MONITORING YEAR 6 ANNUAL REPORT

Final

MOORES FORK STREAM MITIGATION PROJECT

Surry County, NC
NCDEQ Contract 6500
DMS Project Number 94709
DWR # 12-0396
USACE Action ID SAW-2011-02257

Data Collection Period: April-September 2021
Draft Submission Date: November 12, 2021
Final Submission Date: January 7, 2022

PREPARED FOR:

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

PREPARED BY:

Wildlands Engineering, Inc.
1430 South Mint Street, Suite 104
Charlotte, NC 28203
Phone: 704.332.7754
Fax: 704.332.3306

January 7, 2022

Mr. Matthew Reid
Western Project Manager
Division of Mitigation Services
5 Ravenscroft Dr.
Suite 102
Asheville, NC 28801

RE: Moores Fork Stream Mitigation Project
Yadkin River Basin – CU# 03040101
Surry County, North Carolina
NCEEP Project # 94709
Contract No. 6500

Dear Mr. Reid:

Wildlands Engineering, Inc. (Wildlands) has reviewed the Division of Mitigation Services (DMS) comments from the Draft Monitoring Year 6 report for the Moores Fork Stream Mitigation Project. The following Wildlands responses to DMS's report comments are noted in italics lettering.

DMS comment: 1.2.4 Stream Areas of Concern and Management Activities: Please also add to the repair discussion that the conservation easement was remarked by a PLS as part of the repair. Additional signage, posts and fresh paint were part of this additional work.

Wildlands response: Text was added to section 1.2.4 to discuss that the conservation easement was remarked by a PLS.

DMS comment: CCPV: Thanks for providing updated invasive species polygons. Please continue to update as treatment occurs and populations are reduced. This map is a useful tool for the contractor treating the site. DMS will continue treating invasives until the project is closed.

Wildlands response: You're welcome. Wildlands will continue to update the CCPV figures as treatment of invasive species occurs, and populations are reduced.

DMS comment: Tables 6a-6j and Table 7: Please include the date that the project was visually assessed at the top of the table. This was an IRT request at the 2021 credit release meeting. Please include this information in future monitoring reports.

Wildlands response: The dates that the project was visually assessed was added to the top of Tables 6a-6j and Table 7.

DMS comment: Digital Files: No comments

Wildlands response: Noted.

Enclosed please find one (2) hard copy and one (1) electronic copy on USB of the Final Monitoring Report. Please contact me at 704-941-9093 if you have any questions.

Sincerely,

Kirsten Y. Gimbert
Project Manager
kgimbert@wildlandseng.com

EXECUTIVE SUMMARY

The North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services (DMS) restored, enhanced, and preserved approximately 19,587 linear feet (LF) of Moores Fork and 13 unnamed tributaries (UTs), provided livestock fencing and alternative water sources to exclude livestock from streams, removed invasive plant species across the project, and established native riparian buffers. The restoration project was developed to fulfill stream mitigation requirements accepted by the DMS for the Upper Yadkin River Basin (Cataloging Unit 03040101). The Moores Fork Stream Mitigation Project (Site) will net 11,587.543 stream mitigation units (SMU) through a combination of restoration, enhancement I and II, and preservation.

The Site is within a Targeted Local Watershed (TLW) identified in the Upper Yadkin River Basin Restoration Priority (RBRP) plan (NCDENR, 2009). The RBRP identified the Stewarts Creek 14-digit HUC 03040101100010 as a TLW. Agriculture is the primary land use in the watershed (36% agriculture land cover and only 3% impervious cover), and the RBRP identified degraded riparian buffers as the major stressor to water quality. The Site is also located within the identified RBRP as a priority subwatershed for stream restoration and agricultural BMPs according to the initial Upper Yadkin-Ararat River local watershed planning (LWP).

The final design was completed in June 2013. The Site was constructed in December 2014 and planted in February 2015. An as-built survey was conducted following construction in December 2014. However, following construction, a large flood event with an estimated return interval of 50 to 100 years occurred at the site on April 18-19, 2015, causing damage to the main stem of Moores Fork. This damage was repaired in March and April of 2016, and a second as-built survey was performed on the repaired areas in April of 2016. The baseline monitoring efforts began in June of 2016 and monitoring year (MY) 1 efforts were initiated in late October of 2016. The Site has been monitored on an annual basis and MY6 activities were completed in September 2021. The following report summarizes the MY6 status of the Site.

Overall, the Site is on track to meet monitoring success criteria for MY7 vegetation, geomorphology, and hydrology performance standards. The MY6 vegetation survey resulted in an average stem density of 482 planted stems per acre and an average height of 14.9 feet. The Site is on track to meet the MY7 density requirement of 210 planted stems per acre, with all 12 plots (100%) individually exceeding this requirement. Additionally, the MY6 visual assessment revealed that invasive plant populations have been reduced due to ongoing treatments. In 2021, DMS implemented stream repairs for nine instances of lateral and vertical instability throughout the Site that currently appear stable and are functioning as designed. The performance standard of two recorded bankfull events in separate monitoring years was met for both Moores Fork and Silage Tributary in MY3. In MY6, at least one bankfull event occurred on Moores Fork and on Silage Tributary.

MOORES FORK STREAM MITIGATION PROJECT

Year 6 Monitoring Report

TABLE OF CONTENTS

APPENDICES

Section 1: PROJECT OVERVIEW

The Site was implemented under a design-bid-build contract with DMS in Surry County, NC. The Site is located in the Yadkin River Basin; eight-digit HUC 03040101 and the 14-digit HUC 03040101100010 (Figure 1). Located in the Piedmont physiographic province (NCGS 2004), the project watershed primarily includes agricultural land cover. The drainage area for the lower end of Moores Fork is 1,527 acres, and the drainage area for Silage Tributary is 156 acres. The Site is located approximately 0.25 mile north of NC 89 on Horton Road. The project site is located on both sides of Horton Road. Latitude and longitude for the site are 36.506671 N and -80.704115 W, respectively (Figure 1).

The NCDEQ DMS restored, enhanced, and preserved approximately 19,587 LF of Moores Fork and 13 UTs, provided livestock fencing and alternative water sources to keep livestock out of the streams, removed invasive plant species across the project, and established native riparian buffers. The restoration project was developed to fulfill stream mitigation requirements accepted by the DMS for the Upper Yadkin River Basin (HUC 03040101). Mitigation work within the Site included restoring and enhancing 15,308 LF and preserving 4,279 LF of stream. The Moores Fork Stream Restoration Project will net 11,587.543 SMUs through a combination of restoration, enhancement I and II, and preservation. Due to overhead utility easements that cross project streams, 7.8 SMUs were removed on Silage Tributary Reach 2 (starting at STA 30+10.49 and ending at STA 30+33.95), 10.4 SMUs were removed on Moores Fork (starting at STA 37+22.01 and ending at STA 37+42.79), and 4.1 SMUs were removed on Corn Trib (starting at STA 19+38.58 and ending at STA 19+59.15) as shown in Table 1 of Appendix A.

The final design was completed in June 2013. The Site was constructed in December 2014 and planted in February 2015. An as-built survey was conducted following construction in December 2014. However, following construction, a large flood event with an estimated return interval of 50 to 100 years occurred at the site on April 18-19, 2015, causing damage to the main stem of Moores Fork. This damage was repaired in March and April of 2016, and a second as-built survey was performed on the repaired areas in April of 2016. The baseline monitoring efforts began in June of 2016 and MY1 efforts were initiated in late October of 2016. The MY6 monitoring activities were completed in September 2021. More detailed information related to the project activity, history, and contacts can be found in Appendix A, Tables 1 and 2. Directions and a map of the Site are provided in Figure 1, and project components are illustrated for the Site in Figure 2. Please refer to the Project Component Map (Figure 2) for the stream features and to Table 1 for the project component and mitigation credit information for the Site. This report documents the results of the MY6 monitoring efforts.

1.1 Project Goals and Objectives

Prior to construction activities, dairy and farming operations on the site deforested riparian buffers and allowed direct livestock access to the stream, leading to elevated temperatures and nutrient level. Channel straightening and dredging throughout much of the project are also contributed to channel degradation. Table 11 in Appendix D present the pre-restoration conditions in detail.

This mitigation site is intended to provide numerous ecological benefits within the Yadkin River Basin. The project goals identified in the Mitigation Plan (Confluence, 2012) include:

- Improve water quality in Moores Fork and the UTs through reductions in sediment and nutrient inputs from local sources;
- Create conditions for dynamic equilibrium of water and sediment movement between the supply reaches and project reaches;
- Promote floodwater attenuation and secondary functions associated with more frequent and extensive floodwater contact times;

- Improve in-stream habitat by increasing the diversity of bedform features;
- Enhance and protect native riparian vegetation communities; and
- Reduce fecal, nutrient, and sediment loads to project streams by promoting and implementing livestock best management practices.

The project objectives have been defined as follows:

- Restoration of the dimension, pattern, profile of approximately 1,828 LF of Moores Fork Reach 2 and 243 LF of the Pond Tributary;
- Restoration of the dimension and profile (Enhancement I) of the channel for approximately 2,832 LF of Moores Fork Reach 3, 900 LF of Silage Reach 1, 2,448 LF of Silage Reach 2, 300 LF of Barn Reach 1 and 112 LF of Corn Reach 2;
- Limited channel work coupled with livestock exclusion, gully stabilization, invasive species control and buffer planting (Enhancement II) on approximately 761 LF of Moores Fork Reach 1, 167 LF of Cow Tributary 1, 767 LF of Cow Tributary 2, 3,134 LF of Barn Reach 2, 1,350 LF of Corn Reach 1, and 466 LF of UT1;
- Livestock exclusion fencing and other best management practice installations;
- Invasive plant species control measures across the entire project wherever necessary; and
- Preservation of approximately 4,279 LF of relatively un-impacted forested streams (UTs 2, 3, 6, 7, 8, 9, and 10) in a permanent conservation easement.

1.2 Monitoring Year 6 Data Assessment

Annual monitoring was conducted between April and September 2021 to assess the condition of the project. The stream restoration success criteria for the Site follows the approved performance standards presented in the Moores Fork Stream Mitigation Project Final Mitigation Plan (Confluence, 2012). Annual monitoring will be conducted for seven years to provide a project data chronology that will facilitate an understanding of project status and trends.

1.2.1 Vegetation Assessment

A total of 12 vegetation monitoring plots were established during the baseline monitoring within the project easement areas using a standard 10 by 10 meter plot. Please refer to Figures 3.0-3.6 in Appendix B for the vegetation monitoring locations. The final vegetation performance standard is the survival of 210 planted stems per acre and an average of 8 feet minimum in height at the end of year seven of the monitoring period.

The MY6 vegetation survey was completed in September 2021, resulting in an average stem density of 482 planted stems per acre and an average stem height of 14.9 feet. The Site is well on track to meet the MY7 density requirement of 210 planted stems per acre, with all 12 plots (100%) individually exceeding the requirement. The Site is also on track to meet the MY7 height requirement with 10 of 12 plots (83%) individually exceeding the requirement. A few stems that were previously noted missing were found alive this year, which slightly increased the overall stem count by less than 1%. A majority (88%) of the surviving planted stems in vegetation plots are thriving with a health score (vigor) of 3 or 4. Approximately 12% of the surviving stems scored a vigor of 2, indicating that they have fair plant health with some damage present. This lower vigor rating is due to damage from storm events, vine strangulation, suffocation from dense herbaceous cover, insects, deer, or other unknown factors. However, some planted stems previously damaged by the aforementioned factors have grown to a height where they can likely survive and outcompete herbaceous cover, vines, and deer. In addition, desirable volunteer species such as red maple, river birch, tag alder, and tulip poplar are present throughout the Site. Please refer to Appendix B for vegetation plot photographs and Appendix C for vegetation data tables.

1.2.2 Vegetation Areas of Concern and Management Activity

Currently, only 2% of the easement acreage is mapped with invasive species areas of concern. Areas of invasive plant populations were identified in MY6 throughout the Site. Species included: kudzu (*Pueraria montana*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Multiflora rose (*Rosa multiflora*), oriental bittersweet (*Celastrus orbiculatus*), morning glory (*Convolvulus sp*.), and English ivy (*Hedera helix*). In 2021, invasive treatment occurred in February, April, May, and September and will continue through closeout. Along the left floodplain of Moores Fork, areas of kudzu persist and additional pockets were observed (discovered in MY6) along the stream banks and within the easement where kudzu is spreading from the adjacent property.

Isolated bare/sparsely vegetated areas observed in MY6 are of minimal concern as herbaceous cover continues to become more established. Vegetation areas of concern are shown in Figures 3.0-3.6 in Appendix B.

1.2.3 Stream Assessment

MY6 is a reduced monitoring year that does not require morphological surveys; therefore no cross-sectional survey was performed in 2021. In general, MY6 riffle pebble counts in Moores Fork indicate coarser sediment size distribution as compared to MY0. Along Silage Tributary, MY6 riffle pebble counts indicate similar or coarser sediment size distribution as compared to MY0. Please refer to Appendix D for pebble count plots.

1.2.4 Stream Areas of Concern and Management Activity

Repair work was completed at Moores Fork in March 2021. DMS contracted with a design firm to develop a repair plan for nine locations throughout the project area. The work included the installation of constructed riffles, boulder step/sills, vegetated geo lifts, and planting live stakes, bare root trees and transplants within disturbed areas. In addition, the conservation easement was remarked by a PLS by adding signage, posts, and fresh paint as needed. Repairs appear to be stable and functioning as designed with herbaceous cover and live stakes becoming well established along banks and rock steps/sills maintaining vertical stability. The repairs described above have decreased bank erosion along Moores Fork Reach 2 from 3.3% in MY5 to 2.5% in MY6 and along Moores Fork Reach 3, from 3.0% in MY5 to 1.0% in MY6. In addition, the repairs have reduced bank erosion along Silage Tributary Reach 1 from 3.3% in MY5 to 1.9% in MY6 and along Silage Tributary Reach 2, from 4.9% in MY5 to 4.1% in MY6. Please refer to a photolog of the repair work in Appendix B. The as-built survey of the repair is included in Appendix F.

The remaining stream areas of concern include localized instances of bank instability and sediment deposition. Along Moores Fork, new or expanded areas of bank instability were noted in MY6 (STA 23+40, 34+90, 40+00, and 43+10) where woody vegetation has failed to take hold along the banks. Areas of stream instability seem to be isolated and are not prevalent along Moores Fork.

Along Silage Tributary, a few new or expanded areas of bank instability were also noted in MY6 (STA 23+80, 28+70, and 29+70). Several structures that were installed for grade control have been undermined by flow piping under or around them. Areas of instability are more frequent along Silage Tributary due to the nature of this confined steep valley in combination with flashy runoff from large precipitation events.

Other stream areas of concern are present in some of the smaller tributaries on the Site. Pond Tributary continues to experience sedimentation along the project start, but well-established willows and other woody vegetation along the banks are maintaining the channel function. At the project start of Corn Tributary, a significant headcut and erosion around the culvert continues to worsen. In 2019, DMS contracted with a provider to control beaver and dams at the Site. No additional beaver activity was

observed in 2021. Stream areas of concern and management activities are shown in Figures 3.0-3.6 in Appendix B.

1.2.5 Hydrology Assessment

Bankfull data collected on September 7, 2021 indicate that at least one bankfull event occurred on Moores Fork and Silage Tributary in MY6. Monthly rainfall data indicate higher than normal rainfall amounts occurred during the months of February and August 2021 (NCCRONOS, 2021). The hydrologic performance standard for the Site states that two bankfull flow events must be documented on restoration reaches within the seven-year monitoring period and must occur in separate years. The performance standard for the Site was met in MY3. Six bankfull events have been documented for Moores Fork and five bankfull events have been documented for Silage Tributary in separate years. Refer to Appendix E for hydrologic data and graphs.

1.3 Monitoring Year 6 Summary

Overall, the Site is on track to meet monitoring success criteria for MY7 vegetation, geomorphology, and hydrology performance standards. The MY6 vegetation survey resulted in an average stem density of 482 planted stems per acre and an average height of 14.9 feet. The Site is on track to meet the MY7 density requirement of 210 planted stems per acre, with all 12 plots (100%) individually exceeding this requirement. Additionally, the MY6 visual assessment revealed that invasive plant populations have been reduced due to ongoing treatments. In 2021, DMS implemented stream repairs for nine instances of lateral and vertical instability throughout the Site that appear stable and functioning as designed. The performance standard of two recorded bankfull events in separate monitoring years has been met for both Moores Fork and Silage Tributary in MY3. In MY6, at least one bankfull event occurred on Moores Fork and on Silage Tributary.

Summary information and data related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these annual monitoring reports can be found in the Mitigation Plan documents available on the DMS website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

Section 2: METHODOLOGY

The stream monitoring methodologies utilized in 2021 are based on standard guidance and procedures documents (Rosgen 1996 and USACE 2003). Geomorphic data were collected following the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS. Planted woody vegetation is being monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008). Crest gages were installed in surveyed riffle cross-sections and monitored semi-annually.

Section 3: REFERENCES

Confluence Engineering, PC. 2012. Moores Fork Stream Mitigation Plan. NCEEP, Raleigh, NC.

Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E. 2003. Stream Restoration A Natural Channel Design Handbook.

Harrelson, Cheryl C; Rawlins, C.L.; Potyondy, John P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique.* Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.

Lee, Michael T., Peet, Robert K., Steven D., Wentworth, Thomas R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. Retrieved from: http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-2.pdf

North Carolina Climate Retrieval and Observations Network of the Southeast Database (NCCRONOS). 2021. State Climate Office of North Carolina. Version 2.7.2. MT Airy 2 W. Station ID No. 315890. Accessed September 2021.

North Carolina Division of Water Resources (NCDWR). 2016. Surface Water Classifications. Retrieved from http://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications

NCDENR. 2009. Upper Yadkin River Basin Restoration Priorities. Retrieved from https://deq.nc.gov/about/divisions/mitigation-services/dms-planning/watershed-planning-documents/yadkin-river-basin

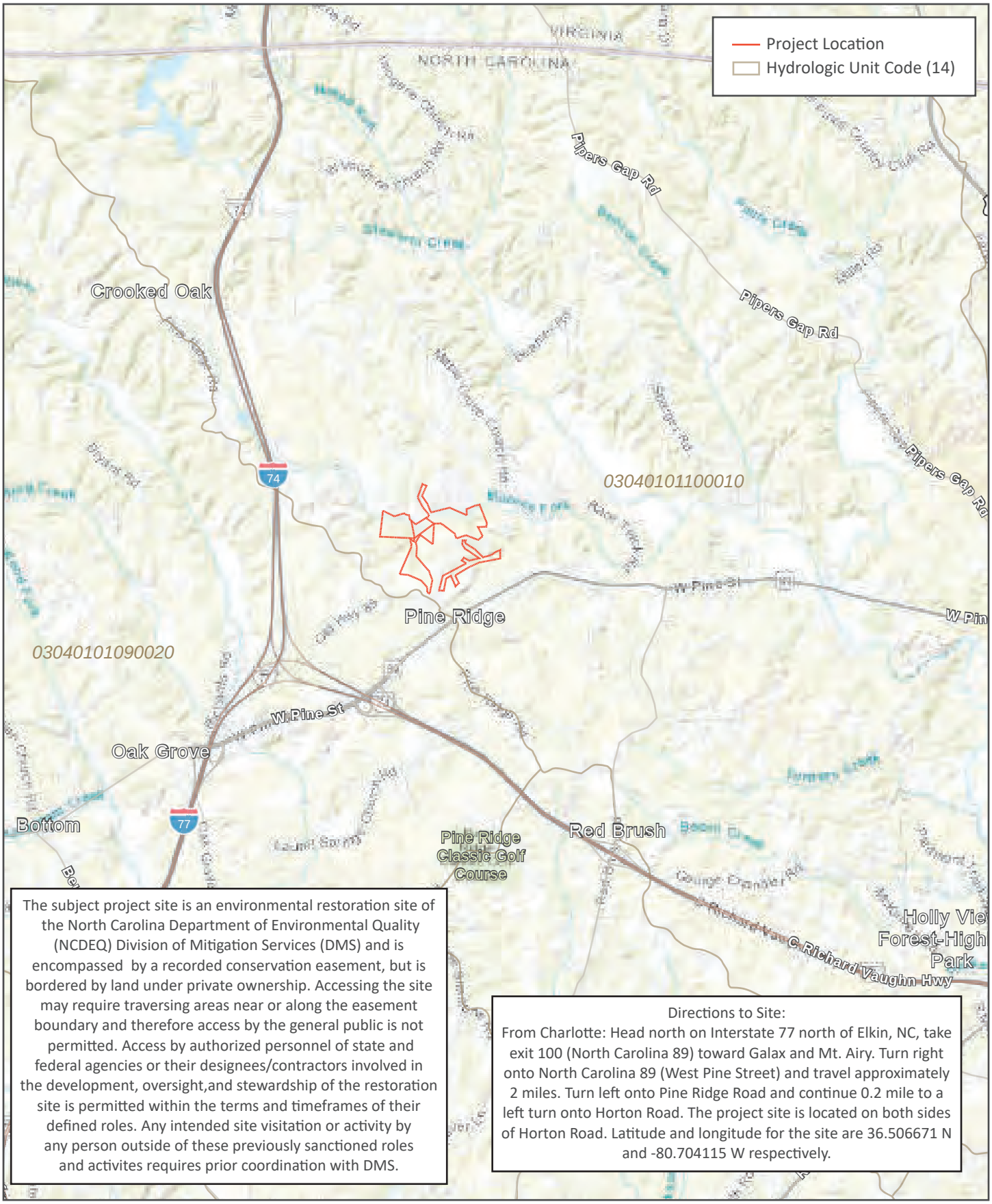
North Carolina Geological Survey (NCGS). 2004. Physiography of North Carolina. Map compiled by the Division of Land Resources. Raleigh.

Rosgen, D.L. 1996. Applied River Morphology. Pagosa Springs, CO: Wildland Hydrology Books.

