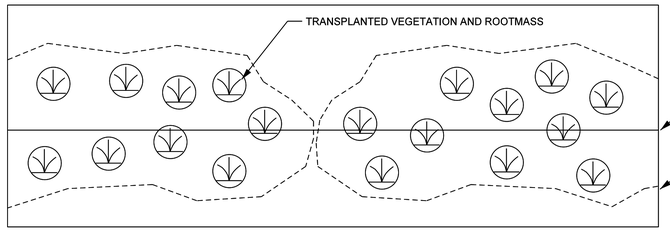
LIVE STAKE DETAIL

NOTES:
1. STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
2. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
3. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
4. STAKES SHOULD BE INSTALLED PERPENDICULAR TO BANK.
5. STAKES SHOULD BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
6. STAKES SHOULD BE INSTALLED LEAVING 1/5 OF STAKE ABOVE GROUND.
7. DOUBLE THE LIVE STAKES IN MEANDER BENDS THAT HAVE A BRUSH TOE AND BANKS ARE MATTED.

TRANSPLANTED VEGETATION



CROSS SECTION VIEW



PLAN VIEW

NOTES:
1. EXCAVATE A HOLE IN THE BANK TO BE STABILIZED THAT WILL ACCOMMODATE THE SIZE OF TRANSPLANT TO BE PLACED. BEGIN EXCAVATION AT THE TOE OF THE BANK.
2. EXCAVATE TRANSPLANT USING A FRONT END LOADER. EXCAVATE THE ENTIRE ROOT MASS AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE. IF ENTIRE ROOT MASS CAN NOT BE EXCAVATE IN ONE BUCKET LOAD, THE TRANSPLANT IS TOO LARGE AND ANOTHER SHOULD BE SELECTED.
3. PLACE TRANSPLANT IN THE BANK TO BE STABILIZED SO THAT VEGETATION IS ORIENTATED VERTICALLY.
4. FILL IN ANY HOLES AROUND THE TRANSPLANT AND COMPACT.
5. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
6. PLACE MULTIPLE TRANSPLANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.

PROJECT REFERENCE NO.	SHEET NO.
167680	2C

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E84DFE4161473

APPROVED BY:

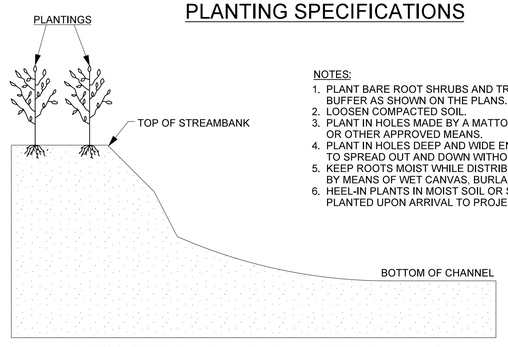
6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

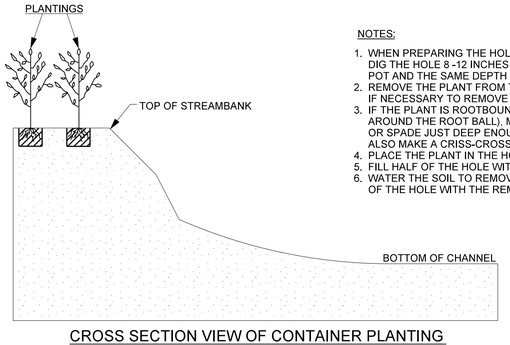
NCDMS ID NO. 100081

PLANTING SPECIFICATIONS



CROSS SECTION VIEW OF BARE ROOT PLANTING

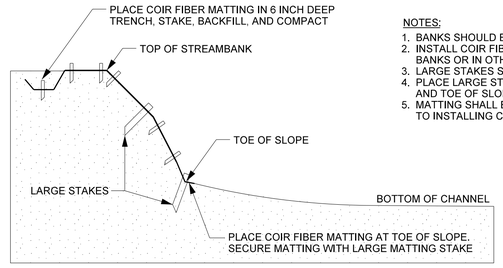
NOTES:
1. PLANT BARE ROOT SHRUBS AND TREES TO THE WIDTH OF THE BUFFER AS SHOWN ON THE PLANS.
2. LOOSEN COMPACTED SOIL.
3. PLANT IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER APPROVED MEANS.
4. PLANT IN HOLES DEEP AND WIDE ENOUGH TO ALLOW THE ROOTS TO SPREAD OUT AND DOWN WITHOUT J-ROOTING.
5. KEEP ROOTS MOIST WHILE DISTRIBUTING OR WAITING TO PLANT BY MEANS OF WET CANVAS, BURLAP, OR STRAW.
6. HEEL-IN PLANTS IN MOIST SOIL OR SAWDUST IF NOT PROMPTLY PLANTED UPON ARRIVAL TO PROJECT SITE.



CROSS SECTION VIEW OF CONTAINER PLANTING

NOTES:
1. WHEN PREPARING THE HOLE FOR A POTTED PLANT OR SHRUB DIG THE HOLE 8 -12 INCHES LARGER THAN THE DIAMETER OF THE POT AND THE SAME DEPTH AS THE POT.
2. REMOVE THE PLANT FROM THE POT. LAY THE PLANT ON ITS SIDE IF NECESSARY TO REMOVE THE POT.
3. IF THE PLANT IS ROOTBOUND (ROOTS GROWING IN A SPIRAL AROUND THE ROOT BALL), MAKE VERTICAL CUTS WITH A KNIFE OR SPADE JUST DEEP ENOUGH TO CUT THE NET OF ROOTS. ALSO MAKE A CRISS-CROSS CUT ACROSS THE BOTTOM OF THE BALL.
4. PLACE THE PLANT IN THE HOLE.
5. FILL HALF OF THE HOLE WITH SOIL (SAME SOIL REMOVED FOR BACKFILL).
6. WATER THE SOIL TO REMOVE AIR POCKETS AND FILL THE REST OF THE HOLE WITH THE REMAINING SOIL.

COIR FIBER MATTING

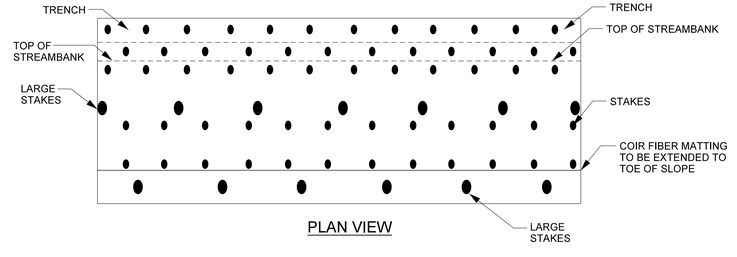


CROSS SECTION VIEW

NOTES:
1. BANKS SHOULD BE SEEDED PRIOR TO PLACEMENT OF MATTING.
2. INSTALL COIR FIBER MATTING PER SPECIFICATIONS ALONG STREAM BANKS OR IN OTHERS LOCATIONS SPECIFIED BY ENGINEER.
3. LARGE STAKES SHOULD NOT BE SPACED FURTHER THAN 36" APART.
4. PLACE LARGE STAKES ALONG ALL SEAMS, IN THE CENTER OF BANK, AND TOE OF SLOPE.
5. MATTING SHALL BE PLACED ON BANKS, STAKED, AND TRENCHED PRIOR TO INSTALLING CONSTRUCTED RIFFLE MATERIAL.

TYPICAL LARGE MATTING STAKE

LEG LENGTH	17.00 IN (43.18 CM) (TAPERED TO POINT)
WIDTH	1.5 IN (3.81 CM)
THICKNESS	1.5 IN (3.81 CM)



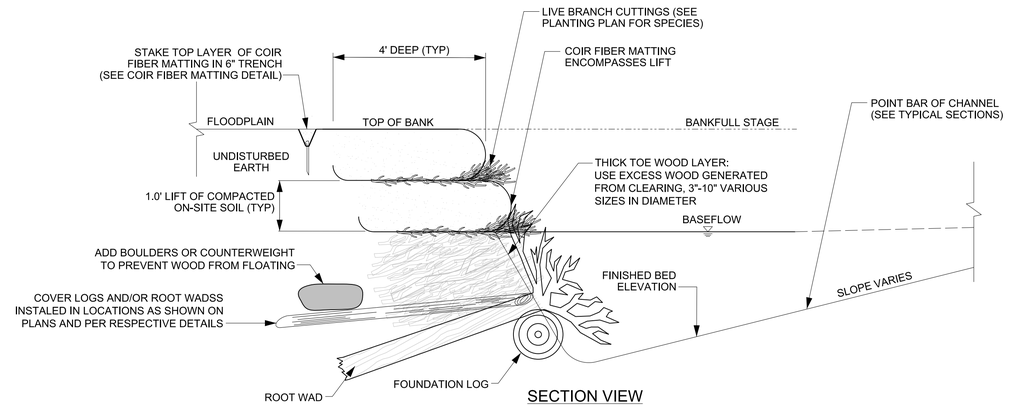
PLAN VIEW

TYPICAL SMALL MATTING STAKE

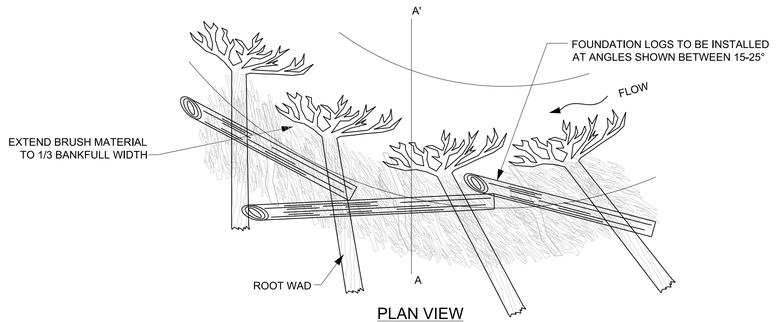
LEG LENGTH	11.00 IN (27.94 CM)
HEAD WIDTH	1.25 IN (3.18 CM)
HEAD THICKNESS	0.40 IN (1.02 CM)
LEG WIDTH	0.60 IN (1.52 CM) (TAPERED TO POINT)
LEG THICKNESS	0.40 IN (1.02 CM)
TOTAL LENGTH	12.00 IN (30.48 CM)

2/26/03

GEOLIFT WITH LIVE BRUSH, LOGS AND ROOT WADS



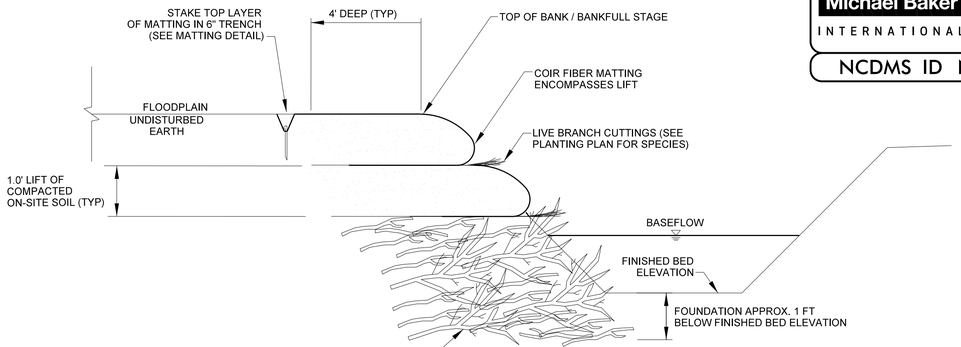
SECTION VIEW



PLAN VIEW

GEOLIFT WITH BRUSH TOE

NOTES:
1. LIVE BRANCH CUTTINGS SHALL BE THE SAME SPECIES AS THE LIVE STAKES AND SHALL BE INSTALLED DURING VEGETATION DORMANCY.
2. LIVE BRANCH CUTTINGS SHALL BE INSTALLED AT A DENSITY OF 20-30 CUTTINGS PER LINEAR FOOT AND A MAXIMUM DIAMETER OF 2.5 INCHES.
3. NUMBER OF SOIL LIFTS MAY VARY. IN GENERAL LIFTS SHALL EXTEND TO THE TOP OF BANK OR BANKFULL STAGE.



NOTES:
1. WHEN GEOLIFTS ARE BUILT ABOVE ROOT WAD CLUSTER, USE LARGE STONE BACKFILL BEHIND ROOT MASS TO BUILT FOUNDATION.
2. CLASS I STONE MAY BE USED AT THE DIRECTION OF THE ENGINEER TO BUILD THE FOUNDATION IN LIEU OF BRUSH MATERIAL.

PROJECT REFERENCE NO.	SHEET NO.
167680	2D

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E84DF4161473...

APPROVED BY:

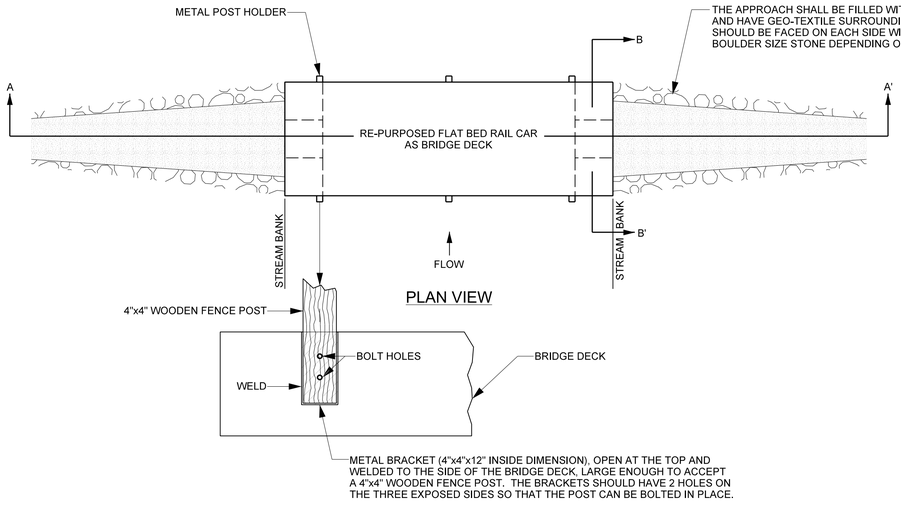
6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