United States Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.

United States Geological Survey (USGS), 1998. North Carolina Geology. https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/

APPENDIX A. General Tables and Figures



The subject project site is an environmental restoration site of the North Carolina Department of Environmental Quality (NCDEQ) Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight,and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with DMS.

Directions to Site:
From Charlotte: Head north on Interstate 77 north of Elkin, NC, take exit 100 (North Carolina 89) toward Galax and Mt. Airy. Turn right onto North Carolina 89 (West Pine Street) and travel approximately 2 miles. Turn left onto Pine Ridge Road and continue 0.2 mile to a left turn onto Horton Road. The project site is located on both sides of Horton Road. Latitude and longitude for the site are 36.506671 N and -80.704115 W respectively.

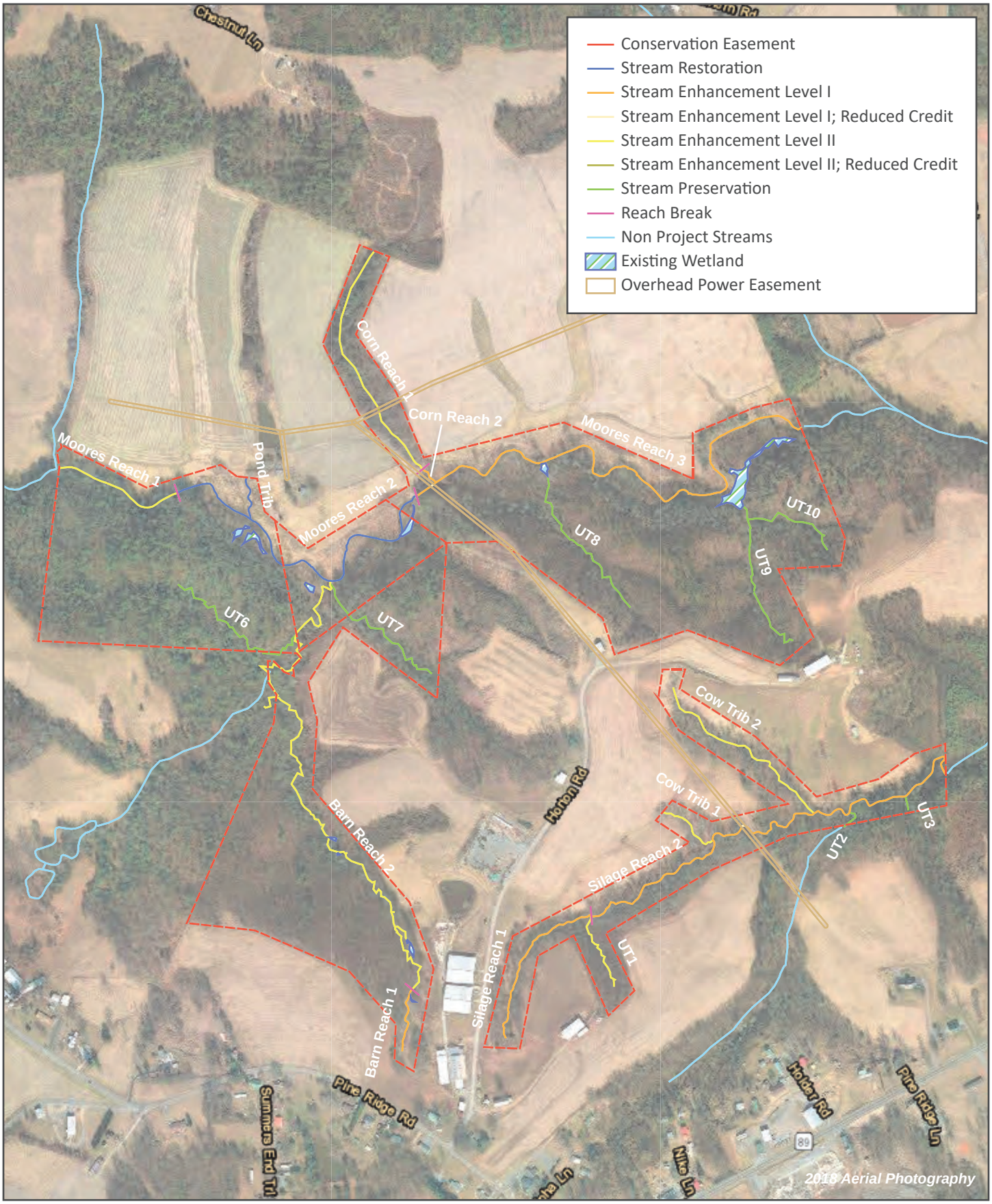
WILDLANDS ENGINEERING

0 0.5 1 Mile

N

Figure 1 Project Vicinity Map
Moores Fork Stream Mitigation Site
DMS Project No. 94709
Monitoring Year 6 - 2021

Surry County, NC



WILDLANDS ENGINEERING

0 700 Feet

N

Figure 2 Project Component/Asset Map
Moores Fork Stream Mitigation Site
DMS Project No. 94709
Monitoring Year 6 - 2021

Surry County, NC

Table 1. Project Components and Mitigation Credits
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Mitigation Credit Summaries [1]				
Type	**Restoration**	**Enhancement I**	**Enhancement II**	**Preservation**
Total	2071.000	5757.790	2902.953	855.800

Project Components [1]								
Project Component or Reach ID	**Stationing**	**Pre-project Footage or Acreage**	**Restoration Footage or Acreage**	**Restoration Level**	**Restoration or Rest Equiv.**	**Mitigation Ratio**	**Mitigation Credits**	**Notes**
Moores Reach 1	STA 989-1750	761	761	N/A	EII	2.5:1	304.400	-
Moores Reach 2	STA 1750-3578	1,636	1,828	P2	R	1:1	1,828.000	-
Moores Reach 3	STA 3578-6410	2,856	2,832	P2/3	EI	1:1	2,821.610	Reduction in 10.39 SMU because of 20' overhead powerline easement
Silage Reach 1	STA 1000-1900	900	900	P1	EI	1:1	900.000	-
Silage Reach 2	STA 1900-4348	2,448	2,448	P3	EI	1.5:1	1,624.180	Reduction in 7.82 SMU because of 20' overhead powerline easement.
Cow Trib 1	STA 1219-1386	167	167	P4	EII	1.5:1	111.333	-
Cow Trib 2	STA 1331-2098	767	767	P4	EII	1.5:1	511.333	-
Pond Trib	STA 1000-1243	194	243	P2	R	1:1	243.000	-
Barn Reach 1	STA 1000-1300	300	300	P3	EI	1:1	300.000	-
Barn Reach 2	STA 1350-3746; STA 4069-4757	3,134	3,134	N/A	EII	2.5:1	1,253.600	-
Corn Reach 1	STA 1000-2350	1,350	1,350	N/A	EII	2.5:1	535.886	Reduction in 4.114 SMU because of 20' overhead powerline
Corn Reach 2	STA 2350-2462	112	112	P3	EI	1:1	112.000	-
UT1	STA 1000-1466	466	466	N/A	EII	2.5:1	186.400	-
Preservation Reaches	UTs 2,3,6,7,8,9,10	4,279	4,279	N/A	P	5:1	855.800	-

Length and Area Summations [1]								
Restoration Level	**Stream (Linear Feet)**	**Riparian Wetland (acres)**		**Non-riparian Wetland (acres)**	**Buffer (Square feet)**		**Upland (acres)**	
		Riverine	Non-Riverine					
		-						
Restoration	2,071	-	-	-	-	-	-	-
Enhancement		-	-	-	-	-	-	-
Enhancement I	6,592							
Enhancement II	6,645							
Creation		-	-	-			-	-
Preservation	4,279	-	-	-			-	-
High Quality Preservation	-	-	-	-			-	-
	-	-	-	-			-	-

N/A - Not Applicable

[1]Project components and mitigation credits reverted back to Mitigation Plan totals as requested by IRT.

Table 2. Project Activity and Reporting History
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Activity or Deliverable		Data Collection Complete	Completion or Delivery
Mitigation Plan		December 2011	November 2012
Final Design – Construction Plans		N/A	June 2013
Construction (Repairs)		N/A	December 2014 (April 2016)
Temporary S&E Mix Applied		N/A	December 2014 (April 2016)
Permanent Seed Mix Applied		N/A	December 2014 (April 2016)
Containerized, Bare Root and B&B Plantings For Reach/Segments		N/A	February 2015 (April 2016)
Invasive Species Treatment		May 2016	May 2016
Baseline Monitoring Document (Year 0)	Vegetation Survey	June 2016	August 2016
	Stream Survey	June 2016	
Invasive Species Treatment		September 2016	September 2016
Year 1 Monitoring	Vegetation Survey	October 2016	November 2016
	Stream Survey	November 2016	
Year 2 Monitoring	Vegetation Survey	August 2017	November 2017
	Stream Survey	July 2017	
Invasive Species Treatment		July, Aug, Sept & Nov 2018	November 2018
Year 3 Monitoring	Vegetation Survey	August 2018	November 2018
	Stream Survey	June 2018	
Supplemental Planting		March 2019	November 2019
Beaver/Dam Removal		July 2019	November 2019
Invasive Species Treatment		Feb, July, & Sept 2019	September 2019
Year 4 Monitoring	Vegetation Survey	August 2019	November 2019
	Stream Survey	N/A	
Invasive Species Treatment		May, June, & July 2020	July 2020
Year 5 Monitoring	Vegetation Survey	August 2020	November 2020
	Stream Survey	July 2020	
Stream Repairs		March 2021	March 2021
Invasive Species Treatment		Feb, Apr, May, & Sept 2021	September 2021
Year 6 Monitoring	Vegetation Survey	September 2021	November 2021
	Stream Survey	N/A	
Year 7 Monitoring	Vegetation Survey	2022	November 2022
	Stream Survey	2022	

N/A - Not Applicable

Table 3. Project Contacts Table
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Designer	Confluence Engineering, PC 16 Broad Street Asheville, NC 28801
Primary project design POC	Andrew Bick 828-606-0306
Construction Contractor	Carolina Environmental Contracting, Inc. 150 Pine Ridge Road Mount Airy, NC 27030
Construction contractor POC	Wayne Taylor 336-341-6489
Survey Contractor	Turner Land Surveying, PLLC PO Box 41023 Raleigh, NC 27629
Survey Contractor POC	David Turner 919-623-5095
Planting Contractor	Keller Environmental, LLC 7921 Haymarket Lane Raleigh, NC 27615
Planting Contractor POC	Jay Keller 919-749-8259
Seeding Contractor	Carolina Environmental Contracting, Inc. 150 Pine Ridge Road Mount Airy, NC 27030
Seeding Contractor POC	Wayne Taylor 336-341-6489
Seed Mix Sources	Green Resources 336-855-6363
Nursery Stock Suppliers	Foggy Mountain Nursery 336-384-5323
Monitoring Performers	Wildlands Engineering, Inc. 1430 South Mint Street, Ste 104 Charlotte, NC 28205 704.332.7754
Monitoring POC	Kirsten Gimbert 704-332-7754

Table 4a. Project Baseline Information and Attributes
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Project Information	
Project Name	Moores Fork Stream Mitigation Project
County	Surry
Project Area (acres)	~140
Project Coordinates (latitude and longitude)	36.506671 N, 80.704115 W
Project Watershed Summary Information	
Physiographic Province	Piedmont
River Basin	Yadkin
USGS Hydrologic Unit 8-digit	03040101
USGS Hydrologic Unit 14-digit	03040101100010
DWR Sub-basin	Pee Dee River Subbasin 03-07-02
Project Drainage Area (acres)	1,527 ac (2.39 mi^2
Project Drainage Area Percentage of Impervious Area	<5%
CGIA Land Use Classification	Cropland and Pasture, Confined Animal Operations

Reach Summary Information					
Parameters	**Moores Fork Reach 1 & 2**	**Moores Fork Reach 3**	**Silage**	**Cow Trib 1**	**Cow Trib 2**
Length of Reach Post Construction (LF)	2,636	2,885	3,348	167	767
Valley classification (Rosgen)	VIII	VIII	II/IV	II	II
Drainage area (acres)	1,193	1,527	156	4	16
NCDWQ stream identification score	35	34.5	23.5	20	23.5
NCDWQ Water Quality Classification	WS-IV	WS-IV	WS-IV	WS-IV	WS-IV
Morphological Description (Rosgen stream type)	C4	C4	G4/C4	G5	G5
Evolutionary trend	C-F	C-F	G-F	G	G
Underlying mapped soils	CsA, FsE	CsA, FsE	FeD2	FeD2	FeD2
Drainage class	well drained	well drained	well drained	well drained	well drained
Soil Hydric status	not hydric	not hydric	not hydric	not hydric	not hydric
Slope	0.008	0.006	0.030	0.056	0.038
FEMA classification	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA
Native vegetation community	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest
Percent composition of exotic invasive vegetation	0	0	0	0	0

Wetland Summary Information				
Parameters	**Wetland 1**	**Wetland 2**	**Wetland 3**	**Wetland 4**
Size of Wetland (acres)	0.49	0.04	0.08	0.15
Wetland Type	riparian non-riverine	riparian non-riverine	riparian non-riverine	riparian non-riverine
Mapped Soil Series	FsE	FsE	CsA	FsE & CsA
Drainage class	well drained	well drained	well drained	well drained
Soil Hydric Status	not hydric	not hydric	not hydric	not hydric
Source of Hydrology	UT9 & UT10	UT8	Toe seep	Toe seep
Hydrologic Impairment	none	none	none	none
Native vegetation community	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest
Percent composition of exotic invasive vegetation	0	0	0	0

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States – Section 404	Y	Y	USACE ID No. SAW-2011-02257
Waters of the United States – Section 401	Y	Y	NCDWR # 12-0396
Endangered Species Act	Y	Y	CE Approved 12/21/11
Historic Preservation Act	N	N/A	-
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	N	N/A	-
FEMA Floodplain Compliance	N	N/A	-
Essential Fisheries Habitat	N	N/A	-

N/A Not-applicable

Table 4b. Project Baseline Information and Attributes
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Project Information	
Project Name	Moores Fork Stream Mitigation Project
County	Surry
Project Area (acres)	~140
Project Coordinates (latitude and longitude)	36.506671 N, 80.704115 W
Project Watershed Summary Information	
Physiographic Province	Piedmont
River Basin	Yadkin
USGS Hydrologic Unit 8-digit	03040101
USGS Hydrologic Unit 14-digit	03040101100010
DWR Sub-basin	Pee Dee River Subbasin 03-07-02
Project Drainage Area (acres)	1,527 ac (2.39 mi^2)
Project Drainage Area Percentage of Impervious Area	<5%
CGIA Land Use Classification	Cropland and Pasture, Confined Animal Operations

Reach Summary Information				
Parameters	**Pond Trib**	**Barn Reach 1 & 2**	**Corn Reach 1 & 2**	**UT1**
Length of Reach Post Construction (LF)	243	3,434	1,452	466
Valley classification (Rosgen)	VIII	IV	IV	IV
Drainage area (acres)	27	184	30	6
NCDWQ stream identification score	20	36.5	21	23
NCDWQ Water Quality Classification	WS-IV	WS-IV	WS-IV	WS-IV
Morphological Description (Rosgen stream type)	B4/5	G4	G4	B4
Evolutionary trend	B-C-F	G-F	G-F	-
Underlying mapped soils	CsA	FeD2, FsE	CsA, FsE	FeD2
Drainage class	well drained	well drained	well drained	well drained
Soil Hydric status	not hydric	not hydric	not hydric	not hydric
Slope	0.029	0.025	0.057	0.040 +/-
FEMA classification	Not in SFHA	Not in SFHA	Not in SFHA	Not in SFHA
Native vegetation community	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest	Felsic Mesic Forest
Percent composition of exotic invasive vegetation	0	0	0	0

Wetland Summary Information		
Parameters	**Wetland 5**	**Wetland 6**
Size of Wetland (acres)	0.03	0.06
Wetland Type	riparian non-riverine	riparian non-riverine
Mapped Soil Series	FeD2	FsE & FeD2
Drainage class	well drained	well drained
Soil Hydric Status	not hydric	not hydric
Source of Hydrology	Toe Seep	Toe Seep
Hydrologic Impairment	none	none
Native vegetation community	Dist. Small Stream/ Narrow FP Forest	Dist. Small Stream/ Narrow FP Forest
Percent composition of exotic invasive vegetation	0	0

N/A Not-applicable

Table 5. Monitoring Component Summary

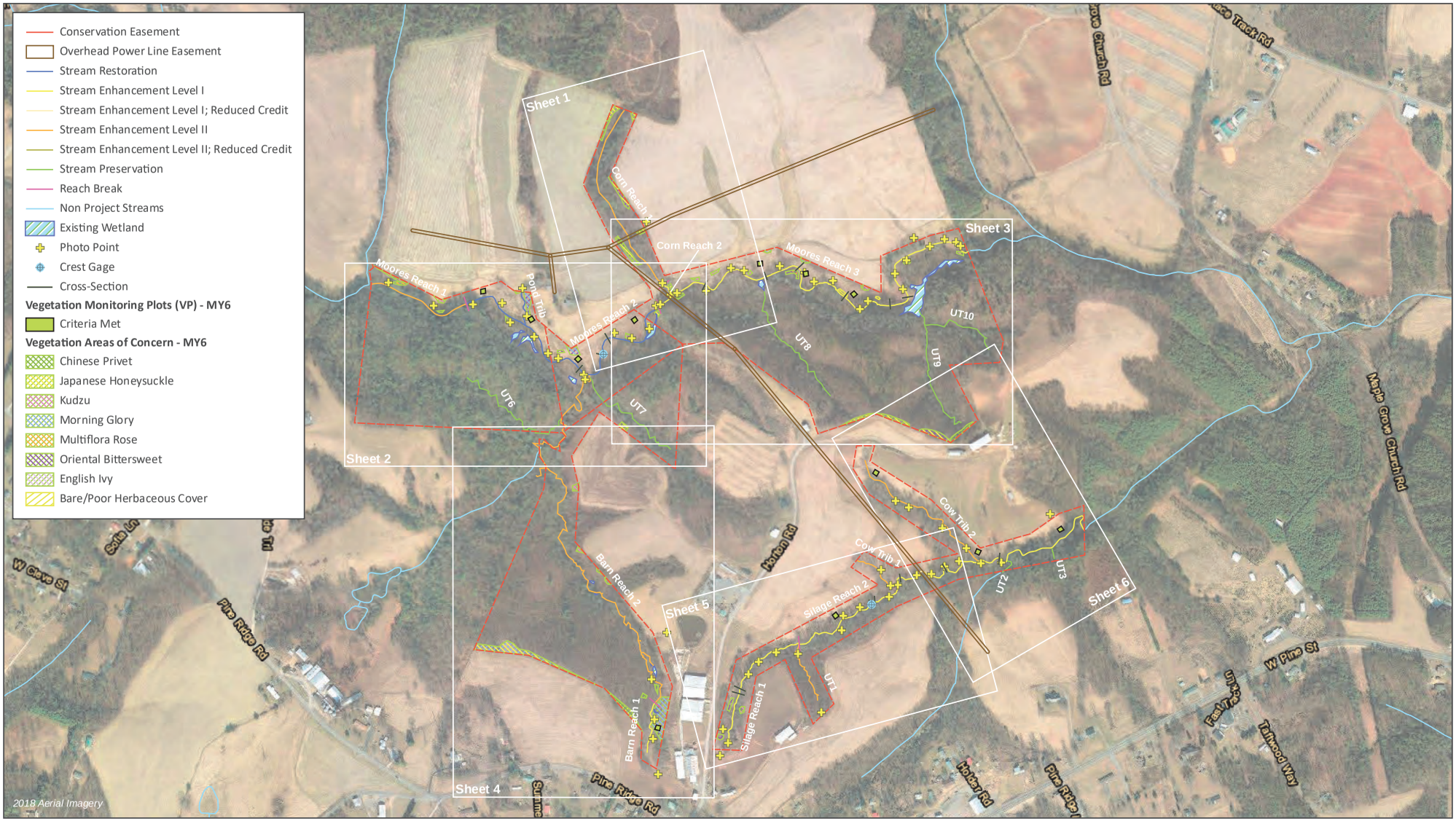
Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Parameter	Monitoring Feature	Quantity/ Length by Reach												Frequency
		Moores Reach 1	Pond Trib	Moores Reach 2	Corn Reach 1	Corn Reach 2	Moores Reach 3	Silage Reach 1	Silage Reach 2	UT1	Cow Trib 1	Cow Trib 2	Barn 1	Barn 2	
Dimension	Riffle XS			2			4	1	3						Years 1, 2, 3, 5, 7
	Pool XS			1			2	1	2						Years 1, 2, 3, 5, 7
Substrate	100 Pebble Count			2			4	1	3						Annual
Hydrology	Crest Gage			1					1						Semi-Annual
Vegetation	Vegetation Plots			4			3	1	2			1	1		Annual
Visual Assessment	Project Site	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Semi-Annual
Reference Photos	Permanent Photo Points	2	2	11	1	2	19	6	12	2	2	4	3	3	Annual