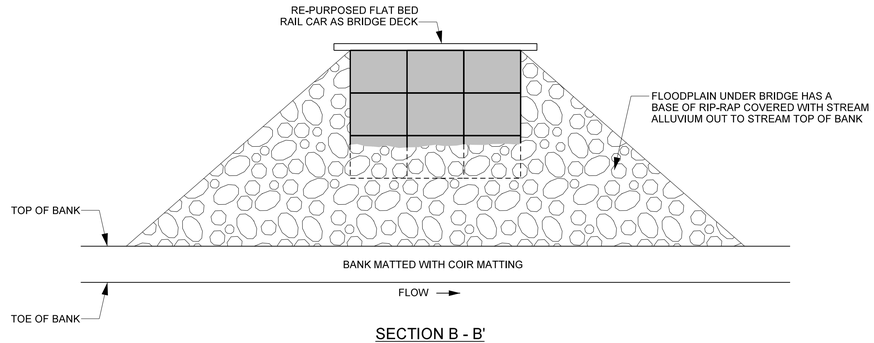
NCDMS ID NO. 100081

FLAT BED RAIL CAR BRIDGE APPLICATION

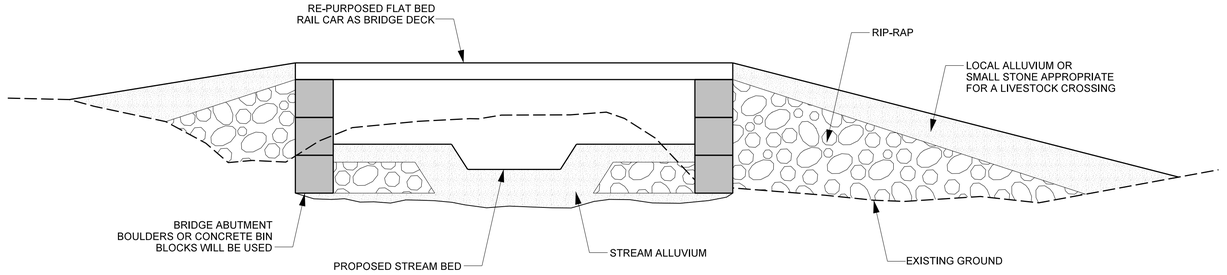


PLAN VIEW

NOTES:
1. GENERALLY, CONSTRUCTION SHOULD BE FROM THE CENTER OF THE CHANNEL OUT TO THE BRIDGE SUPPORTING STRUCTURE AND APPROACHES.
2. THE STREAM CHANNEL THROUGH THE BRIDGE OPENING SHOULD BE CONSTRUCTED AND THE BANKS MATTED BEFORE THE STONE IS PLACED FOR STABILIZING THE CROSSING OR BLOCKS/BOULDERS ARE PLACED TO SUPPORT THE BRIDGE DECK.
3. ABUTMENTS SHOULD BE CONSTRUCTED FROM THE CONCRETE BIN BLOCKS OR LARGE BOULDERS (ENGINEER APPROVED).
4. BLOCKS OR BOULDERS SHOULD EXTEND BELOW SCOUR DEPTH. FOOTERS SHALL BE AT LEAST 2' BELOW THE EXISTING BED.
5. GEO-TEXTILE FABRIC SHALL BE PLACED BETWEEN SURFACE STONE AND SOIL USED IN THE BRIDGE APPROACHES.
6. BOULDERS AND OTHER STONE SHALL BE BACKFILLED AND COMPACTED. VOID SPACE BETWEEN FABRIC AND STONE SURFACE MATERIAL SHALL BE MINIMIZED.
7. GEO-TEXTILE FABRIC SHOULD BE PLACED BEHIND BOULDERS/STONE, BURIED BELOW STONE DEPTH AND EXTENDED INTO THE BANK.
8. THE CUBE FENCE POST HOLDERS SHOULD BE ATTACHED BY WELDING PRIOR TO PLACING THE DECK IN PLACE.



SECTION B - B'

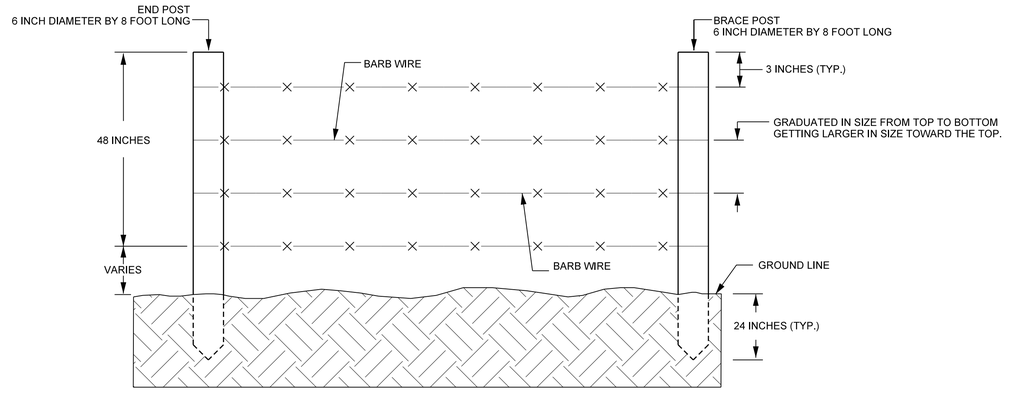


SECTION A - A'

6/6/2023
K:\Projects\167680_UT to Magness C:\Design\As-Built\Plans\167680_ASB-PSH_02D.dgn
mcbrady

2/26/03

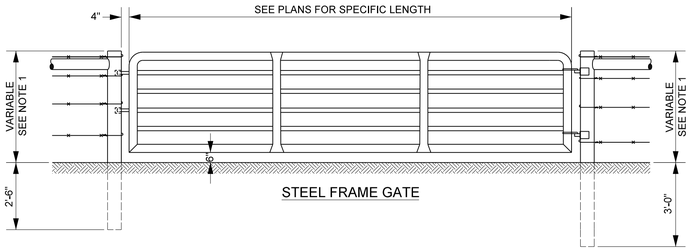
BARB WIRE FIELD FENCE



NOTE:

1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

STEEL GATES

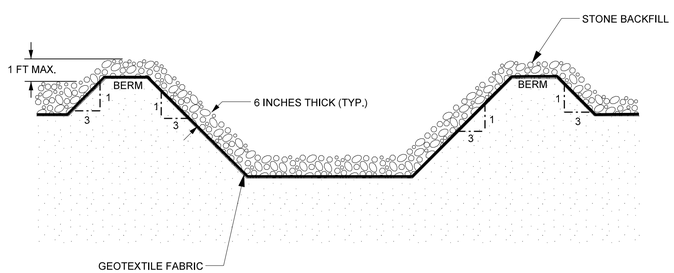


STEEL FRAME GATE

NOTES:

1. POST HEIGHT DIMENSION SHALL BE THE SAME AS REQUIRED FOR THE ADJACENT FENCE.
2. CONSTRUCT AN END OR STRESS PANEL, AS REQUIRED IN THE SPECIFICATION, ON EACH SIDE OF GATE.
3. HINGES AND LOCKS SHALL BE INSTALLED AS SPECIFIED BY GATE MANUFACTURER.

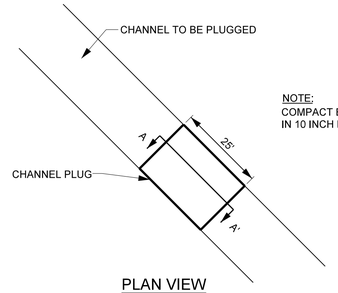
FORD STREAM CROSSING



NOTES:

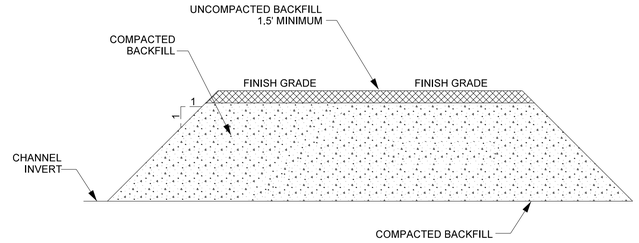
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM. COMPLETE ONE SIDE BEFORE STARTING ON THE OTHER SIDE.
4. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
5. GRADE SLOPES TO A 3:1 SLOPE. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES.
6. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
7. A STABILIZED PAD OF STONE BACKFILL, 6 INCHES THICK, LINED WITH GEOTEXTILE FABRIC SHALL BE USED OVER THE BERM AND ACCESS SLOPES.
8. WIDTH OF THE CROSSING SHALL BE SUFFICIENT TO ACCOMMODATE THE LARGEST VEHICLE CROSSING THE CHANNEL.
9. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.

CHANNEL PLUG



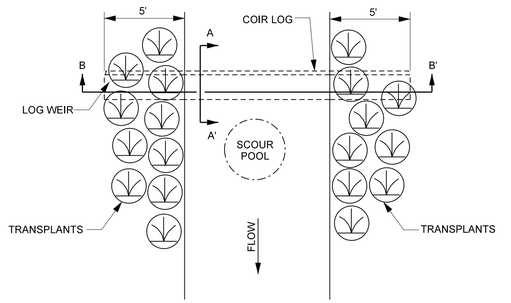
PLAN VIEW

NOTE:
COMPACT BACKFILL USING ON-SITE HEAVY EQUIPMENT IN 10 INCH LIFTS.

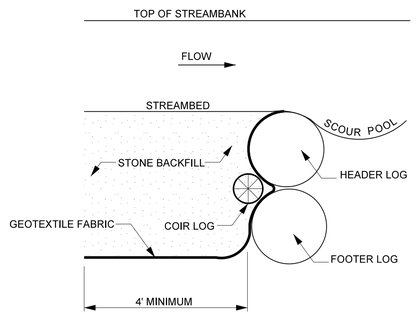


SECTION A - A'

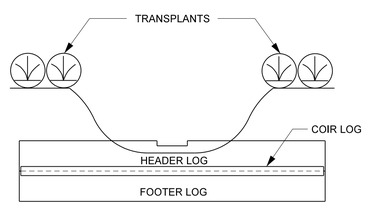
LOG STEP



PLAN VIEW



SECTION A - A'



CROSS SECTION VIEW B - B'

NOTES:

1. LOGS SHOULD BE AT LEAST 10 INCHES IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. TOP OF HEADER LOG SHOULD BE SET AT SAME ELEVATION AS THE STREAMBED.
3. DIAMETER OF COIR LOG SHOULD BE APPROXIMATELY 1/2 DIAMETER OF LOGS.
4. USE GEOTEXTILE FABRIC WITH COIR LOGS TO SEAL GAPS BETWEEN LOGS.
5. PLACE TRANSPLANTS ALONG BANKS TO PROTECT AGAINST BANK EROSION.
6. THE HEADER LOG SHOULD BE NOTCHED 2 - 3 INCHES DEEP IN THE CENTER AND FOR 20 - 30% OF THE CHANNEL WIDTH.

PROJECT REFERENCE NO.	SHEET NO.
167680	2E

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M. McKeithan 347E84DF4181473

APPROVED BY:

6/12/2023

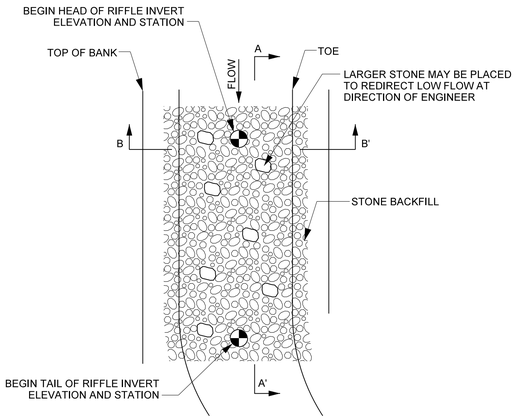
DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

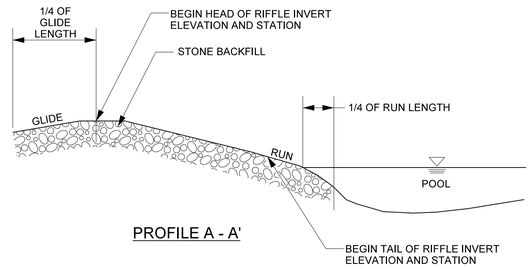
NCDMS ID NO. 100081

2/26/03

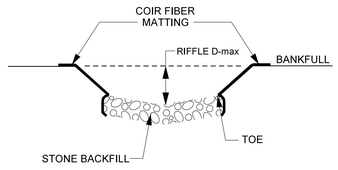
CONSTRUCTED RIFFLE



PLAN VIEW



PROFILE A - A'



SECTION B - B'

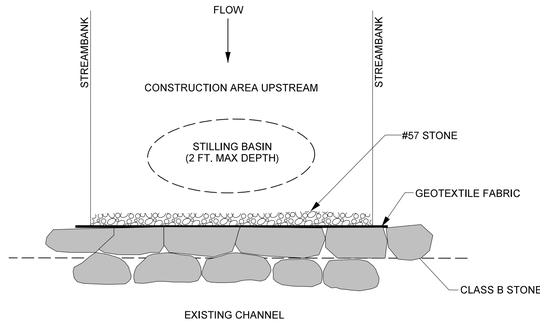
NOTES: STONE CONSTRUCTED RIFFLE

1. UNDERCUT CHANNEL BED ELEVATION AS NEEDED TO ALLOW FOR LAYERS OF STONE TO ACHIEVE FINAL GRADE.
2. INSTALL COIR FIBER MATTING ALONG COMPLETED BANKS SUCH THAT THE EROSION CONTROL MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
3. INSTALL STONE BACKFILL, COMPACTED TO GRADE.
4. FINAL CHANNEL BED SHAPE SHOULD BE ROUNDED, SMOOTH, AND CONCAVE, WITH THE ELEVATION OF THE BED 0.2 FT DEEPER IN THE CENTER THAN AT THE EDGES.
5. STONE BACKFILL SHALL CONSIST OF 5% CLASS I, 10% CLASS B, 50% CLASS A, 20% ABC, AND 15% ON-SITE ALLUVIUM.
6. CONSTRUCTED RIFFLES SHALL BE 12" THICK.
7. BOULDERS FOR REACH 1A AND 1B MUST BE AT LEAST 2' x 3' x 4'; WHILE BOULDERS FOR UT2 SHOULD BE 1' x 2' x 3'.
8. SATURATED WOODY DEBRIS THAT IS EXISTING WITHIN THE CHANNEL CAN BE RELOCATED INTO THE NEW RIFFLE AREAS.