APPENDIX B. Visual Assessment Data



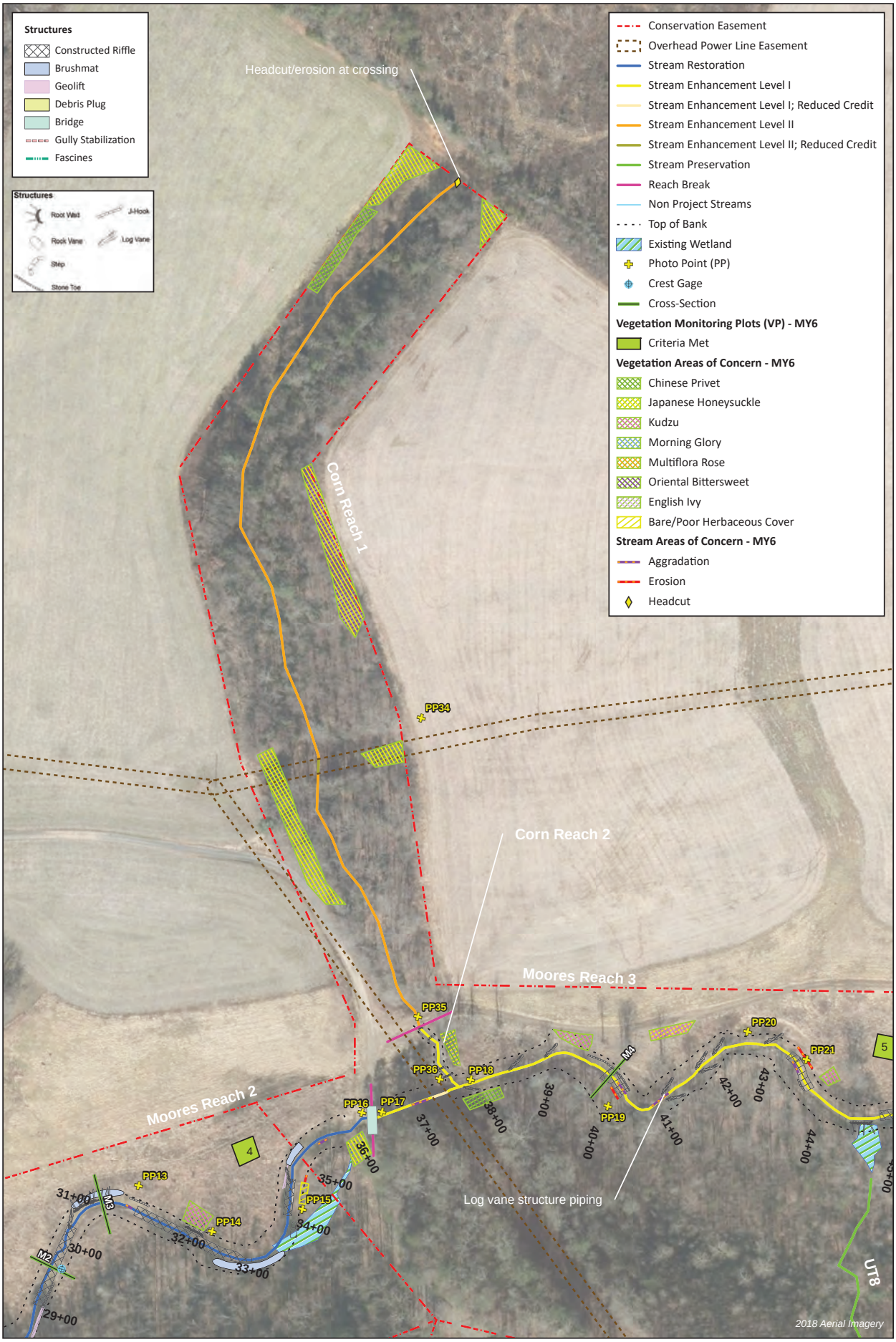
WILDLANDS ENGINEERING

0 300 600 Feet

N

Figure 3.0 Current Condition Plan View (Key)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Surry County, NC

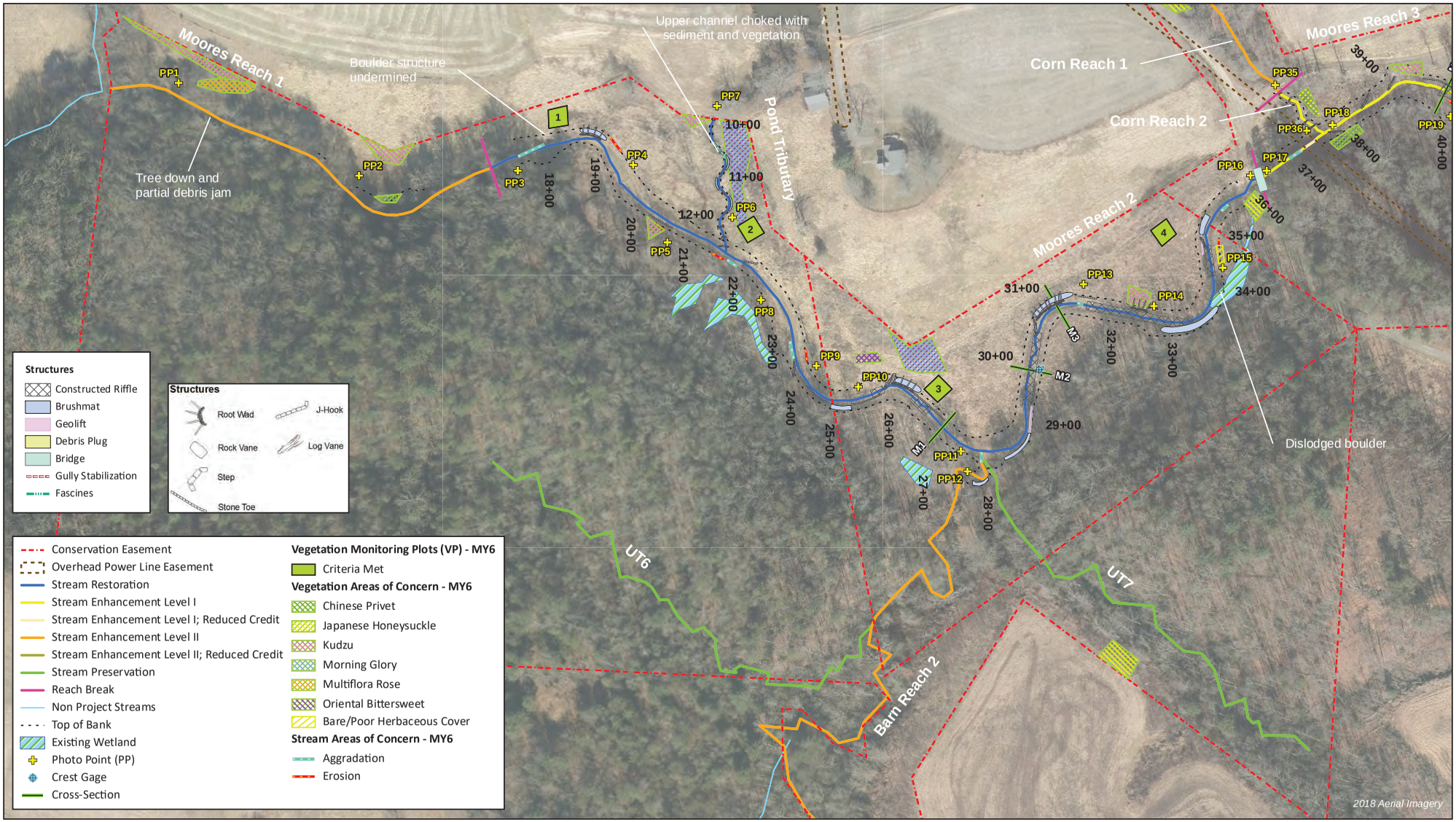


WILDLANDS ENGINEERING

0 125 250 Feet

Figure 3.1 Current Condition Plan View (Sheet 1 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Surry County, NC



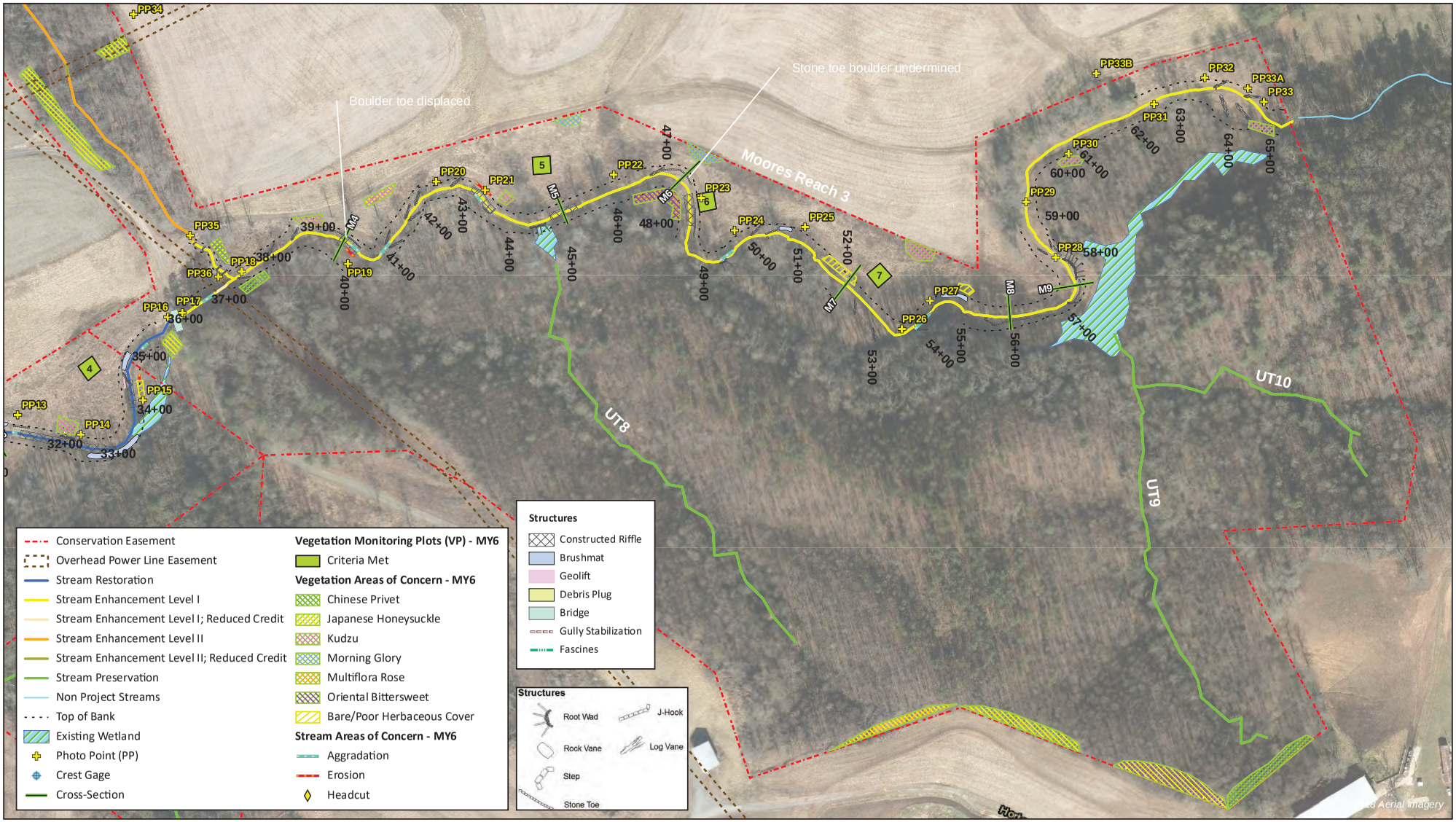
WILDLANDS ENGINEERING

0 150 300 Feet

N

Figure 3.2 Current Condition Plan View (Sheet 2 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

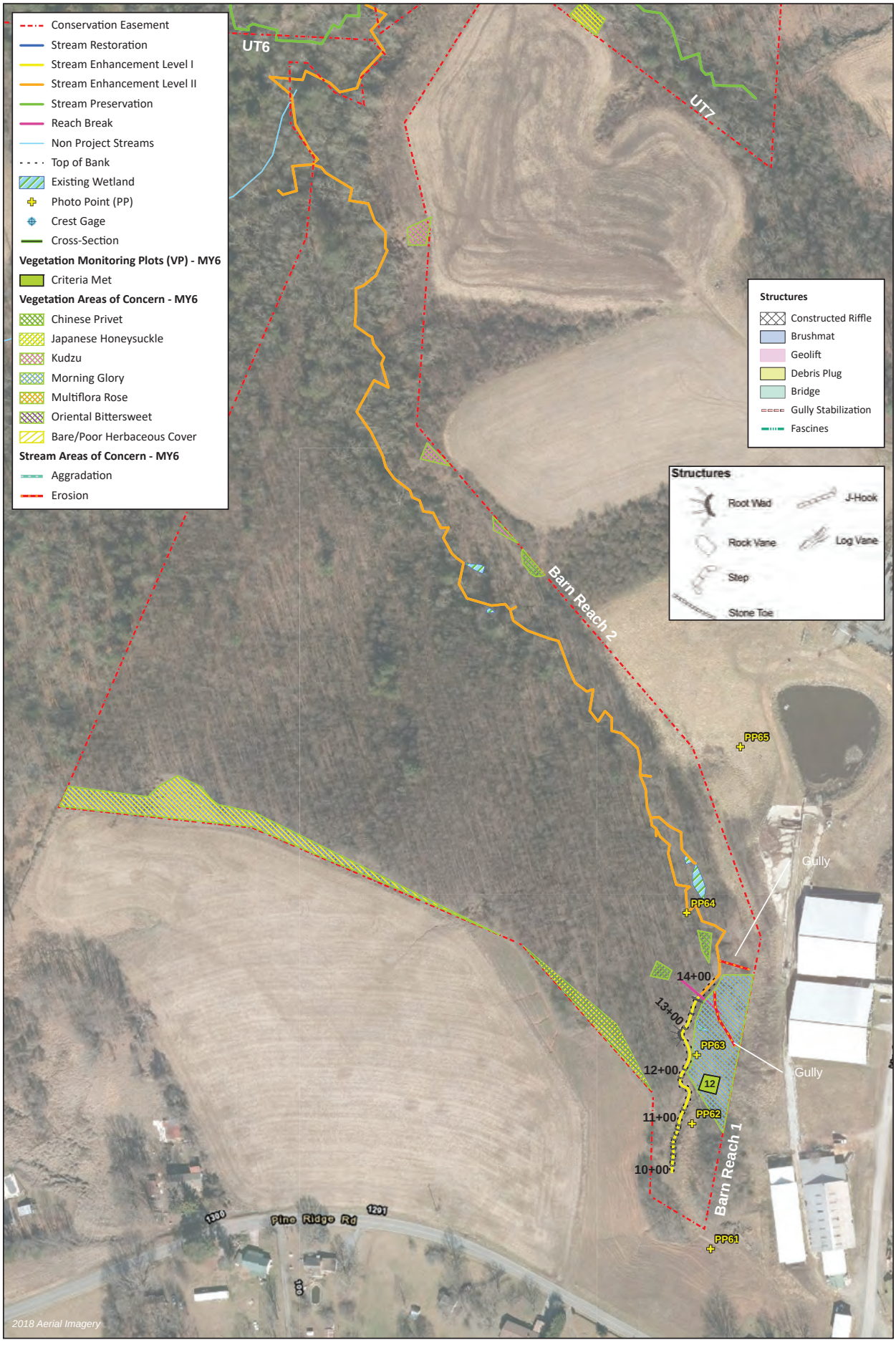
Surry County, NC



WILDLANDS ENGINEERING

Figure 3.3 Current Condition Plan View (Sheet 3 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Surry County, NC

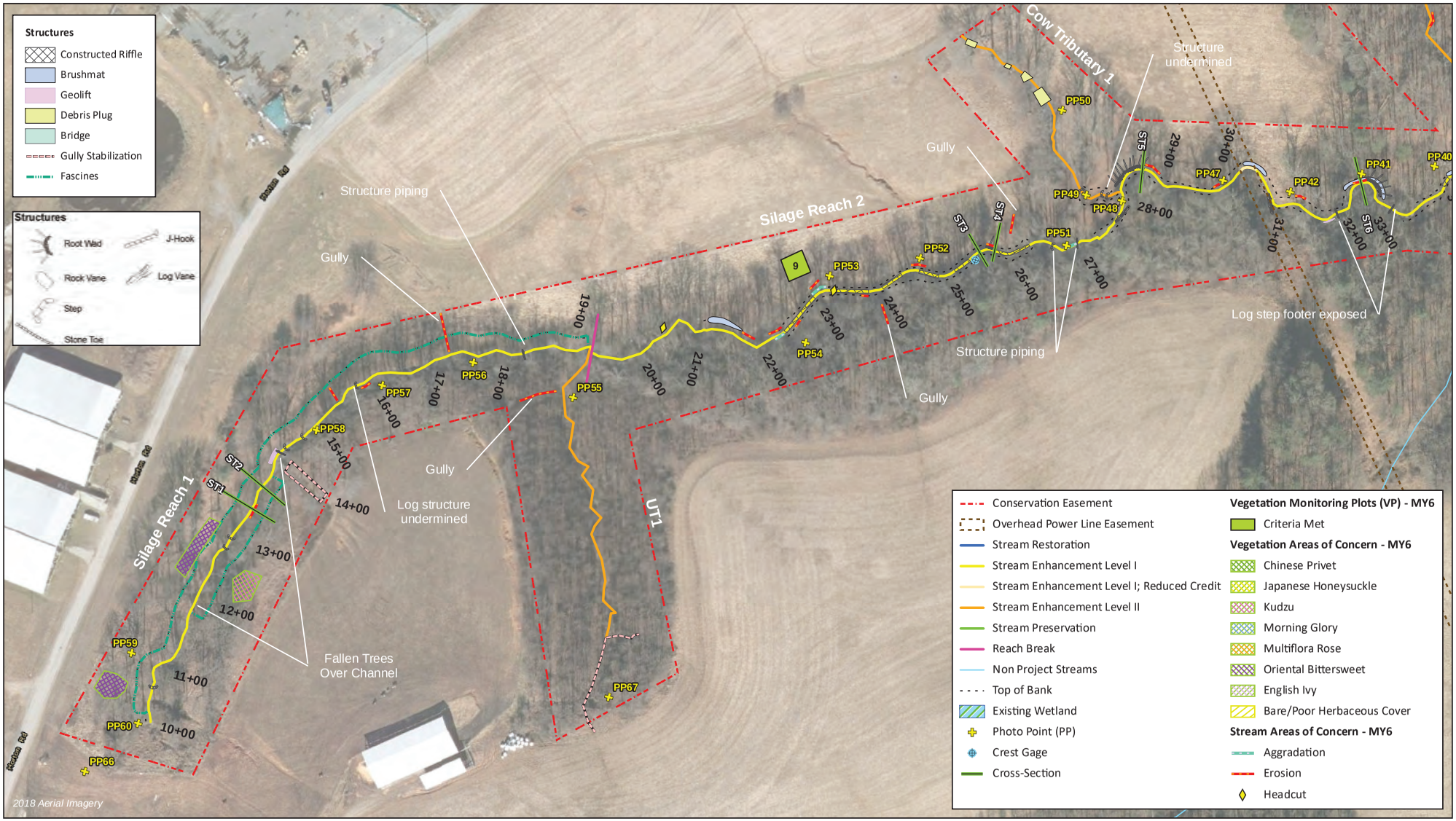


WILDLANDS ENGINEERING

0 250 500 Feet

Figure 3.4 Current Condition Plan View (Sheet 4 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

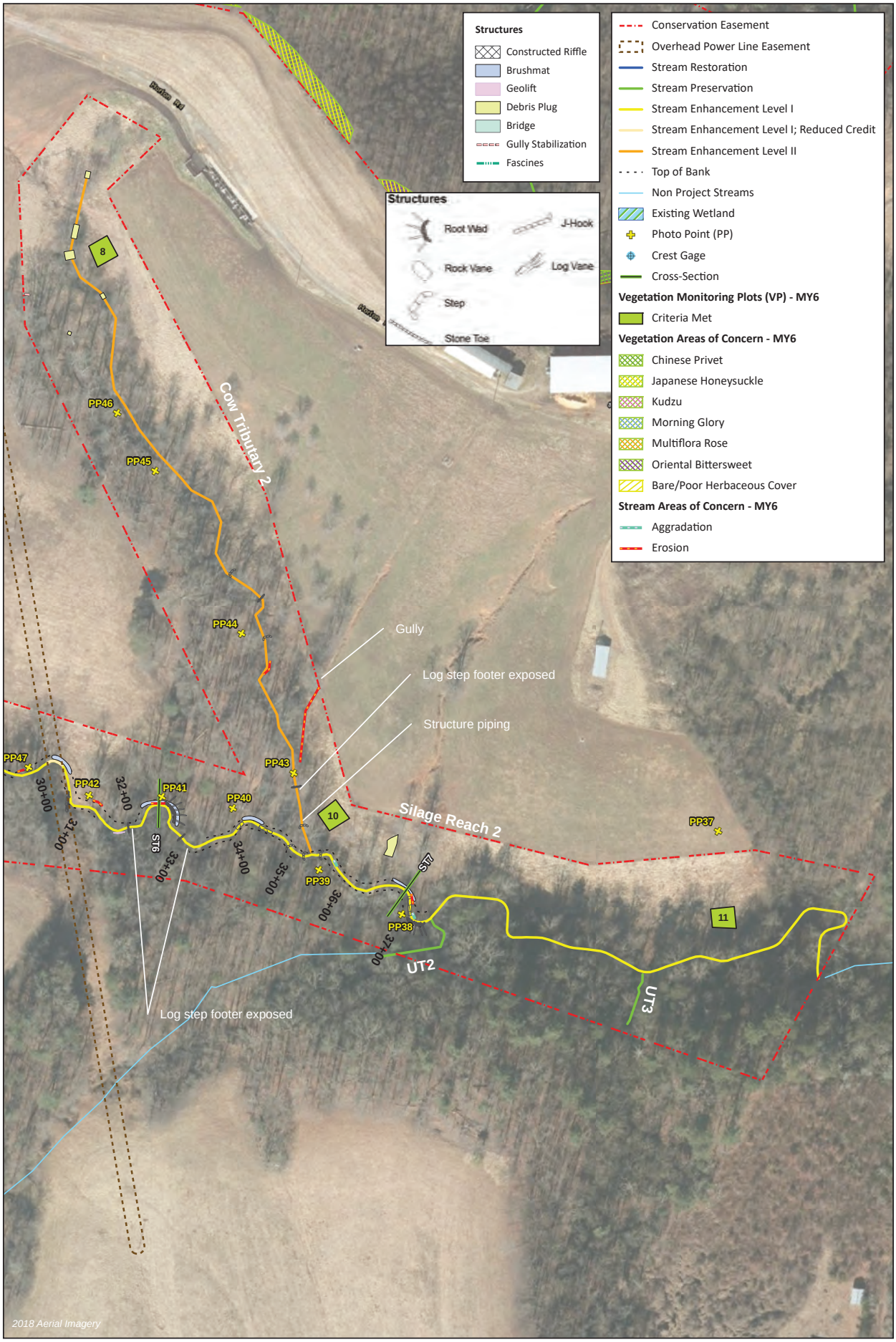
Surry County, NC



WILDLANDS ENGINEERING

Figure 3.5 Current Condition Plan View (Sheet 5 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Surry County, NC