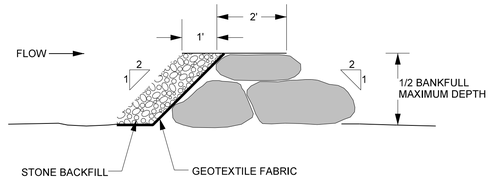
NOTES: NATURAL ALLUVIUM RIFFLE

1. STOCK PILE NATURAL ALLUVIUM RIFFLE FROM SECTIONS OF CHANNEL THAT ARE BEING ABONDONED AND FILLED.
2. APPLY NATURAL ALLUVIUM BED MATERIAL IN THOSE RIFFLES WHERE STONE IS NOT INDICATED.
3. ANY WATER LOGGED WOODY MATERIAL COLLECTED SHOULD BE INSTALLED WITH BED MATERIAL.

ROCK DAM



PLAN VIEW



CROSS SECTION

NOTES:
CLEAN OUT STILLING BASIN OF TRAPPED SEDIMENT PRIOR TO REMOVAL.

PROJECT REFERENCE NO.	SHEET NO.
167680	2F

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E84DFE4161473

APPROVED BY:

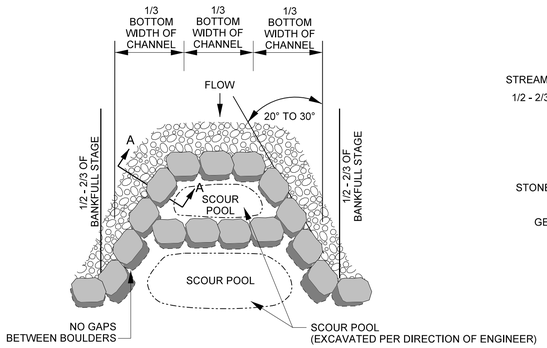
6/12/2023

DATE:

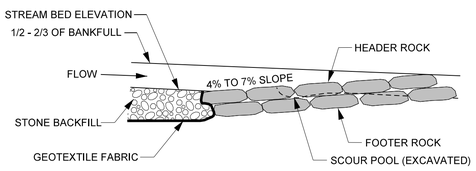
Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

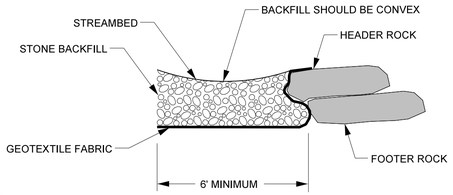
ROCK DOUBLE DROP CROSS VANE



PLAN VIEW



PROFILE VIEW

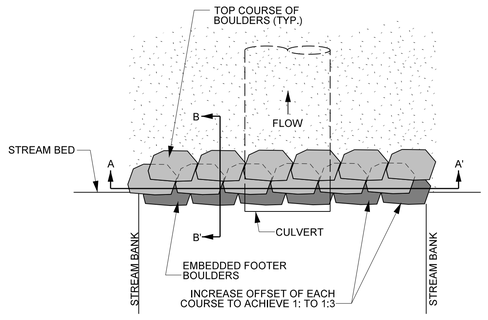


SECTION A - A

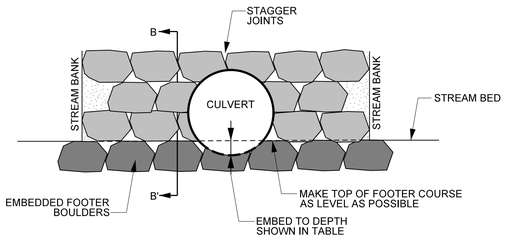
NOTES FOR ALL VANE STRUCTURES:

1. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS.
2. START AT BANK AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
3. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
4. AN EXTRA ROCK CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
5. USE HAND PLACED STONE TO FILL GAPS ON UPSTREAM SIDE OF HEADER AND FOOTER ROCKS.
6. INSTALL GEOTEXTILE FABRIC BEGINNING AT THE TOP OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF SIX FEET.
7. AFTER ALL STONE BACKFILL HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH WELL GRADED MIX OF CLASS B, CLASS A, & #57 STONE TO THE ELEVATION 2"-4" BELOW THE THE HEADER ROCK. INCORPORATE ON-SITE ALLUVIUM WHERE AVAILABLE. FILL SHOULD BE CONCAVE BEHIND THE VANE ARM TO ALLOW POOLING OF FLOW.
8. START SLOPE AT 3/4 THE BANKFULL ELEVATION.
9. ALL REACHES, BOULDER SIZE 2' x 2' x 4'.

BOULDER HEADWALL / ENDWALL



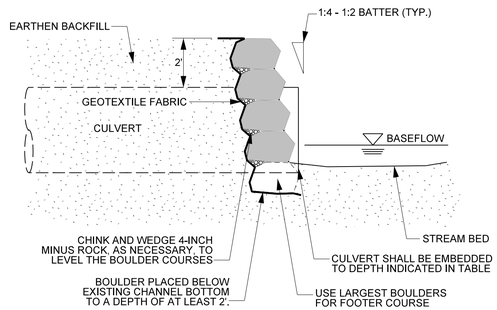
PLAN VIEW



SECTION A - A'

NOTES:

1. BOULDERS SHALL BE TOUCHING SO THAT VOID SPACE IS MINIMIZED.
2. BOULDERS SHOULD EXTEND BELOW SCOUR DEPTH. FOOTER BOULDERS SHALL BE AT LEAST 2' BELOW THE EXISTING BED
3. GEOTEXTILE MATTING SHOULD BE PLACED BETWEEN BOULDERS AND SOIL.
4. BOULDERS SHOULD BE BACKFILLED AND COMPACTED. VOID SPACE BETWEEN FABRIC AND BOULDER OR ROCK FILL MATERIAL, SHOULD BE MINIMIZED.
5. BOULDERS SHOULD NOT BE HIGHER THAN THE TOP OF CROSSING ELEVATION.
6. FILTER FABRIC SHOULD BE PLACED BEHIND BOULDERS, BURIED BELOW BOULDER DEPTH, AND EXTEND INTO THE BANK.



SECTION B - B'

2/26/03

AS-BUILT LEGEND

- PROPOSED DESIGN
- AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22
- RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN
- WETLAND RE-ESTABLISHMENT
- WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- CHANNEL PLUG

NAD 83

PIN: 2641-72-1337

FENCE LINE ENCROACHES CONSERVATION EASEMENT

FENCE ENCROACHMENT CORRECTED BY CONTRACTOR

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-53-8722
DB: 1168 PG: 30 (PARCEL 2)
PB: 7 PG: 46 (PORTION OF TRACT 9)

DORCAS S. ROSS
PIN: 2641-64-7567
PORTION OF DB: 11-I PG: 423

FENCE LINE ENCROACHMENT

ELECTRIC FENCE REMOVED

BEGIN UT to MAGNESS
REACH 1A STA. 11+02.65

AS-BUILT TOP OF BANK (TYP.)

BRUSH TOE WITH LIVE STAKES (TYP.)

GEOLIFT WITH LIVE BRUSH (TYP.)

CONSTRUCTED RIFFLE (TYP.)

VP1

MCW1

X-1

X-2

12+00

13+00

14+00

15+00

MATCH LINE – SEE SHEET 4

A DIVERSION OF OVERLAND FLOW WAS ADDED IN THIS AREA OUTSIDE OF THE EASEMENT WITH LANDOWNER AGREEMENT.