WILDLANDS ENGINEERING

Figure 3.6 Current Condition Plan View (Sheet 6 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Surry County, NC

Table 6a. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Moores Fork Reach 1 (Assessed Length : 761 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	4	4			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	5	5			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	5	5			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	5	5			100%			
		2. Thalweg centering at downstream of meander (Glide)	5	5			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	N/A	N/A			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	N/A	N/A			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6b. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Moores Fork Reach 2 (Assessed Length : 1875 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			5	125	93%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	8	8			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	7	7			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	7	7			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	7	7			100%			
		2. Thalweg centering at downstream of meander (Glide)	7	7			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			5	95	97%	2	50	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	5	95	97%	2	50	99%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	14	16			88%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	5	5			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	14	16			88%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	8	9			89%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	2	2			100%			

Table 6c. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Moores Fork Reach 3 (Assessed Length : 2885 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			6	162	94%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	13	13			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	16	16			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	16	16			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	16	16			100%			
		2. Thalweg centering at downstream of meander (Glide)	16	16			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	55	99%	0	0	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	2	55	99%	0	0	99%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	25	27			93%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	27	27			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	16	18			89%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	3	3			100%			

Table 6d. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Silage Reach 1 (Assessed Length : 900 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	12	12			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	12	12			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	12	12			100%			
		2. Thalweg centering at downstream of meander (Glide)	12	12			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	35	98%	0	0	98%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	2	35	98%	0	0	98%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	6	8			75%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	8			75%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6e. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Silage Reach 2 (Assessed Length : 2448 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			5	73	97%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	14	15			93%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	13	16			81%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	13	16			81%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	13	16			81%			
		2. Thalweg centering at downstream of meander (Glide)	13	16			81%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			12	200	96%	1	15	96%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	12	200	96%	1	15	96%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	12	16			75%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	12	16			75%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	12	16			75%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	3	4			75%			

Table 6f. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Cow Trib 1 (Assessed Length : 167 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	2	2			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	2	2			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A			N/A			
		2. Thalweg centering at downstream of meander (Glide)	N/A	N/A			N/A			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	12	13			92%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	12	13			92%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	12	13			92%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6g. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Cow Trib 2 (Assessed Length : 767 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	N/A	N/A			N/A			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	N/A	N/A			N/A			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A			N/A			
		2. Thalweg centering at downstream of meander (Glide)	N/A	N/A			N/A			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	20	99%	0	0	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	1	20	99%	0	0	99%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	22	24			92%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	22	24			92%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	22	24			92%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6h. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Pond Trib (Assessed Length : 243 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			1	37	85%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	N/A	N/A			N/A			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	N/A	N/A			N/A			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A			N/A			
		2. Thalweg centering at downstream of meander (Glide)	N/A	N/A			N/A			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	7	7			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	7	7			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	N/A	N/A			N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 6i. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Barn Trib Reach 1 (Assessed Length : 350 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	N/A	N/A			N/A			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	N/A	N/A			N/A			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	N/A	N/A			N/A			
		2. Thalweg centering at downstream of meander (Glide)	N/A	N/A			N/A			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	15	15			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	15	15			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	15	15			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	1	1			100%			

Table 6j. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Corn Trib Reach 2 (Assessed Length : 112 feet)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A			N/A			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	1	1			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	1	1			100%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%			
		2. Thalweg centering at downstream of meander (Glide)	1	1			100%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	4			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	N/A	N/A			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	N/A	N/A			N/A			

Table 7. Vegetation Condition Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 6 - 2021

Date of Visual Assessments: April 2021, September 2021

Planted Acreage **15.4**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Cross Hatch Yellow	3	0.04	0.2%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	N/A	0	0.00	0.0%
			Total	3	0.04	0.2%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	N/A	0	0.00	0.0%
			Cumulative Total	3	0.04	0.2%

Easement Acreage **140**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	Cross Hatch (Color varies by species)	45	2.8	2.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	None	N/A	0	0.00	0.0%

Stream Photographs

PP1 – Moores Reach 1, looking upstream *(04/19/2021)*

PP2 – Moores Reach 1, looking downstream *(04/19/2021)*

PP3 – Moores Reach 2, looking downstream *(04/19/2021)*

PP4 – Moores Reach 2, looking downstream *(04/19/2021)*

PP5 – Moores Reach 2, looking upstream *(04/19/2021)*

PP6 – Pond Tributary, looking downstream *(04/19/2021)*

	
PP7 – Pond Tributary, looking downstream *(04/19/2021)*	**PP8** – Moores Reach 2, looking downstream *(04/19/2021)*
	
PP9 – Moores Reach 2, looking downstream *(04/19/2021)*	**PP10** – Moores Reach 2, looking downstream *(04/19/2021)*
	
PP11 – Moores Reach 2, looking downstream *(04/19/2021)*	**PP12 –** Barn Reach 2, looking upstream *(04/19/2021)*

	
PP13 – Moores Reach 2, looking downstream *(04/19/2021)*	**PP14 –** Moores Reach 2, looking downstream *(04/19/2021)*
	
PP15 – Moores Reach 2, looking downstream *(04/19/2021)*	**PP16 –** Moores Reach 2, looking upstream *(04/19/2021)*
	
PP17 – Moores Reach 3, looking downstream *(04/19/2021)*	**PP18 –** Moores Reach 3, looking downstream *(04/19/2021)*

	
PP19 – Moores Reach 3, looking downstream *(04/19/2021)*	**PP20 –** Moores Reach 3, looking downstream *(04/19/2021)*
	
PP21 – Moores Reach 3, looking downstream *(04/19/2021)*	**PP22 –** Moores Reach 3, looking downstream *(04/19/2021)*
	
PP23 – Moores Reach 3, looking downstream *(04/19/2021)*	**PP24 –** Moores Reach 3, looking downstream *(04/19/2021)*

PP25 – Moores Reach 3, looking downstream *(04/19/2021)*

PP26 – Moores Reach 3, looking downstream *(04/19/2021)*

PP27 – Moores Reach 3, looking downstream *(04/19/2021)*

PP28 – Moores Reach 3, looking downstream *(04/19/2021)*

PP29 – Moores Reach 3, looking downstream *(04/19/2021)*

PP30 – Moores Reach 3, looking downstream *(04/19/2021)*

PP31 – Moores Reach 3, looking downstream *(04/19/2021)*

PP32 – Moores Reach 3, looking downstream *(04/19/2021)*

PP33 – Moores Reach 3, looking downstream *(04/19/2021)*

PP33a – Moores Reach 3, looking upstream *(04/19/2021)*

PP33b – Moores Reach 3, looking downstream *(04/19/2021)*

PP34 – Corn Reach 1, looking downslope *(04/19/2021)*

PP35 – Corn Reach 2, looking downstream *(04/19/2021)*

PP36 – Corn Reach 2, looking upstream *(04/19/2021)*

PP37 – Silage Reach 2, looking downslope *(04/20/2021)*

PP38 – Silage Reach 2, looking downstream *(04/20/2021)*

PP39 – Silage Reach 2, looking upstream *(04/20/2021)*

PP40 – Silage Reach 2, looking downstream *(04/20/2021)*

PP41 – Silage Reach 2, looking downstream *(04/20/2021)*

PP42 – Silage Reach 2, looking downstream *(04/20/2021)*

PP43 – Cow Tributary 2, looking downstream *(04/20/2021)*

PP44 – Cow Tributary 2, looking downstream *(04/20/2021)*

PP45 – Cow Tributary 2, looking downstream *(04/20/2021)*

PP46 – Cow Tributary 2, looking upstream *(04/20/2021)*

PP47 – Silage Reach 2, looking downstream *(04/20/2021)*

PP48 – Silage Reach 2, looking upstream *(04/20/2021)*

PP49 – Cow Tributary 1, looking upstream *(04/20/2021)*

PP50 – Cow Tributary 1, looking upstream *(04/20/2021)*

PP51 – Silage Reach 2, looking downstream *(04/20/2021)*

PP52 – Silage Reach 2, looking upstream *(04/20/2021)*

PP53 – Silage Reach 2, looking downstream *(04/20/2021)*

PP54 – Silage Reach 2, looking upstream *(04/20/2021)*

PP55 – UT1, looking upstream *(04/20/2021)*

PP56 – Silage Reach 1, looking downstream *(04/20/2021)*

PP57 – Silage Reach 1, looking upstream *(04/20/2021)*

PP58 – Silage Reach 1, looking upstream *(04/20/2021)*

PP59 – Silage Reach 1, looking downstream *(04/20/2021)*

PP60 – Silage Reach 1, looking downstream *(04/20/2021)*

PP61 – Barn Reach 1, looking downslope *(04/19/2021)*

PP62 – Barn Reach 1, looking downstream *(04/19/2021)*

PP63 – Barn Reach 1, looking downstream *(04/19/2021)*

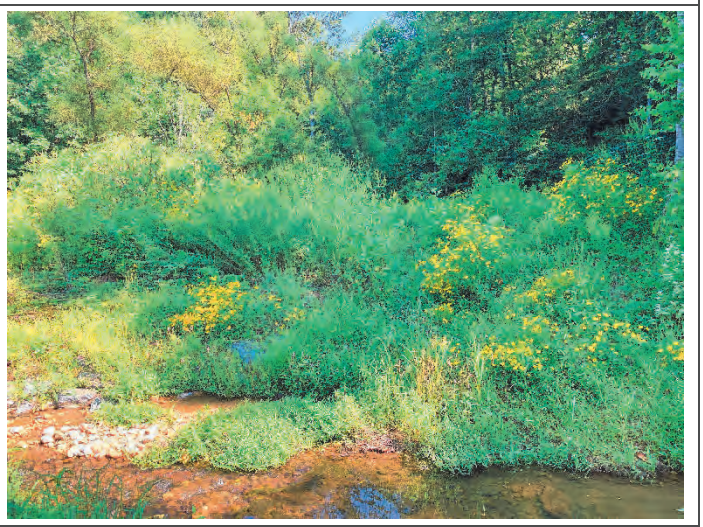
PP64 – Barn Reach 2, looking downstream *(04/19/2021)*

PP65 – Barn Reach 2, looking downslope *(04/19/2021)*

PP66 – Silage Reach 1, looking upslope *(04/20/2021)*

PP67 – UT1, looking downstream *(04/20/2021)*

Stream Repair Photographs

	
Moores Fork Reach 2 STA 35+40 left bank repair – 4/19/2021	Moores Fork Reach 2 STA 35+40 left bank repair – 9/7/2021
	
UT8/Wetland outlet repair at confluence with Moores Fork – 4/19/2021	UT8/Wetland outlet repair at confluence with Moores Fork – 9/7/2021
	
UT10/Wetland outlet repair at confluence with Moores Fork – 4/19/2021	UT10/Wetland outlet repair at confluence with Moores Fork – 9/7/2021

	
UT10/Wetland outlet repair – 4/19/2021	UT10/Wetland outlet repair – 9/7/2021
	
Moores Fork Reach 3 STA 64+10 left bank repair – 4/19/2021	Moores Fork Reach 3 STA 64+10 left bank repair – 9/7/2021
	
Silage Reach 1 STA 10+40 gully stabilization – 4/19/2021	Silage Reach 1 STA 10+40 gully stabilization – 9/8/2021

	
Silage Reach 1 STA 19+00 right bank repair – 4/20/2021	Silage Reach 1 STA 19+00 right bank repair – 9/8/2021
	
UT1 downstream repair near confluence with Silage Reach 1 – 4/20/2021	UT1 downstream repair near confluence with Silage Reach 1 – 9/8/2021
	
Upper UT1 repair area gully stabilization – 4/20/2021	Upper UT1 repair area gully stabilization – 9/8/2021

Silage Reach 1 STA 30+30 left bank repair – 4/20/2021

Silage Reach 1 STA 30+30 left bank repair – 9/8/2021

Upper Cow Trib 2 repair area gully stabilization – 4/20/2021

Upper Cow Trib 2 repair area gully stabilization – 9/8/2021

Upper Cow Trib 2 repair area – 4/20/2021

Upper Cow Trib 2 repair area – 9/8/2021

Vegetation Photographs

Vegetation Plot 1 – *(9/7/2021)*

Vegetation Plot 2 – *(9/7/2021)*

Vegetation Plot 3 – *(9/7/2021)*

Vegetation Plot 4 – *(9/7/2021)*

Vegetation Plot 5 – *(9/7/2021)*

Vegetation Plot 6 – *(9/7/2021)*

Vegetation Plot 7 – *(9/7/2021)*

Vegetation Plot 8 – *(9/8/2021)*

Vegetation Plot 9 – *(9/8/2021)*

Vegetation Plot 10 – *(9/8/2021)*

Vegetation Plot 11 – *(9/8/2021)*

Vegetation Plot 12 – *(9/8/2021)*

APPENDIX C. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Plot	MY7 Success Criteria Met (Y/N)	Tract Mean
1	Y	100%
2	Y	
3	Y	
4	Y	
5	Y	
6	Y	
7	Y	
8	Y	
9	Y	
10	Y	
11	Y	
12	Y	

Table 9. CVS Vegetation Plot Metadata
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Database Name	cvs-eep-entrytool-v2.5.0 Moores MY6.mdb
Database Location	L:\Active Projects\005-02153 Moores Monitoring\Monitoring\Monitoring Year 6 (2021)\Vegetation Assessment
Computer Name	MIMI-PC
File Size	53542912
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	94709
Project Name	Moores Fork Stream Mitigation
Description	
River Basin	
Length(ft)	
Stream-to-edge Width (ft)	
Area (sq m)	
Required Plots (calculated)	
Sampled Plots	12
Required Plots (calculated)	12
Sampled Plots	12

Table 10a. Planted and Total Stem Counts
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Current Plot Data (MY6 2021)																													
			94709-01-0001			94709-01-0002			94709-01-0003			94709-01-0004			94709-01-0005			94709-01-0006			94709-01-0007			94709-01-0008			94709-01-0009		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	Red Maple	Tree																											
Alnus serrulata	Tag Alder	Shrub Tree																		2									
Betula nigra	River Birch, Red Birch	Tree										1	1	1	2	2	3			3									
Cercis canadensis	Redbud	Shrub Tree							1	1	1													1	1	2			
Cornus florida	Flowering dogwood	Tree																											
Diospyros virginiana	American Persimmon	Tree	3	3	3	1	1	1										1	1	1							1	1	1
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree										8	8	8	1	1	1	1	1	1	4	4	5						
Juglans nigra	Black Walnut	Tree															1												
Liriodendron tulipifera	Tulip Poplar	Tree							3	3	3							1	1	1				1	1	1			
Nyssa sylvatica	Black Gum	Tree																2	2	2	2	2	3	2	2	2	1	1	1
Platanus occidentalis	Sycamore	Tree							1	1	1	4	4	4	9	9	9	2	2	2	7	7	7						
Prunus serotina	Black Cherry	Tree																											
Pyrus calleryana	Bradford Pear	Tree															2									1			
Quercus lyrata	Overcup Oak	Tree	6	6	6	4	4	4				2	2	2				3	3	3				4	4	4	6	6	7
Quercus montana	Rock Chestnut Oak	Tree				1	1	1	1	1	1							2	2	2							1	1	1
Quercus nigra	Water Oak	Tree	3	3	3	1	1	1				1	1	1	1	1	1							1	1	1	6	6	6
Quercus phellos	Willow Oak	Tree										1	1	1	2	2	2										1	1	1
Quercus rubra	Northern Red Oak	Tree							1	1	1																		
Rhus copallinum	Winged Sumac	Shrub Tree																								4			
Rhus glabra	Smooth Sumac	Shrub Tree																											
Salix nigra	Black Willow	Tree																		3									
Stem count			12	12	12	7	7	7	7	7	7	17	17	17	15	15	19	12	12	20	13	13	15	9	9	15	16	16	17
size (ares)			1			1			1			1			1			1			1			1			1		
size (ACRES)			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471			0.02471		
Species count			3	3	3	4	4	4	5	5	5	6	6	6	5	5	7	7	7	10	3	3	3	5	5	7	6	6	6
Stems per ACRE			486	486	486	283	283	283	283	283	283	688	688	688	607	607	769	486	486	809	526	526	607	364	364	607	647	647	688

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

PnoLS: Number of planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total stems

Table 10b. Planted and Total Stem Counts
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Current Plot Data (MY6 2021)											Annual Stem Counts & Means																				
			94709-01-0010			94709-01-0011			94709-01-0012			MY6 (2021)			MY5 (2020)			MY4 (2019)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	Red Maple	Tree			30			3						33			144			10			20			7						
Alnus serrulata	Tag Alder	Shrub Tree												2																		
Betula nigra	River Birch, Red Birch	Tree										3	3	7	1	1	5	1	1	3			1	1	1	3			2			
Cercis canadensis	Redbud	Shrub Tree										2	2	3	2	2	4			1			1									
Cornus florida	Flowering dogwood	Tree			2									2			2															
Diospyros virginiana	American Persimmon	Tree	4	4	4	1	1	1	6	6	7	17	17	18	18	18	19	17	17	18	17	17	21	16	16	17	14	14	14	14	14	14
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree							2	2	2	16	16	17	17	17	18	15	15	15	15	15	17	15	15	16	13	13	13	14	14	14
Juglans nigra	Black Walnut	Tree									1			2																		
Liriodendron tulipifera	Tulip Poplar	Tree			55							5	5	60	5	5	55	4	4	41	4	4	48	4	4	70	4	4	8	4	4	4
Nyssa sylvatica	Black Gum	Tree	4	4	4	5	5	6				16	16	18	16	16	16	16	16	16	16	16	16	17	17	17	20	20	20	19	19	19
Platanus occidentalis	Sycamore	Tree							1	1	1	24	24	24	24	24	24	24	24	24	23	23	23	24	24	24	25	25	26	26	26	26
Prunus serotina	Black Cherry	Tree															2															
Pyrus calleryana	Bradford Pear	Tree												3						2												
Quercus lyrata	Overcup Oak	Tree				3	3	3	1	1	1	29	29	30	29	29	29	29	29	29	28	28	28	30	30	30	28	28	28	29	29	29
Quercus montana	Rock Chestnut Oak	Tree				5	5	5				10	10	10	9	9	9	11	11	11	14	14	14	14	14	14	21	21	21	22	22	22
Quercus nigra	Water Oak	Tree	3	3	3							16	16	16	16	16	16	15	15	15	15	15	15	15	15	17	14	14	14	14	14	14
Quercus phellos	Willow Oak	Tree										4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	7	7	7	7	7	7
Quercus rubra	Northern Red Oak	Tree										1	1	1	1	1	2															
Rhus copallinum	Winged Sumac	Shrub Tree												4			1															
Rhus glabra	Smooth Sumac	Shrub Tree																		2			5			2			1			
Salix nigra	Black Willow	Tree												3																		
Stem count			11	11	98	14	14	18	10	10	12	143	143	257	142	142	350	136	136	191	136	136	213	140	140	221	146	146	154	149	149	149
size (ares)			1			1			1			12			12			12			12			12			12			12		
size (ACRES)			0.02471			0.02471			0.02471			0.29653			0.29653			0.29653			0.29653			0.29653			0.29653			0.29653		
Species count			3	3	6	4	4	5	4	4	5	12	12	19	12	12	16	10	10	14	9	9	13	10	10	12	9	9	11	9	9	9
Stems per ACRE			445	445	3966	567	567	728	405	405	486	482	482	867	479	479	1180	459	459	644	459	459	718	472	472	745	492	492	519	502	502	502

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

PnoLS: Number of planted stems excluding live stakes
P-all: Number of planted stems including live stakes
T: Total stems

APPENDIX D. Morphological Summary Data and Plots

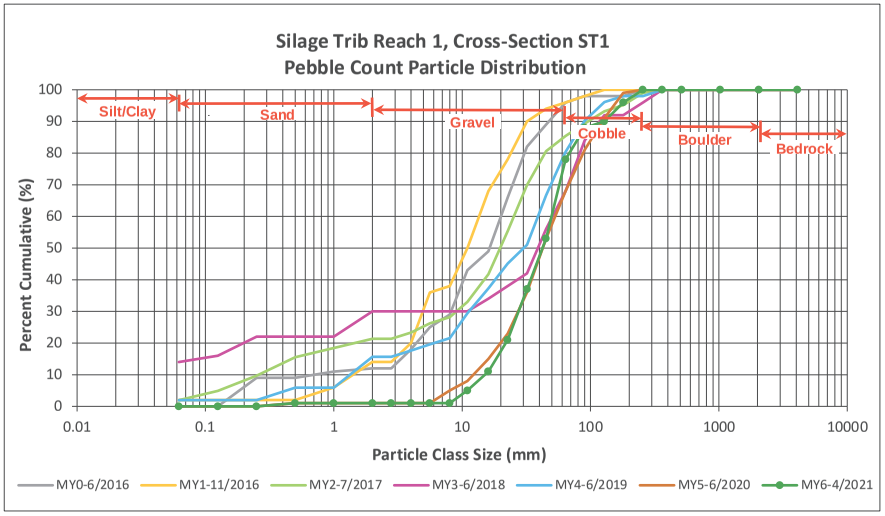
Cross-Section Pebble Count Plots

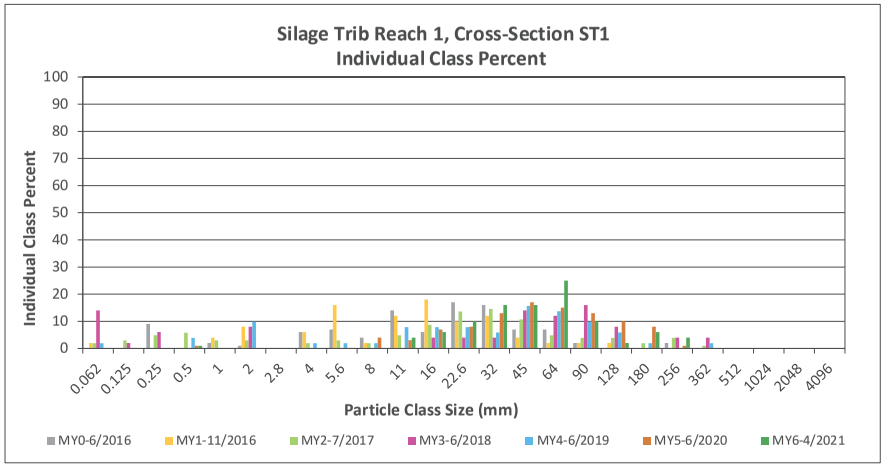
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Silage Trib Reach 1, Cross-Section ST1

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	1	1	1
	Coarse	0.5	1.0			1
	Very Coarse	1.0	2.0			1
GRAVEL	Very Fine	2.0	2.8			1
	Very Fine	2.8	4.0			1
	Fine	4.0	5.6			1
	Fine	5.6	8.0			1
	Medium	8.0	11.0	4	4	5
	Medium	11.0	16.0	6	6	11
	Coarse	16.0	22.6	10	10	21
	Coarse	22.6	32	16	16	37
	Very Coarse	32	45	16	16	53
	Very Coarse	45	64	25	25	78
COBBLE	Small	64	90	10	10	88
	Small	90	128	2	2	90
	Large	128	180	6	6	96
	Large	180	256	4	4	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section ST1	
Channel materials (mm)	
D_{16} =	19.0
D_{35} =	30.6
D_{50} =	42.2
D_{84} =	78.5
D_{95} =	170.1
D_{100} =	256.0





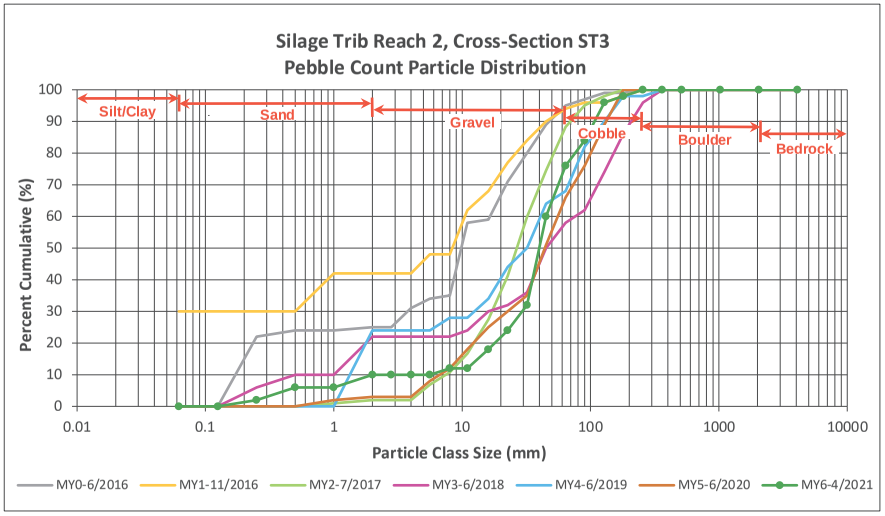
Cross-Section Pebble Count Plots

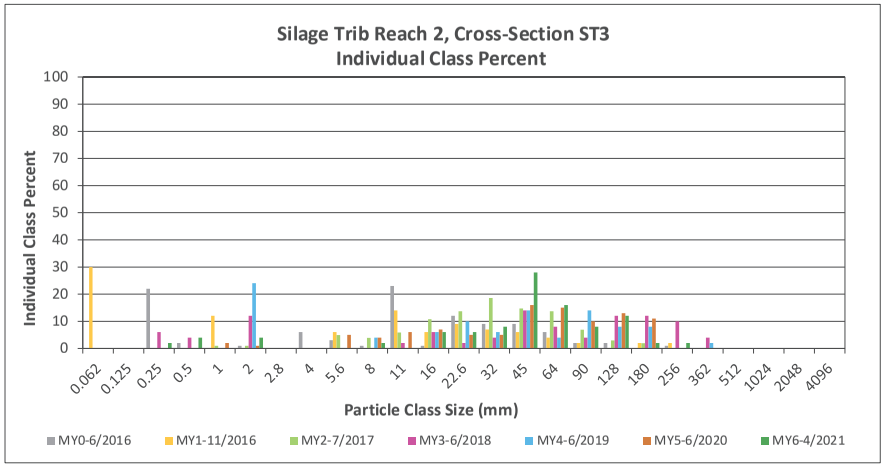
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Silage Trib Reach 2, Cross-Section ST3

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	2	2	2
	Medium	0.25	0.50	4	4	6
	Coarse	0.5	1.0			6
	Very Coarse	1.0	2.0	4	4	10
GRAVEL	Very Fine	2.0	2.8			10
	Very Fine	2.8	4.0			10
	Fine	4.0	5.6			10
	Fine	5.6	8.0	2	2	12
	Medium	8.0	11.0			12
	Medium	11.0	16.0	6	6	18
	Coarse	16.0	22.6	6	6	24
	Coarse	22.6	32	8	8	32
	Very Coarse	32	45	28	28	60
	Very Coarse	45	64	16	16	76
COBBLE	Small	64	90	8	8	84
	Small	90	128	12	12	96
	Large	128	180	2	2	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section ST3	
Channel materials (mm)	
D_{16} =	14.1
D_{35} =	33.2
D_{50} =	39.8
D_{84} =	90.0
D_{95} =	124.3
D_{100} =	256.0





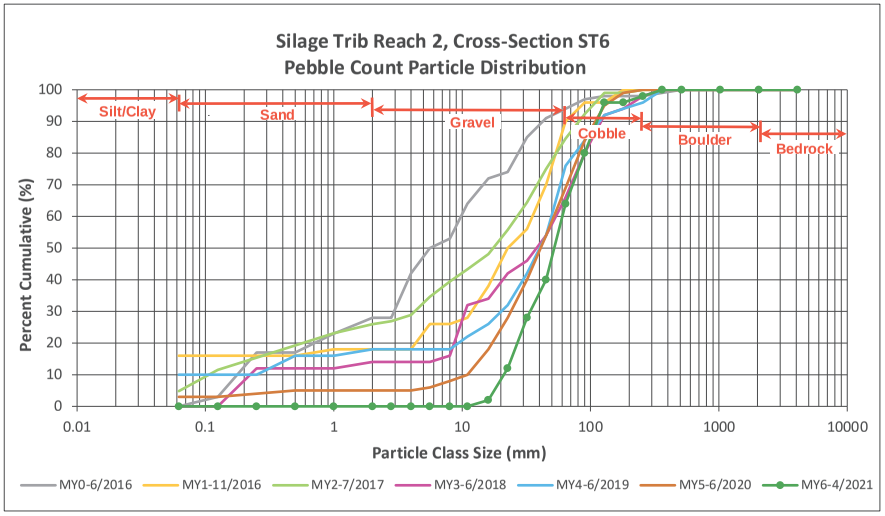
Cross-Section Pebble Count Plots

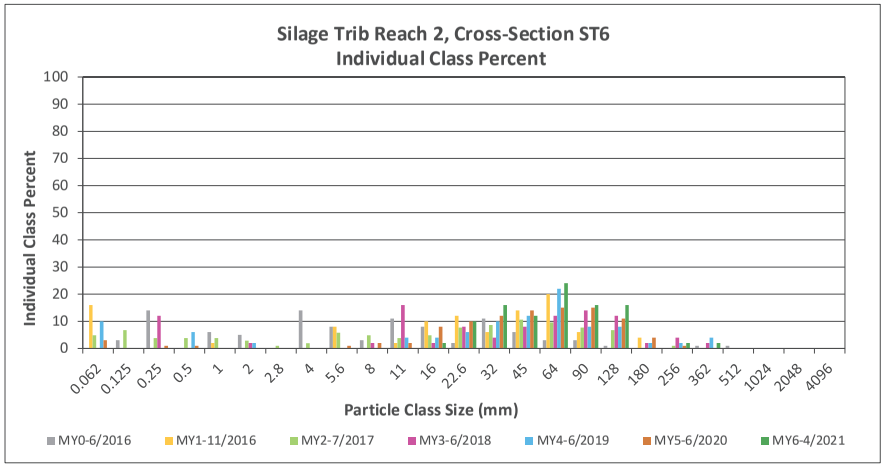
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Silage Trib Reach 2, Cross-Section ST6

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0	2	2	2
	Coarse	16.0	22.6	10	10	12
	Coarse	22.6	32	16	16	28
	Very Coarse	32	45	12	12	40
	Very Coarse	45	64	24	24	64
COBBLE	Small	64	90	16	16	80
	Small	90	128	16	16	96
	Large	128	180			96
	Large	180	256	2	2	98
BOULDER	Small	256	362	2	2	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	100	100	100

Cross-Section ST6	
Channel materials (mm)	
D_{16} =	24.7
D_{35} =	39.0
D_{50} =	52.1
D_{84} =	98.3
D_{95} =	125.2
D_{100} =	362.0





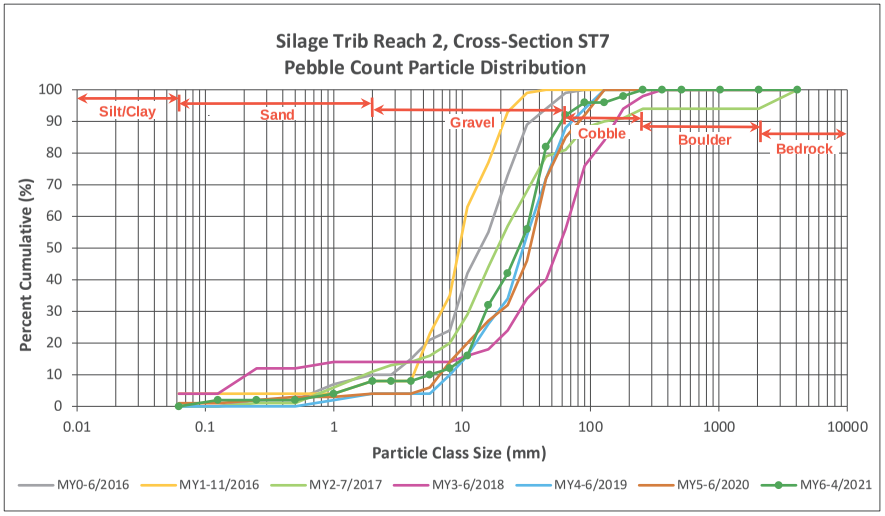
Cross-Section Pebble Count Plots

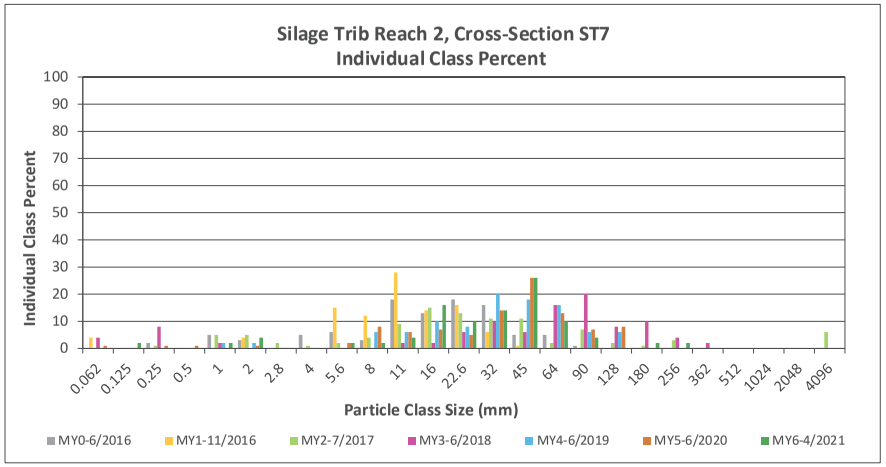
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Silage Trib Reach 2, Cross-Section ST7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125	2	2	2
	Fine	0.125	0.250			2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0	2	2	4
	Very Coarse	1.0	2.0	4	4	8
GRAVEL	Very Fine	2.0	2.8			8
	Very Fine	2.8	4.0			8
	Fine	4.0	5.6	2	2	10
	Fine	5.6	8.0	2	2	12
	Medium	8.0	11.0	4	4	16
	Medium	11.0	16.0	16	16	32
	Coarse	16.0	22.6	10	10	42
	Coarse	22.6	32	14	14	56
	Very Coarse	32	45	26	26	82
	Very Coarse	45	64	10	10	92
COBBLE	Small	64	90	4	4	96
	Small	90	128			96
	Large	128	180	2	2	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	100	100	100

Cross-Section ST7	
Channel materials (mm)	
D_{16} =	11.0
D_{35} =	17.7
D_{50} =	27.6
D_{84} =	48.3
D_{95} =	82.6
D_{100} =	256.0





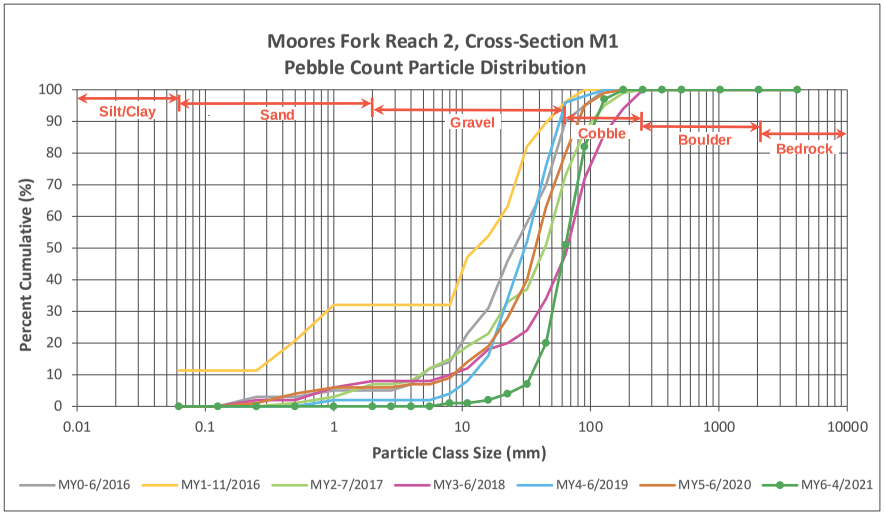
Cross-Section Pebble Count Plots

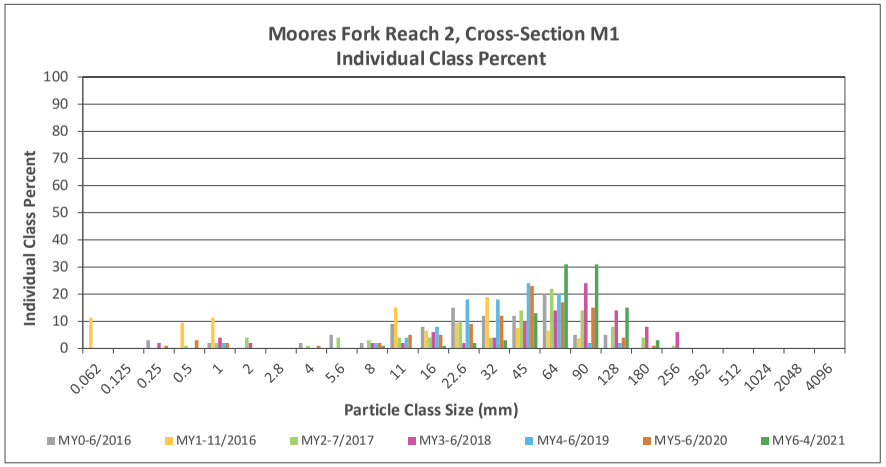
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Moores Fork Reach 2, Cross-Section M1

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0	1	1	1
	Medium	8.0	11.0			1
	Medium	11.0	16.0	1	1	2
	Coarse	16.0	22.6	2	2	4
	Coarse	22.6	32	3	3	7
	Very Coarse	32	45	13	13	20
	Very Coarse	45	64	31	31	51
COBBLE	Small	64	90	31	31	82
	Small	90	128	15	15	97
	Large	128	180	3	3	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	100	100	100

Cross-Section M1	
Channel materials (mm)	
D_{16} =	40.5
D_{35} =	53.4
D_{50} =	63.3
D_{84} =	94.3
D_{95} =	122.1
D_{100} =	180.0





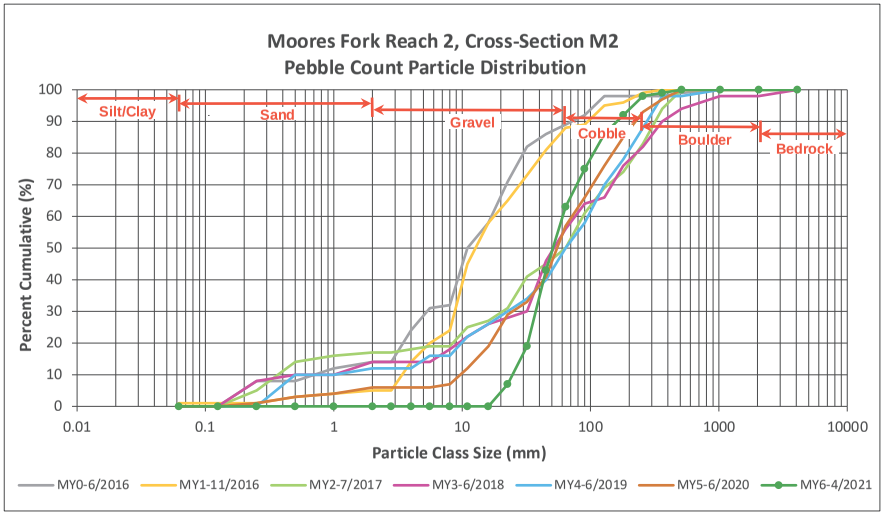
Cross-Section Pebble Count Plots

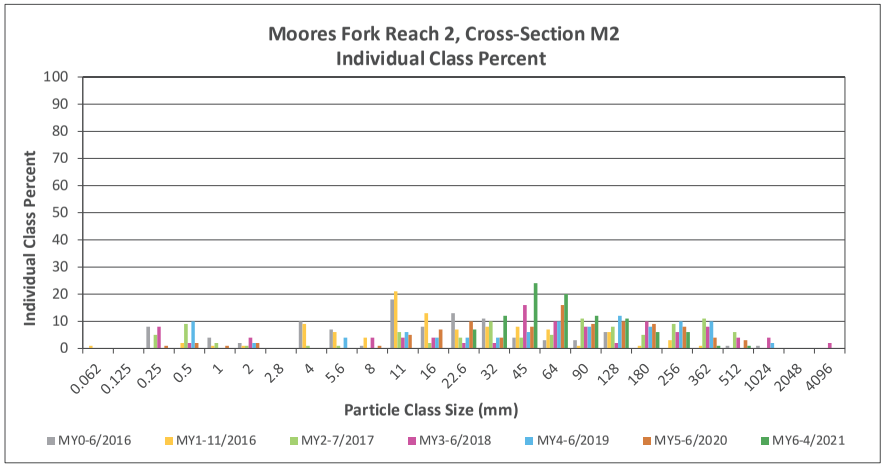
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Moores Fork Reach 2, Cross-Section M2

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6	7	7	7
	Coarse	22.6	32	12	12	19
	Very Coarse	32	45	24	24	43
	Very Coarse	45	64	20	20	63
COBBLE	Small	64	90	12	12	75
	Small	90	128	11	11	86
	Large	128	180	6	6	92
	Large	180	256	6	6	98
BOULDER	Small	256	362	1	1	99
	Small	362	512	1	1	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	100	100	100

Cross-Section M2	
Channel materials (mm)	
D_{16} =	29.3
D_{35} =	40.2
D_{50} =	50.9
D_{84} =	120.1
D_{95} =	214.7
D_{100} =	512.0





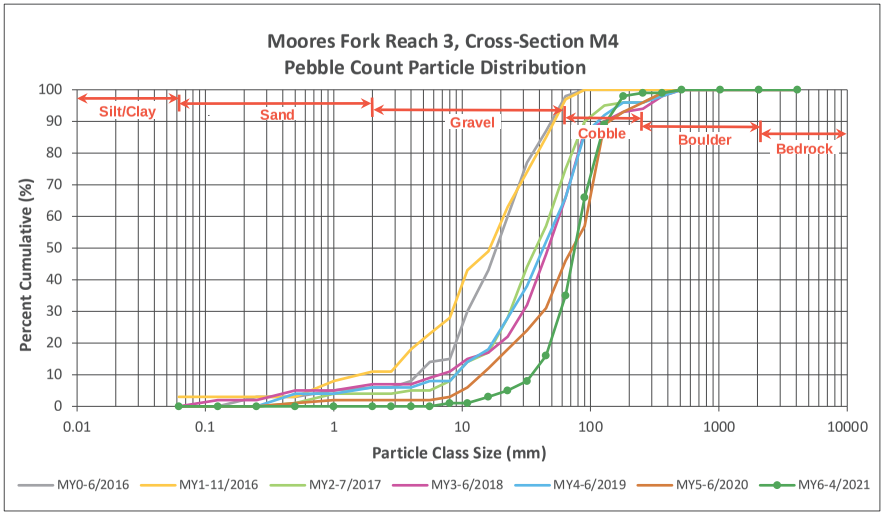
Cross-Section Pebble Count Plots

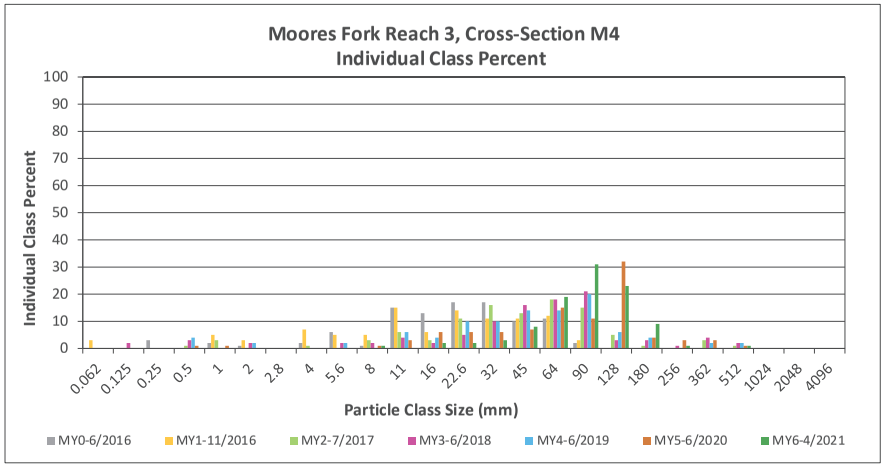
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Moores Fork Reach 3, Cross-Section M4