GENE W. SCHENCK, SR. (LIFE ESTATE)
WARREN SCHENCK
PIN: 2641-64-4323
DB: 1405 PG: 314 &
DB: 1592 PG: 70

LOG VANE (TYP.)

GRADE CONTROL ROCK J-HOOK VANE (TYP.)

AS-BUILT THALWEG (TYP.)

BRUSH TOE WITH MATTING AND DOUBLE LIVE STAKES (TYP.)

GEOLIFT WITH BRUSH TOE (TYP.)

FENCE ENCROACHMENT CORRECTED BY CONTRACTOR

12' GATE INSTALLED IN PLACE OF 4' GATE

FENCE LINE ENCROACHES CONSERVATION EASEMENT

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-53-8722
DB: 1168 PG: 30 (PARCEL 2)
PB: 7 PG: 46 (PORTION OF TRACT 9)

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	3

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M. McKEITHAN

DocuSigned by: Kathleen M McKeithan 347E84DFE181473...

APPROVED BY:

6/12/2023

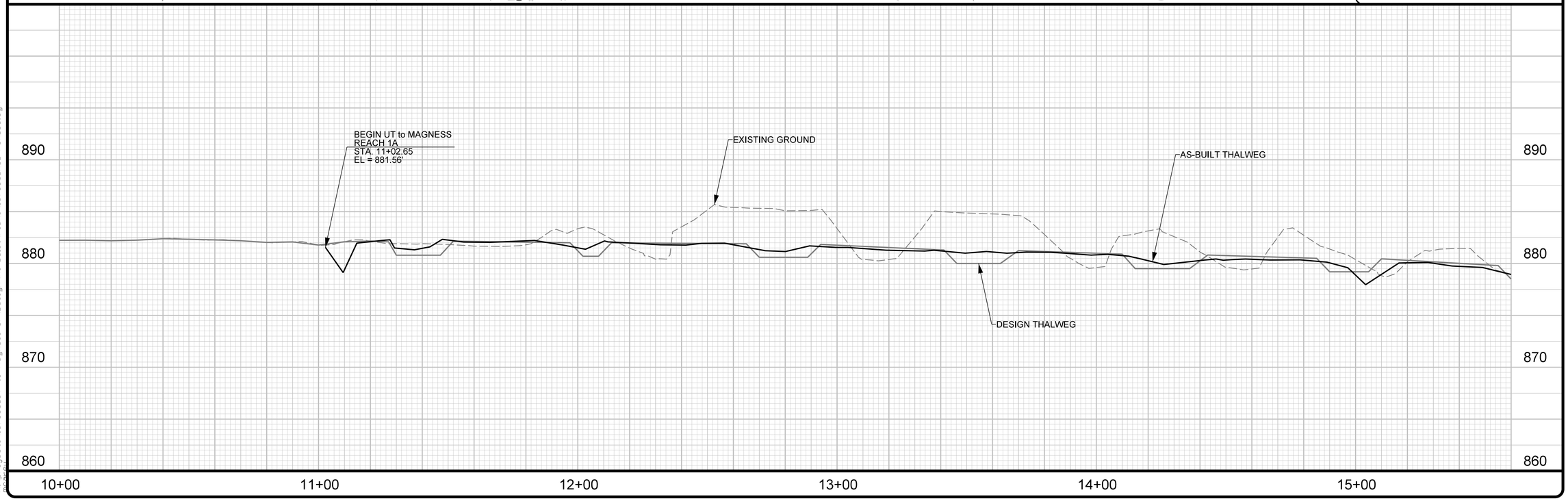
DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)



6/6/2023
N:\Projects\167680_UT to Magness C-\Design\As-Built\Plans\167680_ASB-PSH_03.dgn
mcpherson

2/26/03

APPARENT GAP BETWEEN THE ROBERT & KAY YARBORO PROPERTIES AND THE PROPERTY OF CEDAR LAKE FARM, LLC AS DESCRIBED IN DB: 1587 PG: 1352 (TRACT 4)

NAD 83

GIS PARCEL LINE (NOT SURVEYED)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-52-8927
DB: 1168 PG: 30 (PARCEL 1, TRACT 10)
PB: 7 PG: 46 (TRACT 10)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-53-8722
DB: 1168 PG: 30
(PARCEL 2)
PB: 7 PG: 46
(PORTION OF TRACT 9)

AS-BUILT THALWEG (TYP.)

AS-BUILT TOP OF BANK (TYP.)

GEOLIFT WITH BRUSH TOE (TYP.)

BEDROCK INCORPORATED AS DROP STRUCTURES.

CONSTRUCTED RIFFLE (TYP.)

BRUSH TOE WITH LIVE STAKES (TYP.)

GEOLIFT WITH LIVE BRUSH (TYP.)

STREAM SHIFTED WEST DUE TO BEDROCK ALL ALONG THE LEFT BANK THAT PREVENTED GRADING TO THE PLANNED PROFILE ELEVATION.

MATCH LINE – SEE SHEET 3

MATCH LINE – SEE SHEET 5

16+00 17+00 18+00 19+00 20+00 21+00

CG1 VP2 RVP1 MCW 2

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	4

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M MCKEITHAN

DocuSigned by: Kathleen M McKeithan 247E840F4181472...

APPROVED BY:

6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

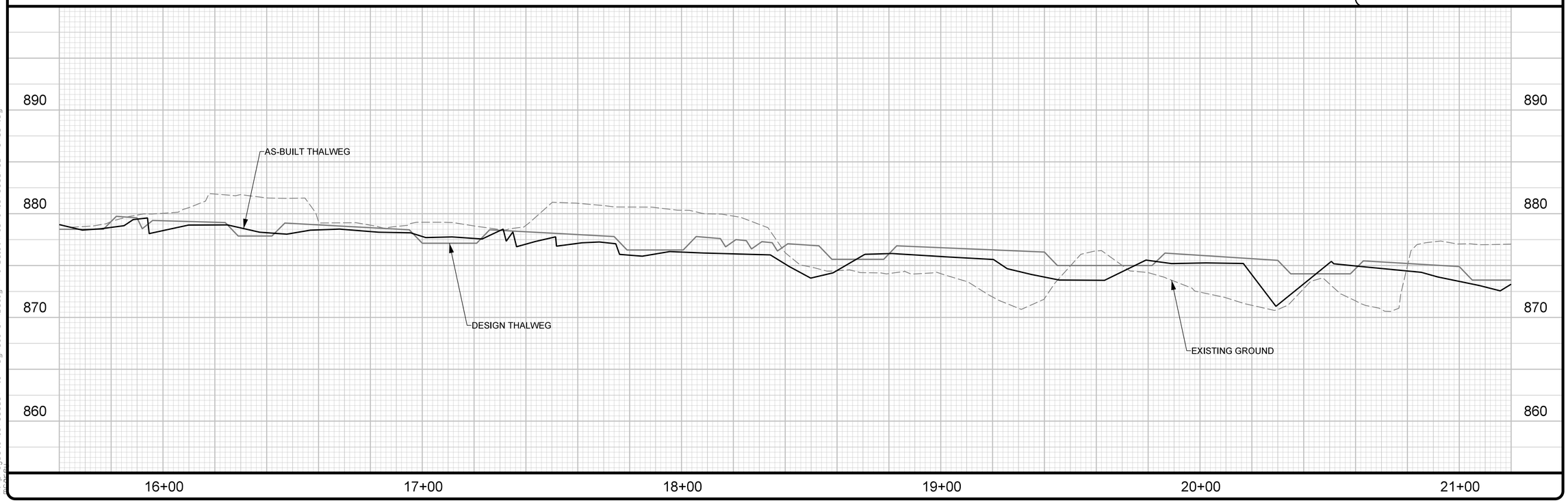
- WETLAND RE-ESTABLISHMENT
- WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- CHANNEL PLUG

AS-BUILT LEGEND

- PROPOSED DESIGN
- AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22
- RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)



6/12/2023
K:\Projects\167680_UT to Magness Cr\Design\As-Built\Plans\167680_ASB-PSH_04.dgn
mcrea

2/26/03

NAD 83

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-52-8927
DB: 1168 PG: 30 (PARCEL 1, TRACT 10)
PB: 7 PG: 46 (TRACT 10)

MCW3

MCW4

MATCH LINE – SEE SHEET 4

MATCH LINE – SEE SHEET 6

AS-BUILT TOP OF BANK (TYP.)