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0	1	1	1
	Medium	8.0	11.0			1
	Medium	11.0	16.0	2	2	3
	Coarse	16.0	22.6	2	2	5
	Coarse	22.6	32	3	3	8
	Very Coarse	32	45	8	8	16
	Very Coarse	45	64	19	19	35
COBBLE	Small	64	90	31	31	66
	Small	90	128	23	23	89
	Large	128	180	9	9	98
	Large	180	256	1	1	99
BOULDER	Small	256	362			99
	Small	362	512	1	1	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section M4	
Channel materials (mm)	
D_{16} =	45.0
D_{35} =	64.0
D_{50} =	75.5
D_{84} =	118.6
D_{95} =	160.7
D_{100} =	512.0





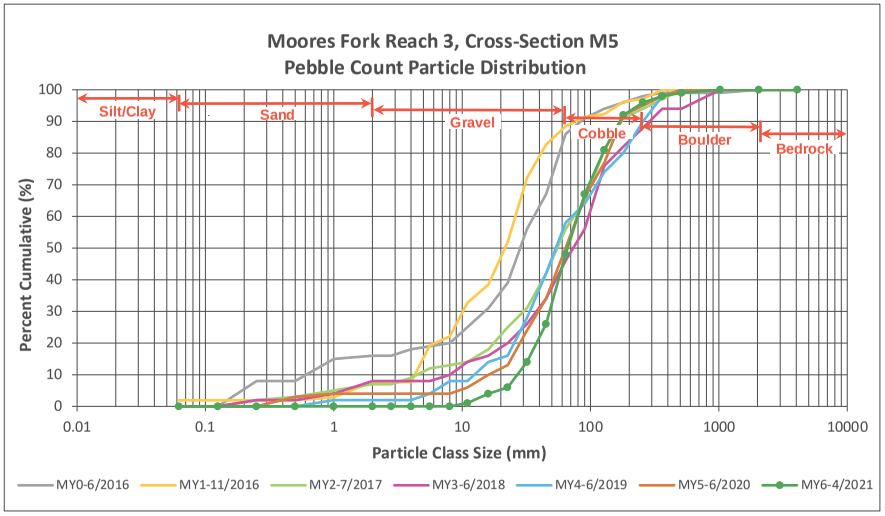
Cross-Section Pebble Count Plots

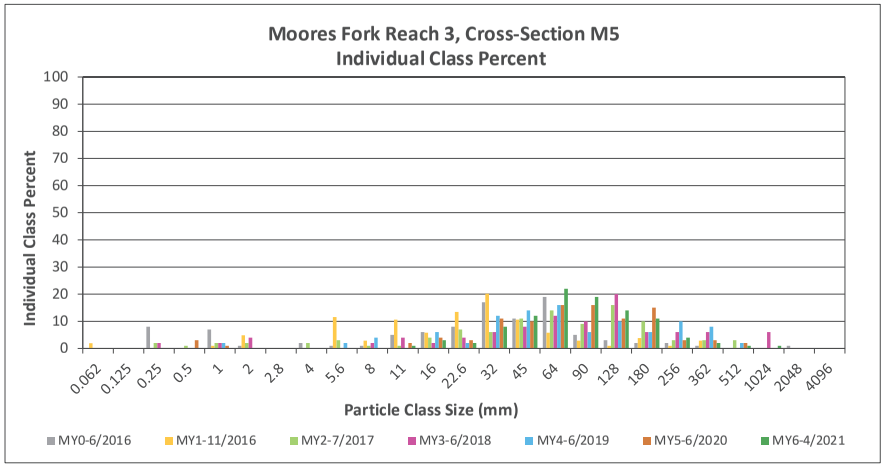
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Moores Fork Reach 3, Cross-Section M5

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0	1	1	1
	Medium	11.0	16.0	3	3	4
	Coarse	16.0	22.6	2	2	6
	Coarse	22.6	32	8	8	14
	Very Coarse	32	45	12	12	26
	Very Coarse	45	64	22	22	48
COBBLE	Small	64	90	19	19	67
	Small	90	128	14	14	81
	Large	128	180	11	11	92
	Large	180	256	4	4	96
BOULDER	Small	256	362	2	2	98
	Small	362	512	1	1	99
	Medium	512	1024	1	1	100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section M5	
Channel materials (mm)	
D_{16} =	33.9
D_{35} =	52.0
D_{50} =	66.3
D_{84} =	140.5
D_{95} =	234.4
D_{100} =	1024.0





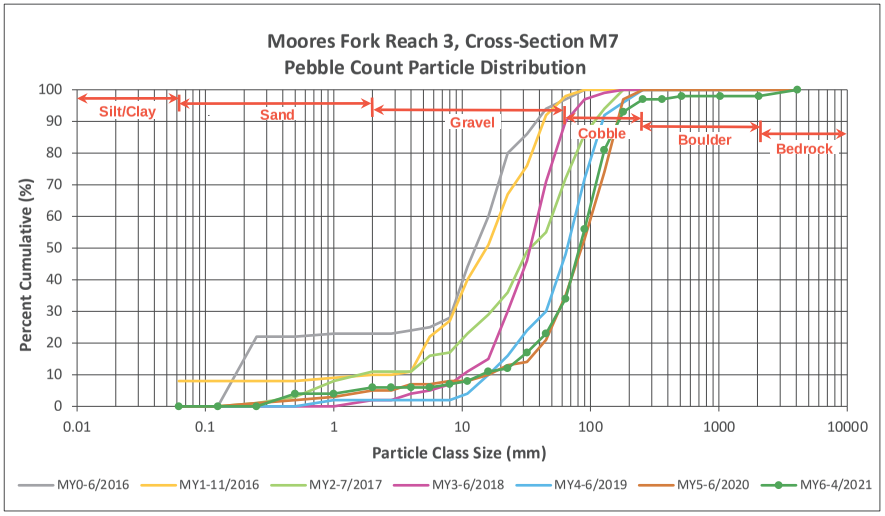
Cross-Section Pebble Count Plots

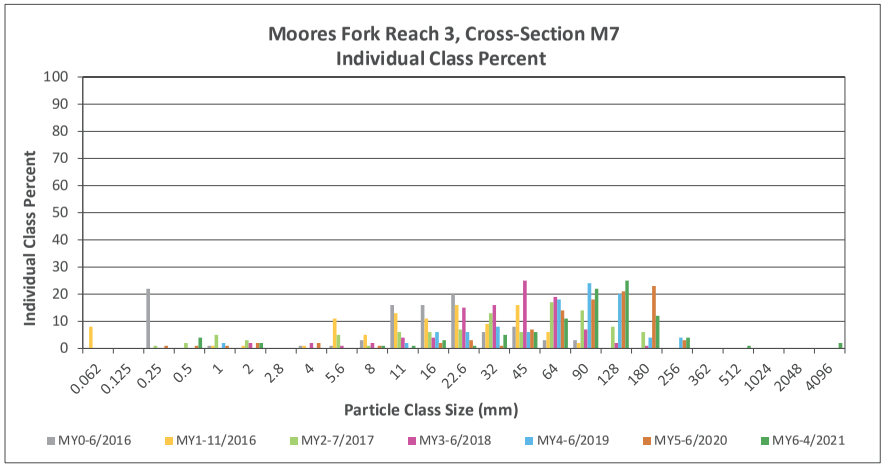
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Moores Fork Reach 3, Cross-Section M7

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	4	4	4
	Coarse	0.5	1.0			4
	Very Coarse	1.0	2.0	2	2	6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0			6
	Fine	4.0	5.6			6
	Fine	5.6	8.0	1	1	7
	Medium	8.0	11.0	1	1	8
	Medium	11.0	16.0	3	3	11
	Coarse	16.0	22.6	1	1	12
	Coarse	22.6	32	5	5	17
	Very Coarse	32	45	6	6	23
	Very Coarse	45	64	11	11	34
COBBLE	Small	64	90	22	22	56
	Small	90	128	25	25	81
	Large	128	180	12	12	93
	Large	180	256	4	4	97
BOULDER	Small	256	362			97
	Small	362	512	1	1	98
	Medium	512	1024			98
	Large/Very Large	1024	2048			98
BEDROCK	Bedrock	2048	>2048	2	2	100
			Total	**100**	**100**	**100**

Cross-Section M7	
Channel materials (mm)	
D_{16} =	29.8
D_{35} =	65.0
D_{50} =	82.0
D_{84} =	139.4
D_{95} =	214.7
D_{100} =	>2048





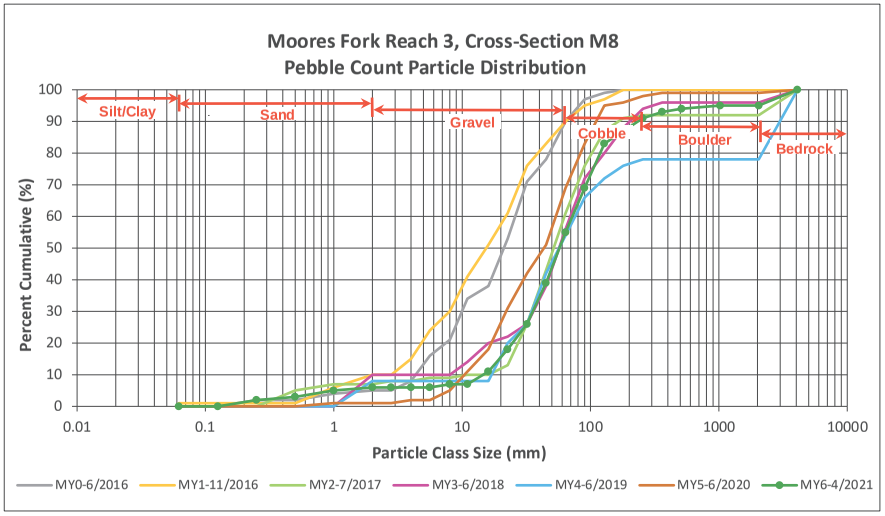
Cross-Section Pebble Count Plots

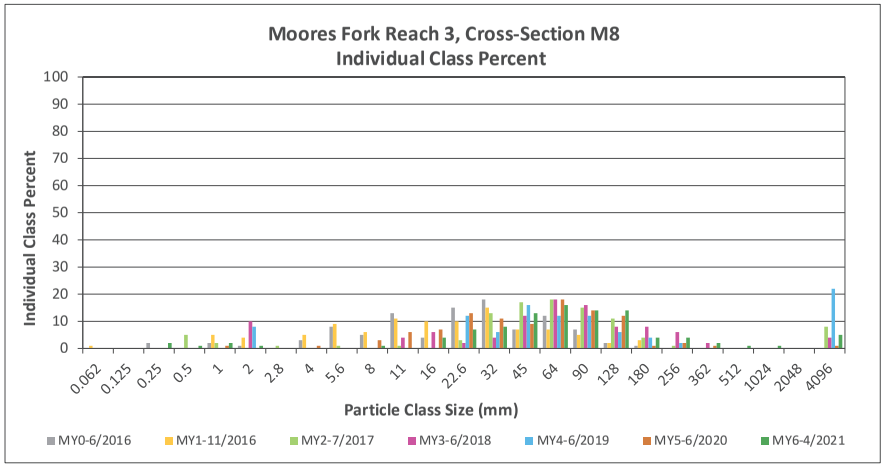
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Moores Fork Reach 3, Cross-Section M8

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	2	2	2
	Medium	0.25	0.50	1	1	3
	Coarse	0.5	1.0	2	2	5
	Very Coarse	1.0	2.0	1	1	6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0			6
	Fine	4.0	5.6			6
	Fine	5.6	8.0	1	1	7
	Medium	8.0	11.0			7
	Medium	11.0	16.0	4	4	11
	Coarse	16.0	22.6	7	7	18
	Coarse	22.6	32	8	8	26
	Very Coarse	32	45	13	13	39
	Very Coarse	45	64	16	16	55
COBBLE	Small	64	90	14	14	69
	Small	90	128	14	14	83
	Large	128	180	4	4	87
	Large	180	256	4	4	91
BOULDER	Small	256	362	2	2	93
	Small	362	512	1	1	94
	Medium	512	1024	1	1	95
	Large/Very Large	1024	2048			95
BEDROCK	Bedrock	2048	>2048	5	5	100
			Total	100	100	100

Cross-Section M8	
Channel materials (mm)	
D_{16} =	20.5
D_{35} =	40.5
D_{50} =	57.3
D_{84} =	139.4
D_{95} =	1024.0
D_{100} =	>2048



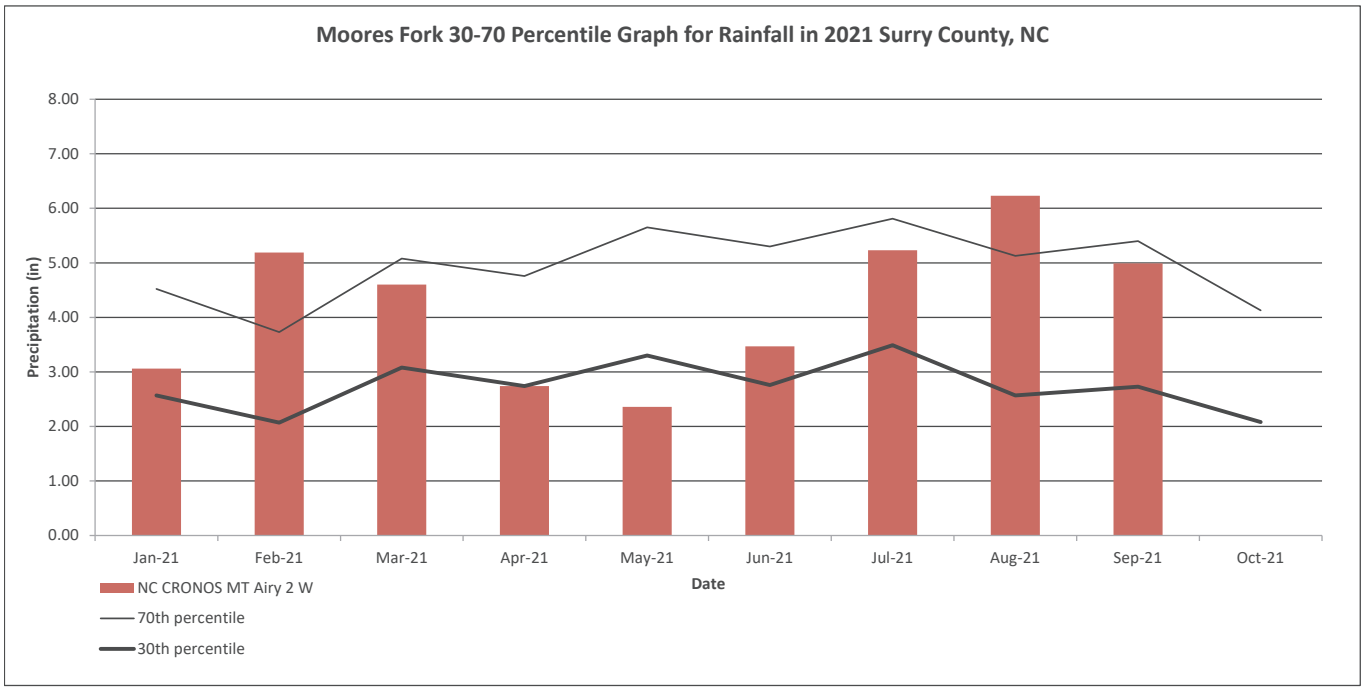


APPENDIX E. Hydrology Summary Data and Plots

Table 11. Verification of Bankfull Events
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

Reach	Monitoring Year	Date of Data Collection	Date of Occurrence	Method	Measurement (ft)
Moores Fork Reach 2	MY1	10/25/2016	~8/4/2016	Crest Gage	1.30
	MY2	7/10/2017	~5/25/2017	Crest Gage	2.55
	MY3	4/12/2018	~3/25/2018	Crest Gage	2.73
	MY4	3/13/2019	~2/24/2019	Crest Gage	2.30
		6/19/2019	~6/18/2019	Debris wracklines	N/A
	MY5	2/27/2020	~1/25/2020	Debris wracklines	N/A
		9/8/2020	~9/1/2020	Debris wracklines	N/A
	MY6	9/7/2021	~8/18/2021	Debris wracklines	N/A
Silage Reach 2	MY1	10/25/2016	~8/4/2016	Crest Gage	0.75
	MY3	4/12/2018	~3/25/2018	Debris wracklines	N/A
	MY4	6/19/2019	~6/18/2019	Crest Gage/Debris wracklines	N/A
	MY5	9/8/2020	~9/1/2020	Debris wracklines	N/A
	MY6	9/7/2021	~8/18/2021	Debris wracklines	N/A

Monthly Rainfall Data
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 6 - 2021

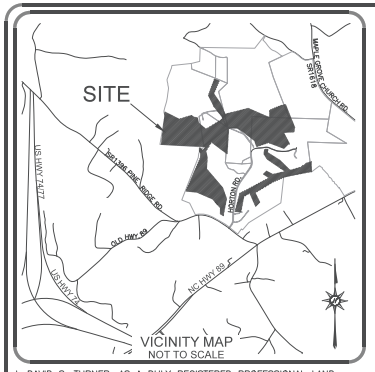


[1] 2021 rainfall collected from NC CRONOS Station Name: MT AIRY 2 W (NCCRONOS, 2021)

[2] 30th and 70th percentile rainfall data collected from weather station MT AIRY 2 W, NC (NCCRONOS, 2021)

APPENDIX F. Adaptive Management Activity

MOORES FORK REPAIR



I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

DAVID S. TURNER, P.L.S. #L-4551

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-4551 DAVID S. TURNER

I, DAVID S. TURNER, CERTIFY THAT THIS PROJECT WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION; THAT THIS TOPOGRAPHIC SURVEY WAS PERFORMED AT THE 95 PERCENT CONFIDENCE LEVEL TO MEET FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS; THAT THIS SURVEY WAS PERFORMED TO MEET THE REQUIREMENTS FOR A TOPOGRAPHIC SURVEY TO THE HORIZONTAL ACCURACY OF CLASS A AND THE VERTICAL ACCURACY WHEN APPLICABLE TO CLASS C STANDARD, AND THAT THE ORIGINAL DATA WAS OBTAINED IN FEB.-MAR. 2021; THAT THE SURVEY WAS COMPLETED ON 4 MARCH 2021; AND ALL COORDINATES ARE BASED ON NAD83 (2011) AND ALL ELEVATIONS ARE BASED ON NAVD88. WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

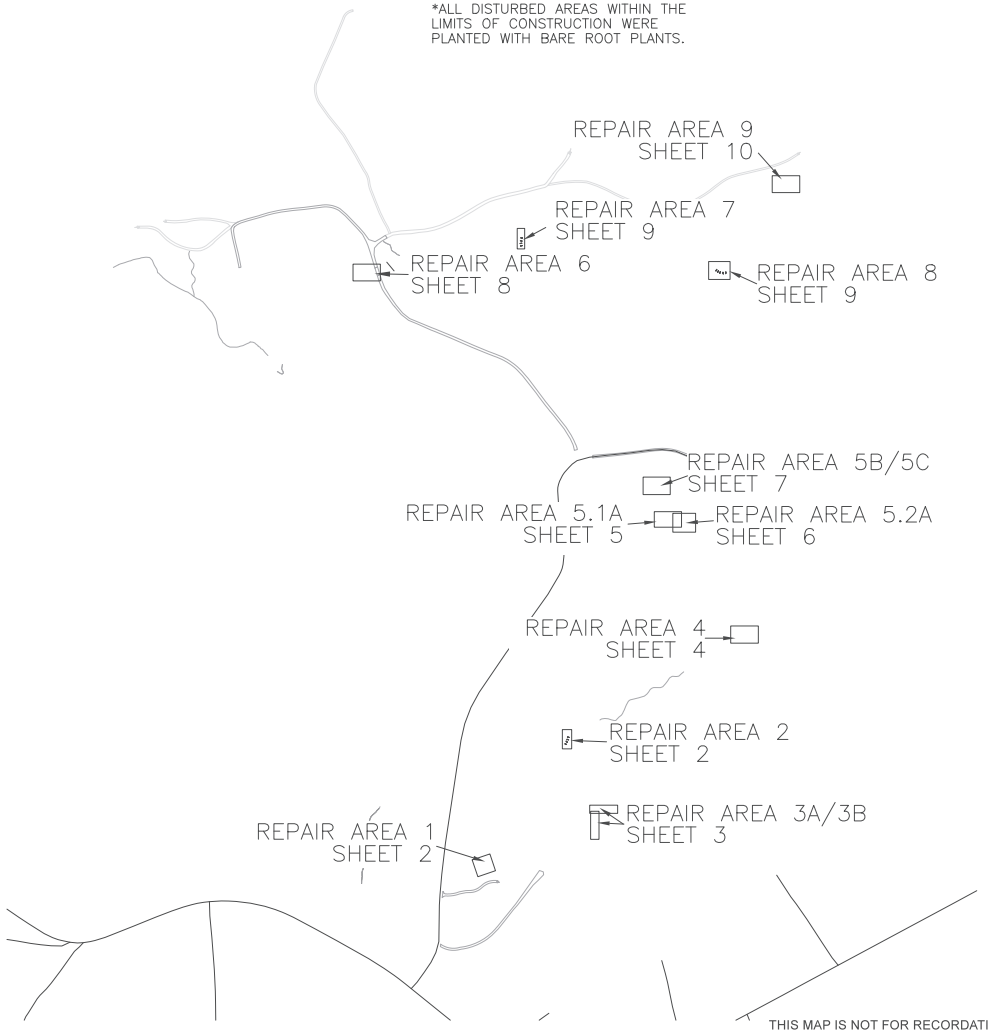
DAVID S. TURNER, P.L.S. #L-4551

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-4551 DAVID S. TURNER

GENERAL NOTES:
1. ALL DISTANCES ARE HORIZONTAL UNLESS OTHERWISE NOTED.
2. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88.
3. THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.
4. THE PURPOSE OF THIS MAP IS TO SHOW THE AS-BUILT CONDITIONS OF THE MOORES FORK REPAIR SITE AND MAY NOT SHOW ALL EXISTING STRUCTURES, AND BOUNDARIES.
5. THE CONTROL NETWORK WAS ESTABLISHED OR RECOVERED FROM EXISTING CONTROL ORIGINALLY PROVIDED BY TURNER LAND SURVEYING IN 2014 AND 2016. ADDITIONAL CONTROL WAS ESTABLISHED BY GPS OBSERVATIONS AND HORIZONTAL TRAVERSE PERFORMED DURING CONSTRUCTION AND AS-BUILT SURVEYS. THE COORDINATES ARE LISTED IN THE CHART BELOW.
6. NO PROPERTY RESEARCH, INVESTIGATION, OR INDEPENDENT SEARCH FOR ENCUMBERANCES, RESTRICTIVE COVENANTS, EASEMENTS OF RECORD, OWNERSHIP, TITLE EVIDENCE, OR OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE EXAMINATION MAY DISCLOSE WERE PERFORMED FOR THIS SURVEY. A LICENSED ATTORNEY-AT-LAW SHOULD BE CONSULTED REGARDING CORRECT OWNERSHIP, WIDTH, AND LOCATION OF EASEMENTS AND OTHER TITLE QUESTIONS REVEALED BY A TITLE EXAMINATION.
7. SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS, AND/OR ENCUMBRANCES THAT MAY AFFECT THE PROPERTY(S).
8. THIS SURVEYOR DOES NOT CERTIFY TO THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITIES THAT MAY OR MAY NOT EXIST WITHIN THE BOUNDARIES AS SHOWN HEREON.

POINTNO.	NORTHING(Y)	EASTING(X)	ELEV(Z)	DESCRIPTION
1	1006138.83	1494492.16	1283.409	TLS#1RBC
2	1006054.47	1494704.49	1274.328	CTL#2
11	1007359.36	1495957.59	1209.357	CTL#11
16	1007396.46	1496285.36	1176.238	CTL#16 EDISC
60	1006878.76	1495227.08	1221.168	TLS#60NL
61	1006804.24	1495046.72	1227.406	TLS#61NL
62	1006795.23	1494939.89	1238.671	TLS#62NL
63	1006692.19	1494761.47	1239.694	TLS#63NL
64	1006476.73	1494666.66	1246.613	TLS#64NL
65	1006240.08	1494595.20	1260.468	TLS#65NL
66	1006412.84	1495302.26	1264.005	TLS#66NL
67	1006238.93	1495199.18	1270.800	TLS#67NL
68	1007491.50	1495768.20	1236.698	TLS#68NL
69	1007798.25	1495511.73	1224.512	TLS#69NL

*ALL DISTURBED AREAS WITHIN THE LIMITS OF CONSTRUCTION WERE PLANTED WITH BARE ROOT PLANTS.



THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.

SURVEY FOR:
NCDEQ DIVISION OF MITIGATION SERVICES
217 WEST JONES ST., SUITE 3000A
RALEIGH, N.C. 27603
(919)707-8976

PROJECT DESIGNER:
KCI ASSOCIATES OF NC
ATTN: ALEX FRENCH, DESIGNER
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 523-7995

CONTRACTOR
BACKWATER ENVIRONMENTAL
ATTN: ROBERT OSBORNE
515 S. KENNEDY ST.
EDEN, NC 27289
(336) 623-2114

REVISIONS, DATE AND INITIAL:

TURNER LAND SURVEYING
P.O. BOX 148
SWANNANOA, NC 28778
P-0702 (919) 827-0745
www.turnerlandsurveying.com
Certified DBE/WBE

AS-BUILT SURVEY FOR:

MOORES FORK REPAIR

STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

DATE: 5/05/2021
SURVEYED BY: NCU/EHK/CPG
DRAWN BY: EGT/DST/KAG
REVIEWED BY: DST/EGT
PROJECT: 21-007
FILE: MOORES FORK REPAIRS_AB.DWG
SCALE: 1"=300'

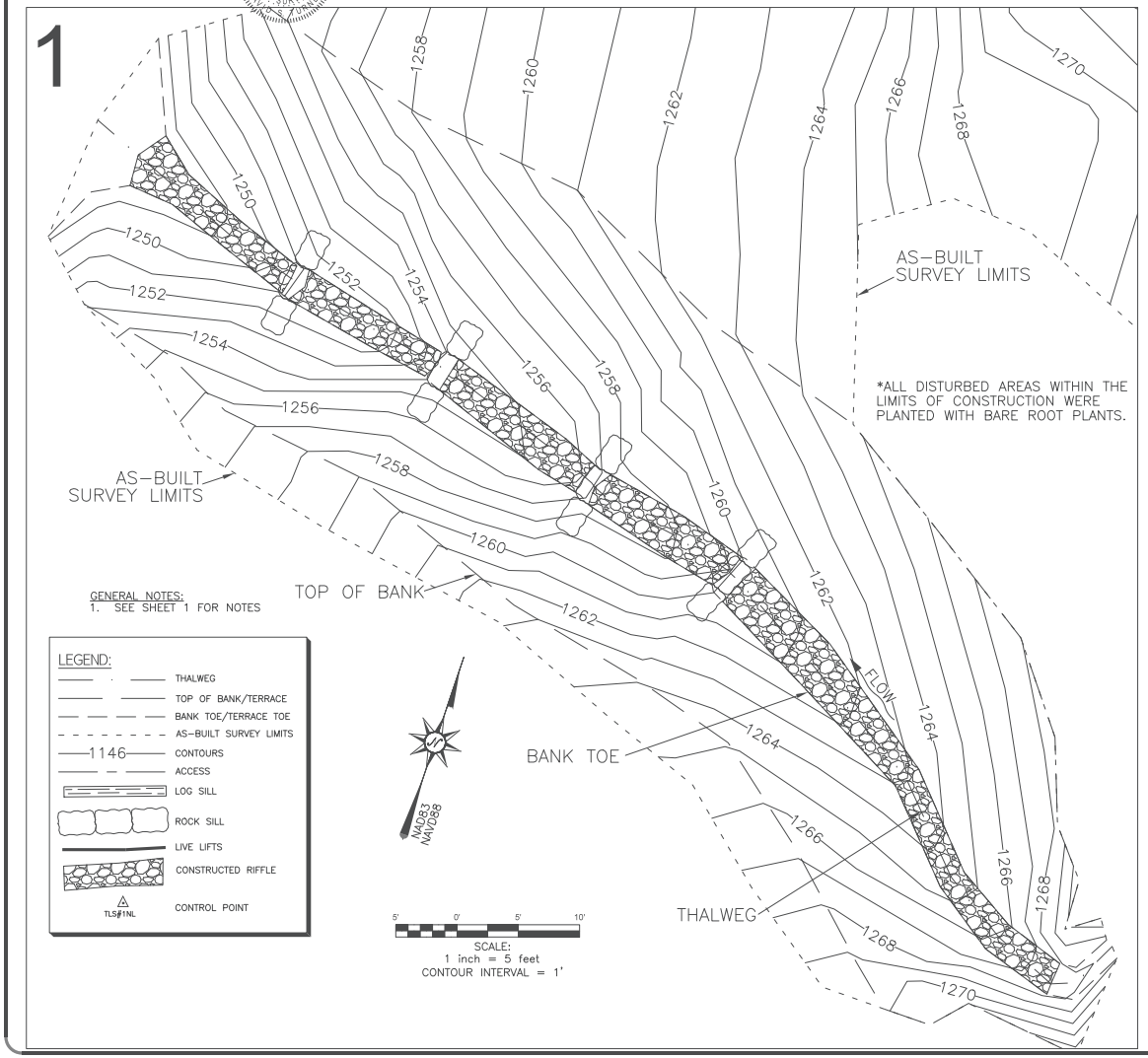
SHEET 1 of 10

I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

DAVID S. TURNER, P.L.S. #L-4551

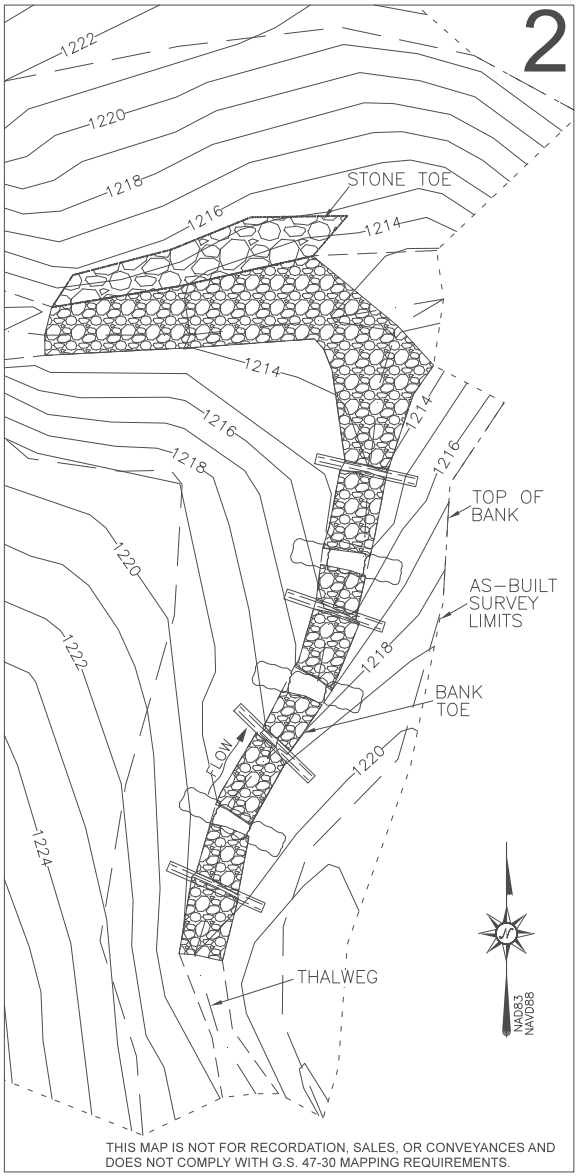
SEAL L-4551 NORTH CAROLINA PROFESSIONAL LAND SURVEYOR DAVID S. TURNER

MOORES FORK REPAIR
AREAS 1 & 2



GENERAL NOTES:
1. SEE SHEET 1 FOR NOTES

LEGEND:
- THALWEG
- TOP OF BANK/TERRACE
- BANK TOE/TERRACE TOE
- AS-BUILT SURVEY LIMITS
- 1146 CONTOURS
- ACCESS
- LOG SILL
- ROCK SILL
- LIVE LIFTS
- CONSTRUCTED RIFFLE
- TLS#1NL CONTROL POINT



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REVISIONS, DATE AND INITIAL:

AS-BUILT SURVEY FOR:

MOORES FORK REPAIR

STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

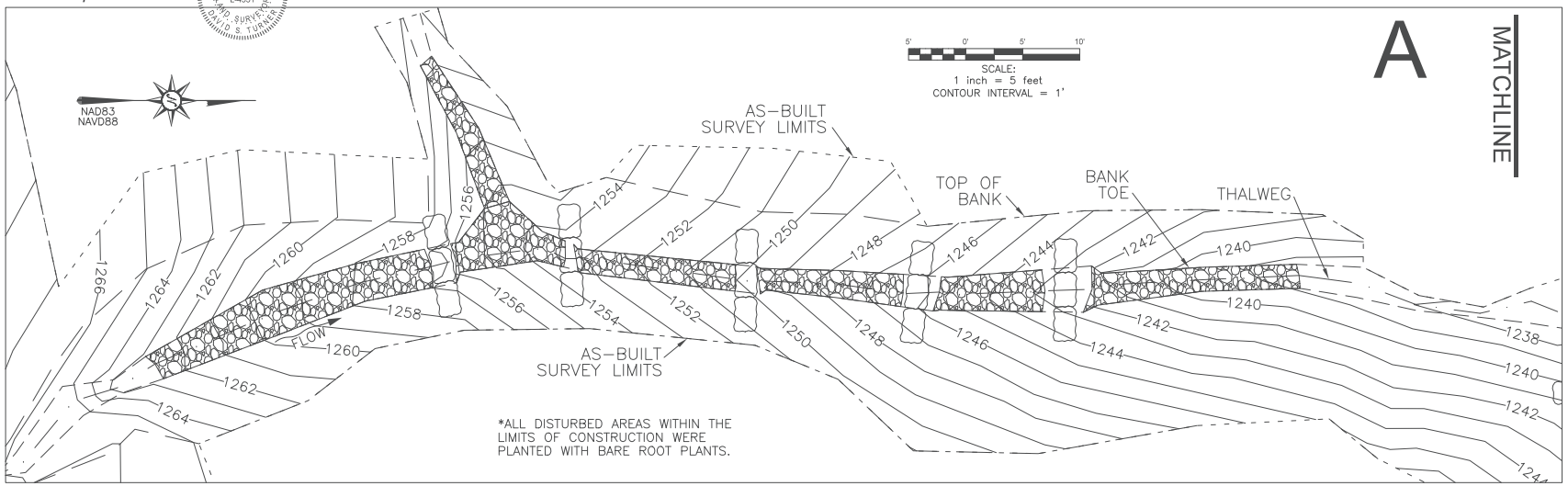
DATE:	5/05/2021
SURVEYED BY:	NCU/EHK/CPG
DRAWN BY:	EGT/DST/KAG
REVIEWED BY:	DST/EGT
PROJECT:	20-0029
FILE:	MOORES FORK REPAIRS_AB.DWG
SCALE:	AS SHOWN

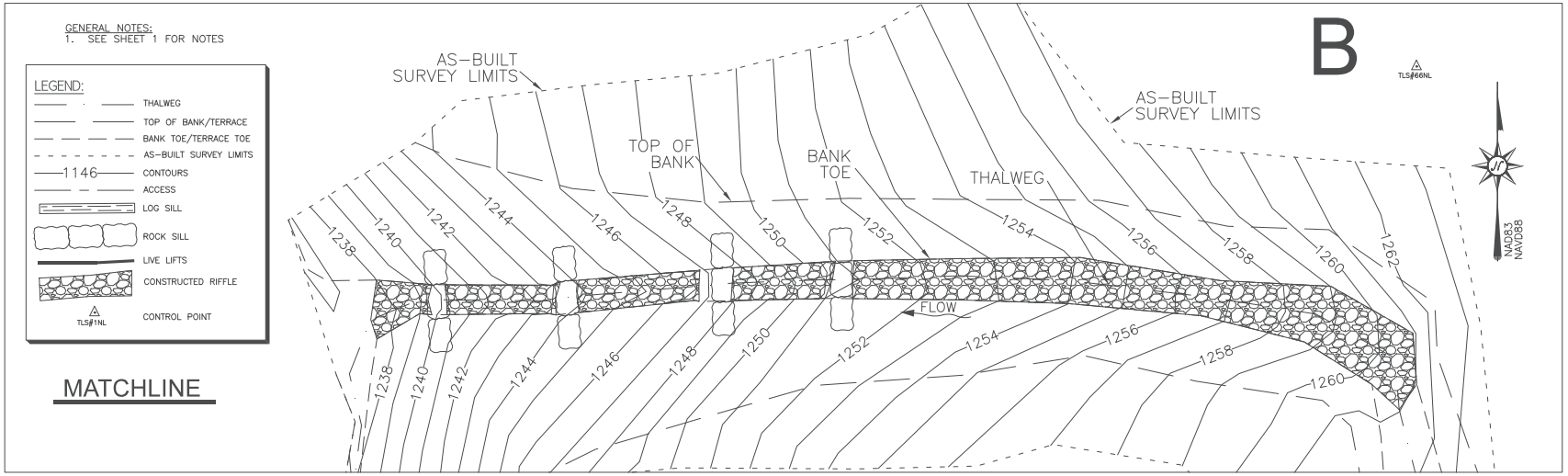
I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

DAVID S. TURNER, P.L.S. #L-4551

SEAL L-4551 NORTH CAROLINA PROFESSIONAL LAND SURVEYOR DAVID S. TURNER

MOORES FORK REPAIR
AREA 3A & 3B





GENERAL NOTES:
1. SEE SHEET 1 FOR NOTES

LEGEND:
- THALWEG
- TOP OF BANK/TERRACE
- BANK TOE/TERRACE TOE
- AS-BUILT SURVEY LIMITS
- 1146 CONTOURS
- ACCESS
- LOG SILL
- ROCK SILL
- LIVE LIFTS
- CONSTRUCTED RIFFLE
- TLS#1NL CONTROL POINT

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AS-BUILT SURVEY FOR:

MOORES FORK REPAIR

STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

DATE:	5/05/2021
SURVEYED BY:	NCU/EHK/CPG
DRAWN BY:	EGT/DST/KAG
REVIEWED BY:	DST/EGT
PROJECT:	20-0029
FILE:	MOORES FORK REPAIRS_AB.DWG
SCALE:	AS SHOWN

SHEET 3 of 10

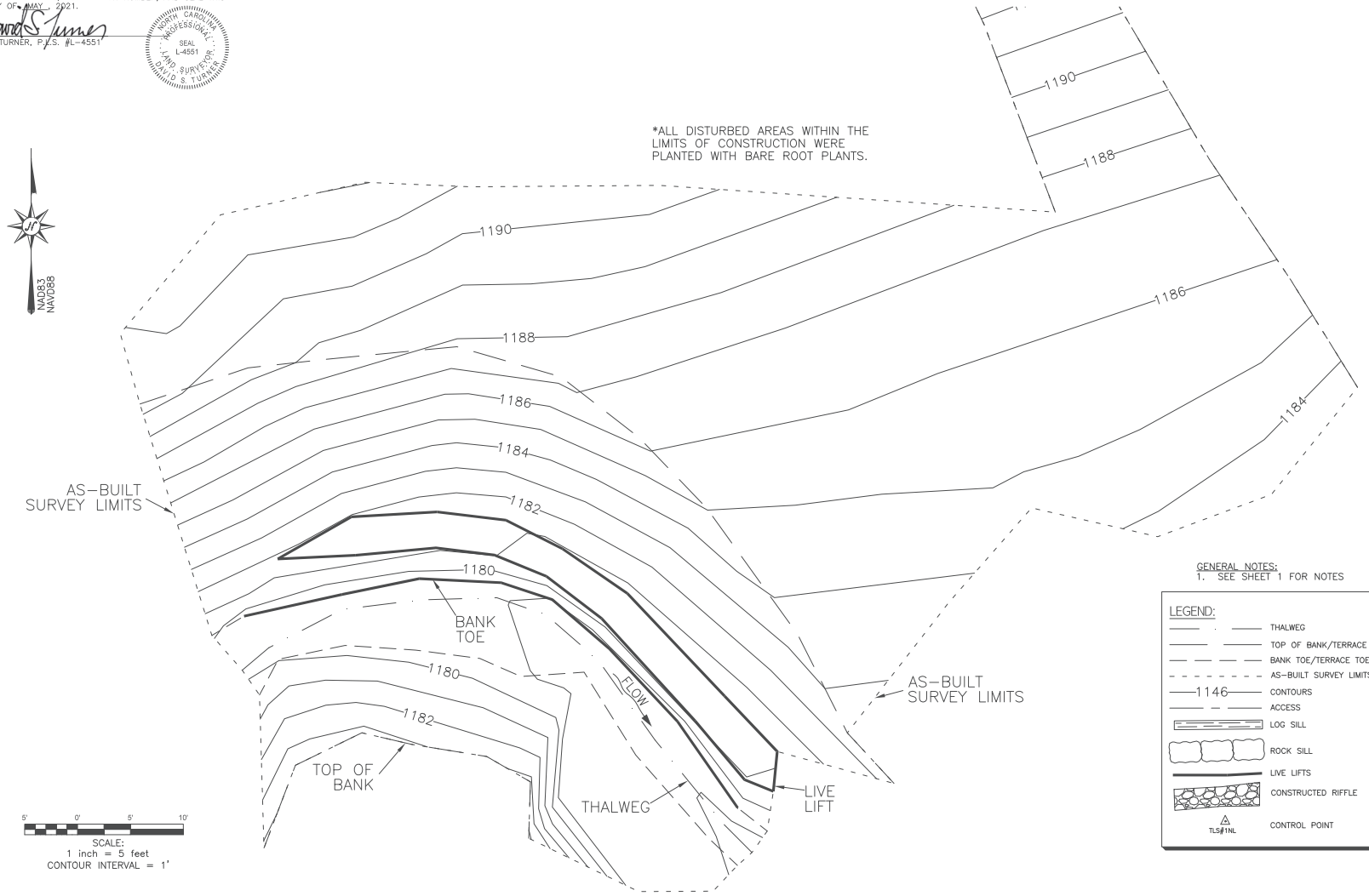
MOORES FORK REPAIR
AREA 4

I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

DAVID S. TURNER, P.L.S. #L-4551

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR DAVID S. TURNER SEAL L-4551

*ALL DISTURBED AREAS WITHIN THE LIMITS OF CONSTRUCTION WERE PLANTED WITH BARE ROOT PLANTS.