GEOLIFT WITH LIVE BRUSH (TYP.)

GRADE CONTROL LOG J-HOOK VANE (TYP.)

GEOLIFT WITH BRUSH TOE (TYP.)

ROCK J-HOOK VANE (TYP.)

LOG VANE (TYP.)

CONSTRUCTED RIFFLE (TYP.)

BRUSH TOE WITH LIVE STAKES (TYP.)

AS-BUILT THALWEG (TYP.)

RIP RAP EXTENDED OUTSIDE OF THE CONSERVATION EASEMENT IN AGREEMENT WITH THE LANDOWNER.

22+00 23+00 24+00 25+00 26+00

X-4 X-5

WLB

UT TO MAGNESS CREEK

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	5

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M. McKETHAN

DocuSigned by: Kathleen M McKethan 347E84DF61181473

APPROVED BY:

6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

- WETLAND RE-ESTABLISHMENT
- WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- CHANNEL PLUG

AS-BUILT LEGEND

- PROPOSED DESIGN
- AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22
- RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)

880
870
860
850

AS-BUILT THALWEG

EXISTING GROUND

DESIGN THALWEG

22+00 23+00 24+00 25+00 26+00

6/6/2023
K:\Projects\167680.UT to Magness C:\Design\As-Built\Plans\167680_ASB-PSH_05.dgn
mgreen

2/26/03

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

FENCE LINE ENCROACHES CONSERVATION EASEMENT

FENCE ENCROACHMENT CORRECTED BY CONTRACTOR

GEOLIFT WITH LIVE BRUSH (TYP.)

CONSTRUCTED RIFFLE (TYP.)

BRUSH TOE WITH LIVE STAKES (TYP.)

BOULDER STEP (TYP.)

MATCH LINE – SEE SHEET 5

MATCH LINE – SEE SHEET 7

VP3

VP4

27+00

28+00

29+00

30+00

31+00

32+00

LOG AND ROCK STEP- POOL (TYP.)

GEOLIFT WITH BRUSH TOE (TYP.)

LOG STEP (TYP.)

AS-BUILT TOP OF BANK (TYP.)

AS-BUILT THALWEG (TYP.)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

AS-BUILT LEGEND

- PROPOSED DESIGN
- AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22
- RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN
- WETLAND RE-ESTABLISHMENT
- WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- CHANNEL PLUG

NAD 83

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	6

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M. McKEITHAN

DocuSigned by: kathleen M McKeithan 247E840F4181472...

APPROVED BY:

6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)

880
870
860
850
840

DESIGN THALWEG

AS-BUILT THALWEG

EXISTING GROUND

27+00 28+00 29+00 30+00 31+00 32+00

6/6/2023
K:\Projects\167680_UT to Magness Cr\Design\As-Built\Plans\167680_ASB-PSH_06.dgn
mcarey

2/26/03

FENCE ENCROACHMENT CORRECTED BY CONTRACTOR

FENCE LINE ENCROACHES CONSERVATION EASEMENT

END UT to MAGNESS
REACH 1A STA. 33+59.68

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

ROCK VANE (TYP.)

LOG STEP (TYP.)

PERMANENT STREAM CROSSING
ADDED WOVEN WIRE AT CROSSING.

AS-BUILT TOP OF BANK (TYP.)

BRUSH TOE WITH LIVE STAKES (TYP.)

LOG VANE (TYP.)

CONSTRUCTED RIFFLE (TYP.)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

33+00 34+00 35+00 36+00 37+00 38+00

X-8 X-9 X-10

MATCH LINE – SEE SHEET 7

MATCH LINE – SEE SHEET 10

MATCH LINE – SEE SHEET 8

VP5

GEOLIFT WITH BRUSH TOE (TYP.)

GEOLIFT WITH LIVE BRUSH (TYP.)

LOG AND ROCK STEP- POOL (TYP.)

AS-BUILT THALWEG (TYP.)

FILL EXISTING CHANNEL

CHANNEL PLUG

WETLAND RE-ESTABLISHMENT

WETLAND REHABILITATION

AS-BUILT LEGEND

PROPOSED DESIGN

AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22

RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN

BEGIN UT to MAGNESS
REACH 1B STA. 33+90.21

FENCE LINE ENCROACHES

FENCE ENCROACHMENT CORRECTED WITH MODIFICATION OF CONSERVATION EASEMENT LINE.

3 - 12' GATES INSTALLED AT NEW LOCATION

2 - 4' GATES AND 12' GATE NOT INSTALLED AT THIS LOCATION

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

CONTROL POINT
5/8" RBCC (303)
GROUND COORDINATES
N: 611887.74'
E: 1246151.64'
ELEV: 861.98'

NAD 83

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	7

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M McKEITHAN

DocuSigned by: Kathleen M McKeithan 247E84DEF181473

APPROVED BY:

6/12/2023

DATE:

Michael Baker INTERNATIONAL

Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)

870
860
850
840

END UT to MAGNESS
REACH 1A
STA. 33+51.77
EL = 859.67'

BEGIN UT to MAGNESS
REACH 1B
STA. 33+81.98
EL = 859.09'

AS-BUILT THALWEG

DESIGN THALWEG

EXISTING GROUND

33+00 34+00 35+00 36+00 37+00 38+00

6/6/2023
K:\Projects\167680_UT to Magness Cr\Design\As-Built\Plans\167680_ASB-PSH_07.dgn
mcarey

2/26/03

MATCH LINE – SEE SHEET 10

MATCH LINE – SEE SHEET 7

MATCH LINE – SEE SHEET 9

LOG AND ROCK STEP-POOL (TYP.)

BOULDER TOE (TYP.)

AS-BUILT THALWEG (TYP.)

AS-BUILT TOP OF BANK (TYP.)

LOG VANE (TYP.)

ROCK CROSS VANE (TYP.)

VP6

BRUSH TOE WITH LIVE STAKES (TYP.)

GRADE CONTROL LOG J-HOOK VANE (TYP.)

END UT 2
STA. 13+06.72

RVP2

CONSTRUCTED RIFFLE (TYP.)

GEOLIFT WITH BRUSH TOE (TYP.)

GEOLIFT WITH LIVE BRUSH (TYP.)

4' GATE NOT INSTALLED

13+00

39+00

40+00

41+00

42+00

43+00

NAD 83

CONTROL POINT
5/8" RBCC (301)
GROUND COORDINATES
N: 611332.86'
E: 1245883.14'
ELEV: 859.26'

ROBERT E. YARBOR & WIFE KAY DIXON YARBORO
PIN: 2641-60-0979
DB: 1105 PG: 2421 &
DB: 1810 PG: 2076

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	8

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M McKEITHAN

DocuSigned by: Kathleen M McKeithan 247E840F4181472...

APPROVED BY:

6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

AS-BUILT LEGEND

- PROPOSED DESIGN
- AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22
- RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN

- WETLAND RE-ESTABLISHMENT
- NON-CREDITED JURISDICTIONAL WETLANDS
- WETLAND REHABILITATION
- FILL EXISTING CHANNEL
- CHANNEL PLUG

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)

EXISTING GROUND

AS-BUILT THALWEG

DESIGN THALWEG

860 850 840 830

38+00 39+00 40+00 41+00 42+00 43+00

6/6/2023
K:\projects\167680_UT to Magness Cr\Design\As-Built\Plans\167680_ASB-PSH_08.dgn
mcrain

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	9

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M McKEITHAN

DocuSigned by: Kathleen M McKeithan 247E840F4181472...

APPROVED BY:

6/12/2023

DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

NAD 83

MATCH LINE – SEE SHEET 8

2 - 12' GATES INSTALLED

PERMANENT GRAVEL FORD STREAM CROSSING

AS-BUILT TOP OF BANK (TYP.)

FENCE CONTINUES TO EXISTING ELECTRIC FENCE

FENCE REMOVED

RIP RAP ADDED TO DRAINAGE DITCH

END UT to MAGNESS
REACH 1B STA. 43+33.93

AS-BUILT THALWEG (TYP.)

SFHA (ZONE AE) PER F.I.R.M. MAP NO. 3710264100

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-60-0979
DB: 1105 PG: 2421 &
DB: 1810 PG: 2076

DUKE ENERGY UTILITY EASEMENT

SELKIRK DRIVE (SR 1803) (AS DRAFTED FROM AERIAL)

JAMES FREDRICK BEAM & WIFE MARGARET O. BEAM,
PORTION OF DB: 1047 PG: 54 (TRACT NO. 1)
HEIRS OF RUTH S. BEAM
PORTION OF DB: 1047 PG: 58 (TRACT NO. 1) & ESTATE FILE: 09E-629
CAROLINE BROWN REYNOLDS
PORTION OF DB: 1047 PG: 62 (TRACT NO. 1), DB: 1329 PG: 2007 (TRACT NO. 1) &
DB: 1643 PG: 1879 (TRACT NO. 1)
DAVID CONRAD BEAM & WIFE REBECCA P. BEAM
DB: 1047 PG: 66 (TRACT NO. 1)
PIN: 2641-60-7498

5' x 7' ELLIPTICAL CMP
INV IN 847.10'
INV OUT 846.45'

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

AS-BUILT LEGEND

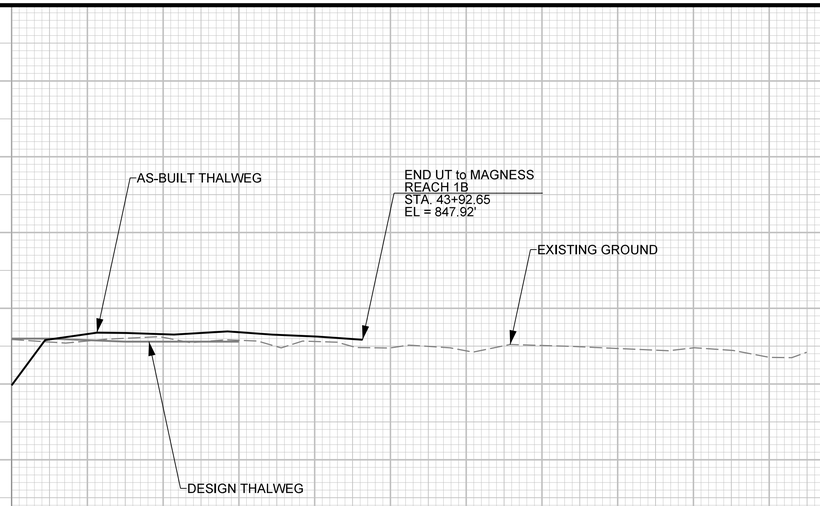
- PROPOSED DESIGN
- AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22
- RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN

FILL EXISTING CHANNEL

CHANNEL PLUG

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)



6/6/2023
K:\Projects\167680_UT to Magness Cr\Design\As-Built\Plans\167680_ASB-PSH_09.dgn
mcreel

2/26/03

NAD 83

GIS PARCEL LINE (NOT SURVEYED)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-60-0979
DB: 1105 PG: 2421 &
DB: 1810 PG: 2076

ROY P. SHARPE & WIFE
DRUSILLA D. SHARPE
PIN: 2641-71-0003
DB: 1632 PG: 190

CEDAR LAKE FARM, LLC
PIN: 2641-72-1337
DB: 1587 PG: 1352 (TRACT 4)

ROBERT E. YARBORO & WIFE
KAY DIXON YARBORO
PIN: 2641-41-9802
DB: 16-D PG: 143 & DB: 1069 PG: 439
PB: 7 PG: 46 (TRACT 11)

CONTROL POINT
NCGS MONUMENT (302)
GROUND COORDINATES
N: 611569.06'
E: 1246122.01'
ELEV: 860.26'

REMOVED SOIL PILE

GEOLIFT WITH LIVE BRUSH (TYP.)

BRUSH TOE WITH
LIVE STAKES (TYP.)

BEGIN UT 2
STA. 10+17.38

12+00

11+00

LOG VANE (TYP.)

FG1

AS-BUILT THALWEG (TYP.)

LOG STEP (TYP.)

AS-BUILT
TOP OF BANK (TYP.)

MATCH LINE – SEE SHEET 8

MATCH LINE – SEE SHEET 7

ELECTRIC FENCE
BARBED WIRE FENCE
DOUBLE ELECTRIC FENCE

BAKER PROJECT REFERENCE NO.	SHEET NO.
167680	10

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 028432 ENGINEER KATHLEEN M McKEITHAN

DocuSigned by: Kathleen M McKeithan
247E840F4184472...

APPROVED BY:

6/12/2023
DATE:

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

NCDMS ID NO. 100081

AS-BUILT LEGEND

- PROPOSED DESIGN
- AS-BUILT SURVEY BY KEE MAPPING & SURVEYING 10/10/22
- RED LINE VARIATIONS FROM ORIGINAL DESIGN SUBMITTED WITH THE MITIGATION PLAN

FILL EXISTING CHANNEL

CHANNEL PLUG

UT TO MAGNESS CREEK RECORD DRAWING PLAN & PROFILE VIEW

20 0 20 40
SCALE (FT)

870
860
850
840

BEGIN UT2
STA. 10+17.38
EL = 858.45'

DESIGN THALWEG

EXISTING GROUND

END UT2
STA. 13+11.35
EL = 854.01'

AS-BUILT THALWEG

10+00 11+00 12+00 13+00 14+00

6/6/2023
K:\Projects\167680_UT to Magness Cr\Design\As-Built\Plans\167680_ASB-PSH_10.dgn
mcgee