GENERAL NOTES:
1. SEE SHEET 1 FOR NOTES

LEGEND:
- THALWEG
- TOP OF BANK/TERRACE
- BANK TOE/TERRACE TOE
- AS-BUILT SURVEY LIMITS
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AS-BUILT SURVEY FOR:

MOORES FORK REPAIR

STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

DATE:	5/05/2021
SURVEYED BY:	NCU/EHK/CPG
DRAWN BY:	EGT/DST/KAG
REVIEWED BY:	DST/EGT
PROJECT:	20-0029
FILE:	MOORES FORK REPAIRS_AB.DWG
SCALE:	AS SHOWN

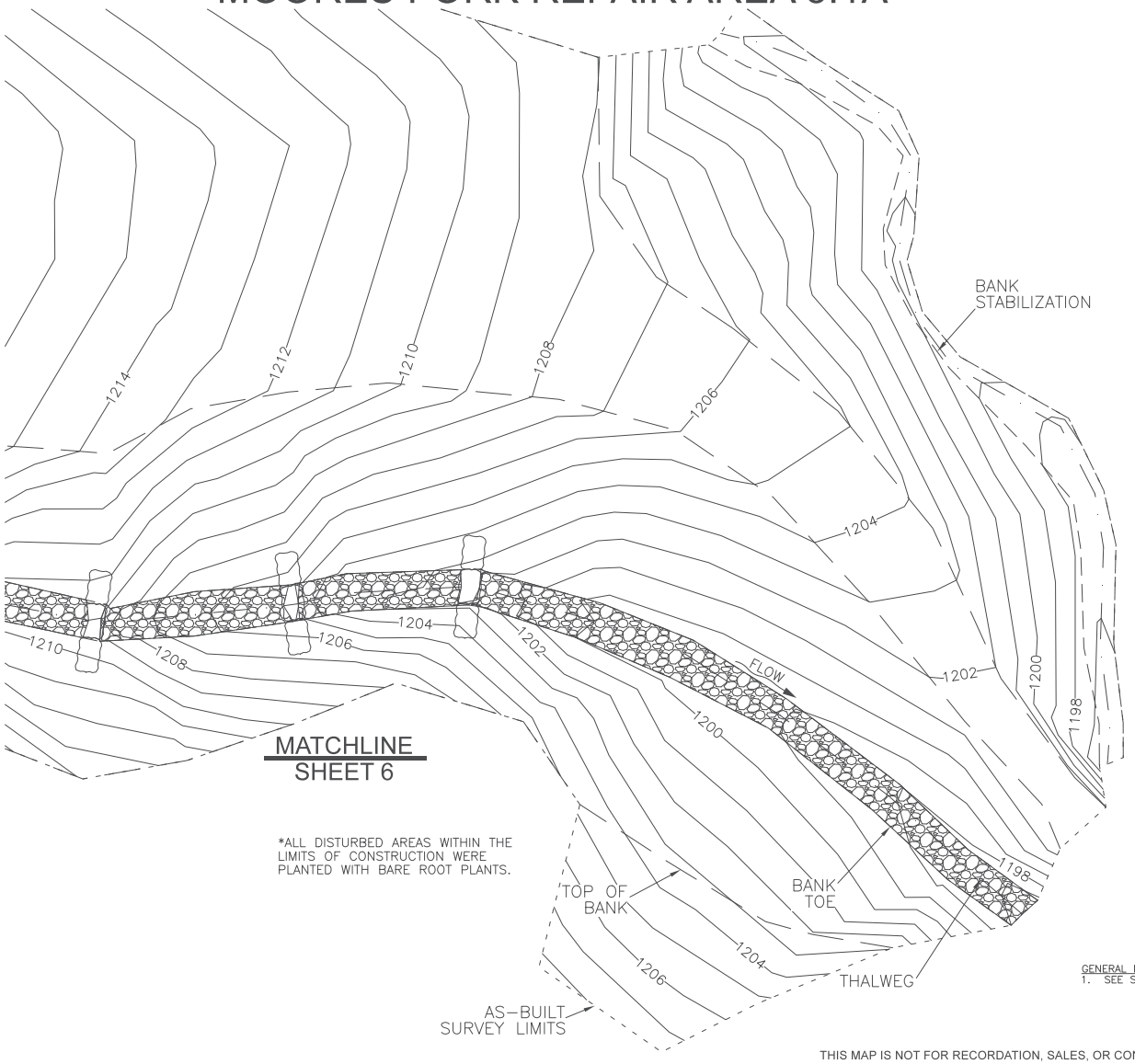
SHEET 4 of 10

MOORES FORK REPAIR AREA 5.1A

I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

DAVID S. TURNER, P.L.S. #L-4551

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-4551 DAVID S. TURNER



NAD83 NAVD88

LEGEND:
- THALWEG
- TOP OF BANK/TERRACE
- BANK TOE/TERRACE TOE
- AS-BUILT SURVEY LIMITS
- 1146 CONTOURS
- ACCESS
- LOG SILL
- ROCK SILL
- LIVE LIFTS
- CONSTRUCTED RIFFLE
- TLS#1NL CONTROL POINT

5' 0' 5' 10'

SCALE:
1 inch = 5 feet
CONTOUR INTERVAL = 1'

*ALL DISTURBED AREAS WITHIN THE LIMITS OF CONSTRUCTION WERE PLANTED WITH BARE ROOT PLANTS.

GENERAL NOTES:
1. SEE SHEET 1 FOR NOTES

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REVISIONS: DATE AND INITIAL:

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AS-BUILT SURVEY FOR:

MOORES FORK REPAIR

STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

DATE:	5/05/2021
SURVEYED BY:	NCU/EHK/CPG
DRAWN BY:	EGT/DST/KAG
REVIEWED BY:	DST/EGT
PROJECT:	20-0029
FILE:	MOORES FORK REPAIRS_AB.DWG
SCALE:	AS SHOWN

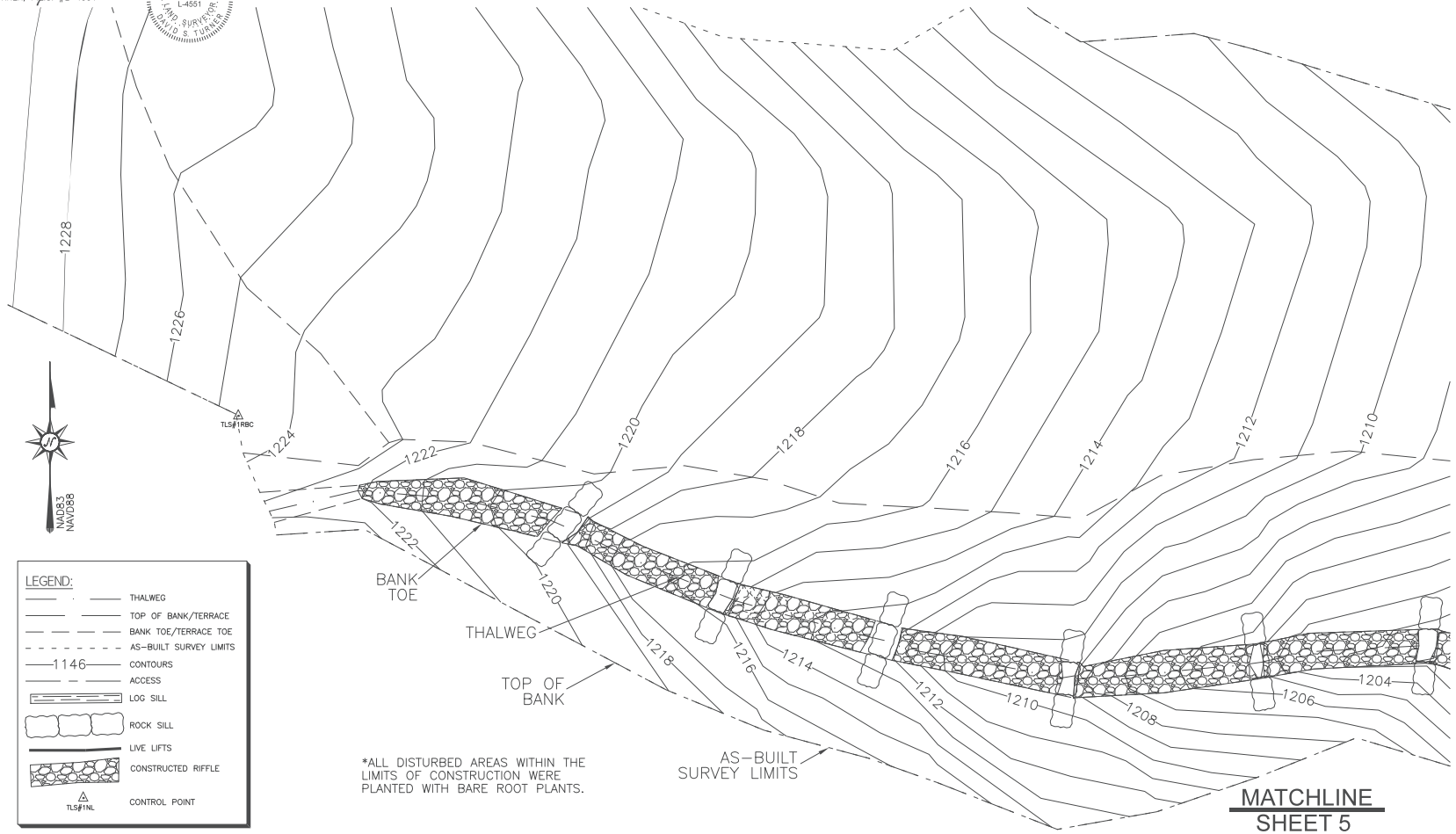
SHEET 5 of 10

MOORES FORK REPAIR
AREA 5.2A

I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

DAVID S. TURNER, P.L.S. #L-4551

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR DAVID S. TURNER SEAL L-4551



LEGEND:
- THALWEG
- TOP OF BANK/TERRACE
- BANK TOE/TERRACE TOE
- AS-BUILT SURVEY LIMITS
- 1146 CONTOURS
- ACCESS
- LOG SILL
- ROCK SILL
- LIVE LIFTS
- CONSTRUCTED RIFFLE
- TLS#1NL CONTROL POINT

*ALL DISTURBED AREAS WITHIN THE LIMITS OF CONSTRUCTION WERE PLANTED WITH BARE ROOT PLANTS.

5' 0' 5' 10'
SCALE:
1 inch = 5 feet
CONTOUR INTERVAL = 1'

GENERAL NOTES:
1. SEE SHEET 1 FOR NOTES

THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.

REVISIONS: DATE AND INITIAL:

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www.turnerlandsurveying.com
Certified UBE/ WBE

AS-BUILT SURVEY FOR:
MOORES FORK REPAIR
STEWARTS CREEK TOWNSHIP SURRY COUNTY NORTH CAROLINA

DATE:	5/05/2021
SURVEYED BY:	NCU/EHK/CPG
DRAWN BY:	EGT/DST/KAG
REVIEWED BY:	DST/EGT
PROJECT:	20-0029
FILE:	MOORES FORK REPAIRS_AB.DWG
SCALE:	AS SHOWN
SHEET	6 of 10

I, DAVID S. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 17th DAY OF MAY, 2021.

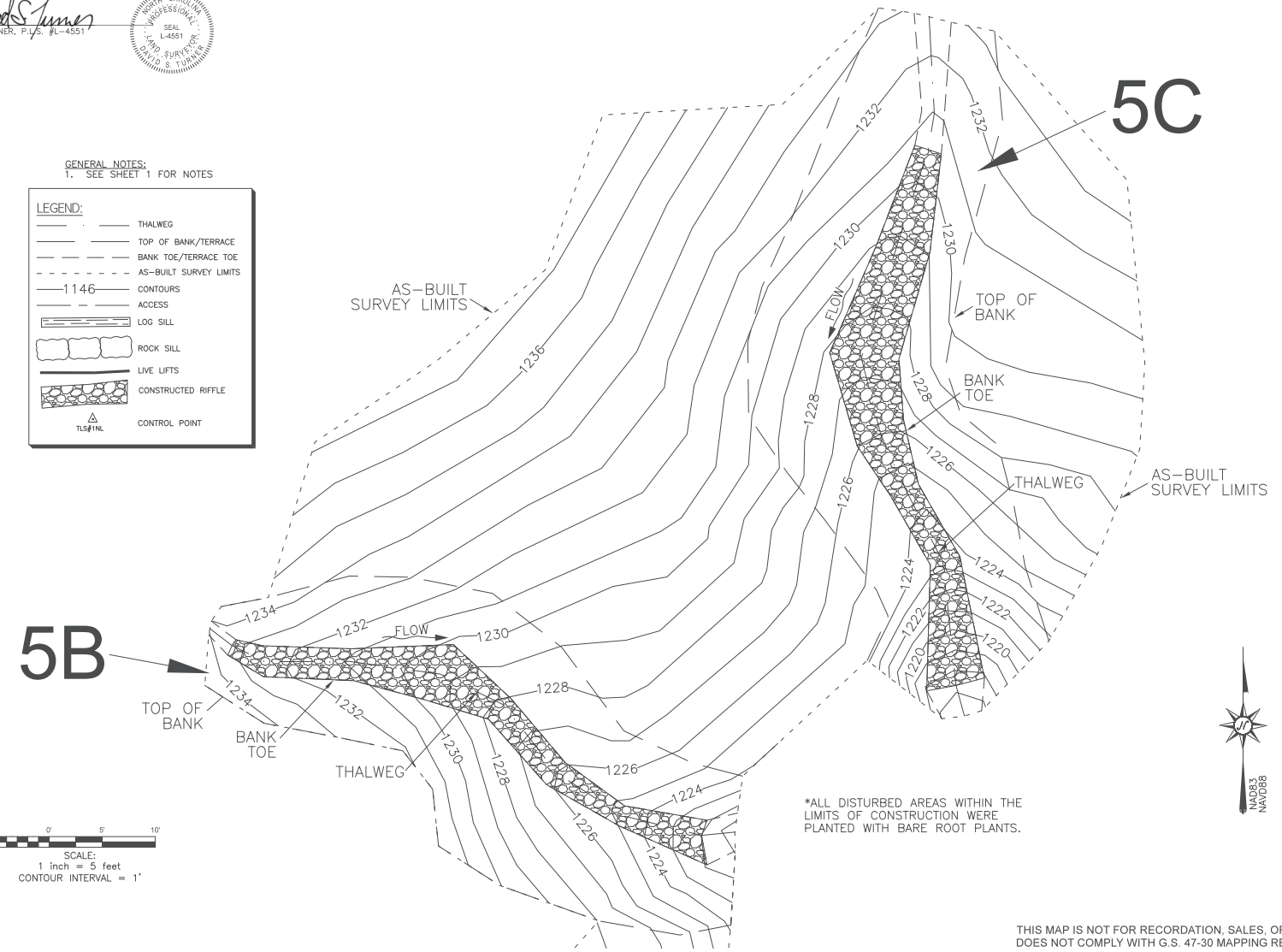
DAVID S. TURNER, P.L.S. #L-4551

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR DAVID S. TURNER SEAL L-4551

MOORES FORK REPAIR
AREA 5B & 5C

GENERAL NOTES:
1. SEE SHEET 1 FOR NOTES

LEGEND:
- THALWEG
- TOP OF BANK/TERRACE
- BANK TOE/TERRACE TOE
- AS-BUILT SURVEY LIMITS
- 1146 CONTOURS
- ACCESS
- LOG SILL
- ROCK SILL
- LIVE LIFTS
- CONSTRUCTED RIFFLE
- TLS#1NL CONTROL POINT



SCALE:
1 inch = 5 feet
CONTOUR INTERVAL = 1'

*ALL DISTURBED AREAS WITHIN THE LIMITS OF CONSTRUCTION WERE PLANTED WITH BARE ROOT PLANTS.

NAD83 NAVD88

THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.

REVISIONS: DATE AND INITIAL:

TURNER LAND SURVEYING
P.O. BOX 148
SWANNANOA, NC 28778
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MOORES FORK REPAIR AREA 6

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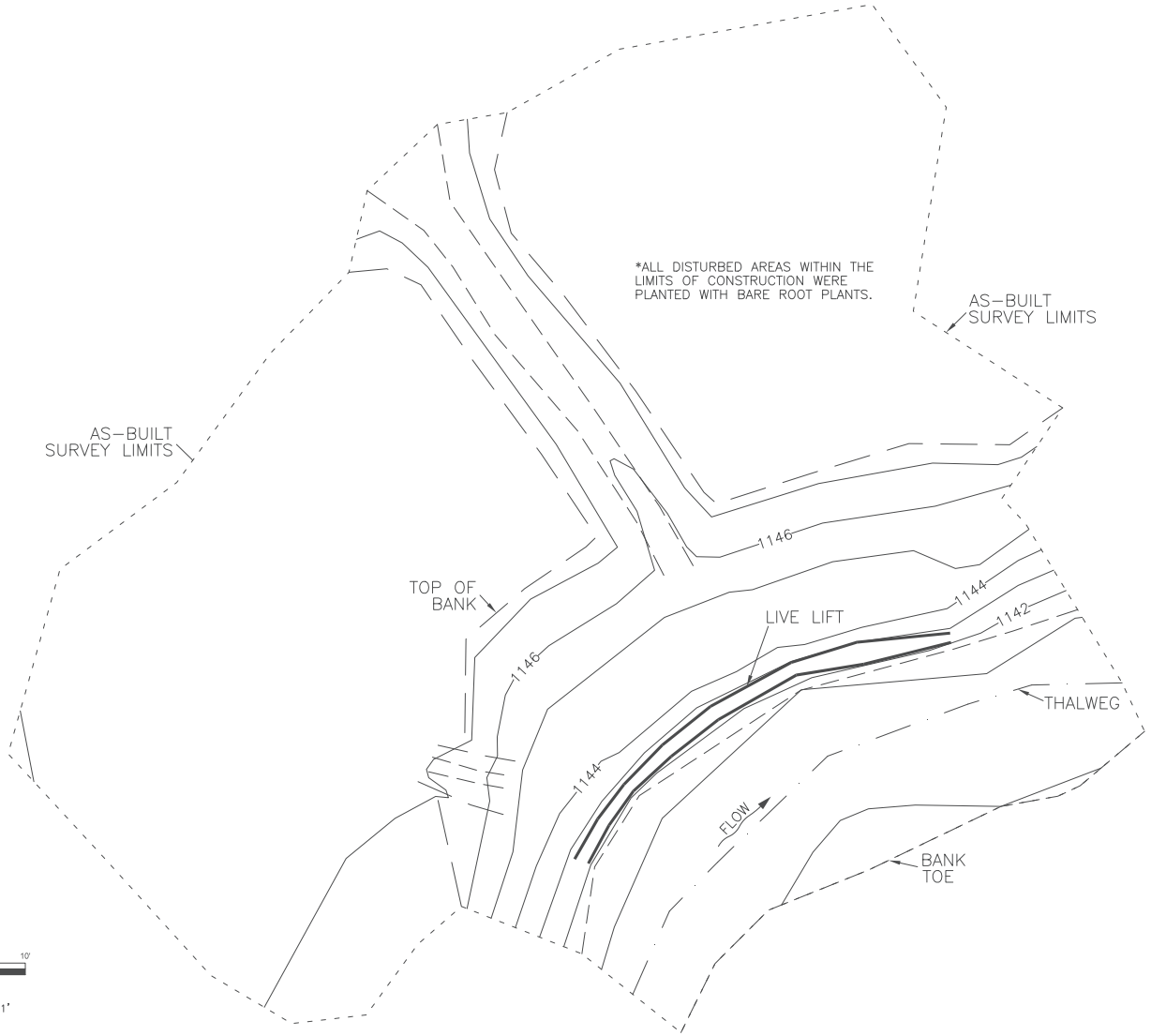

NAD83 NAVD88

5' 0' 5' 10'
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SHEET 8 of 10

GENERAL NOTES:
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MOORES FORK REPAIR
AREAS 7 & 8

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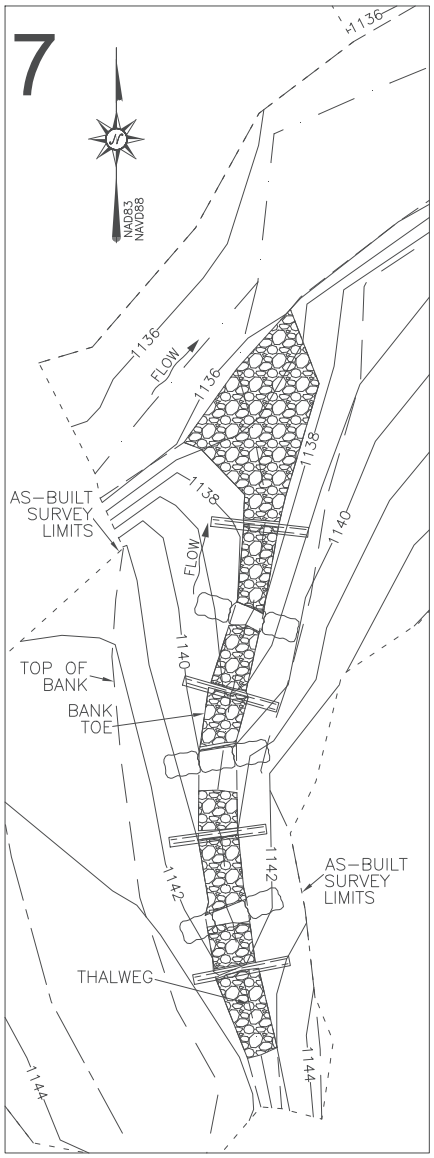

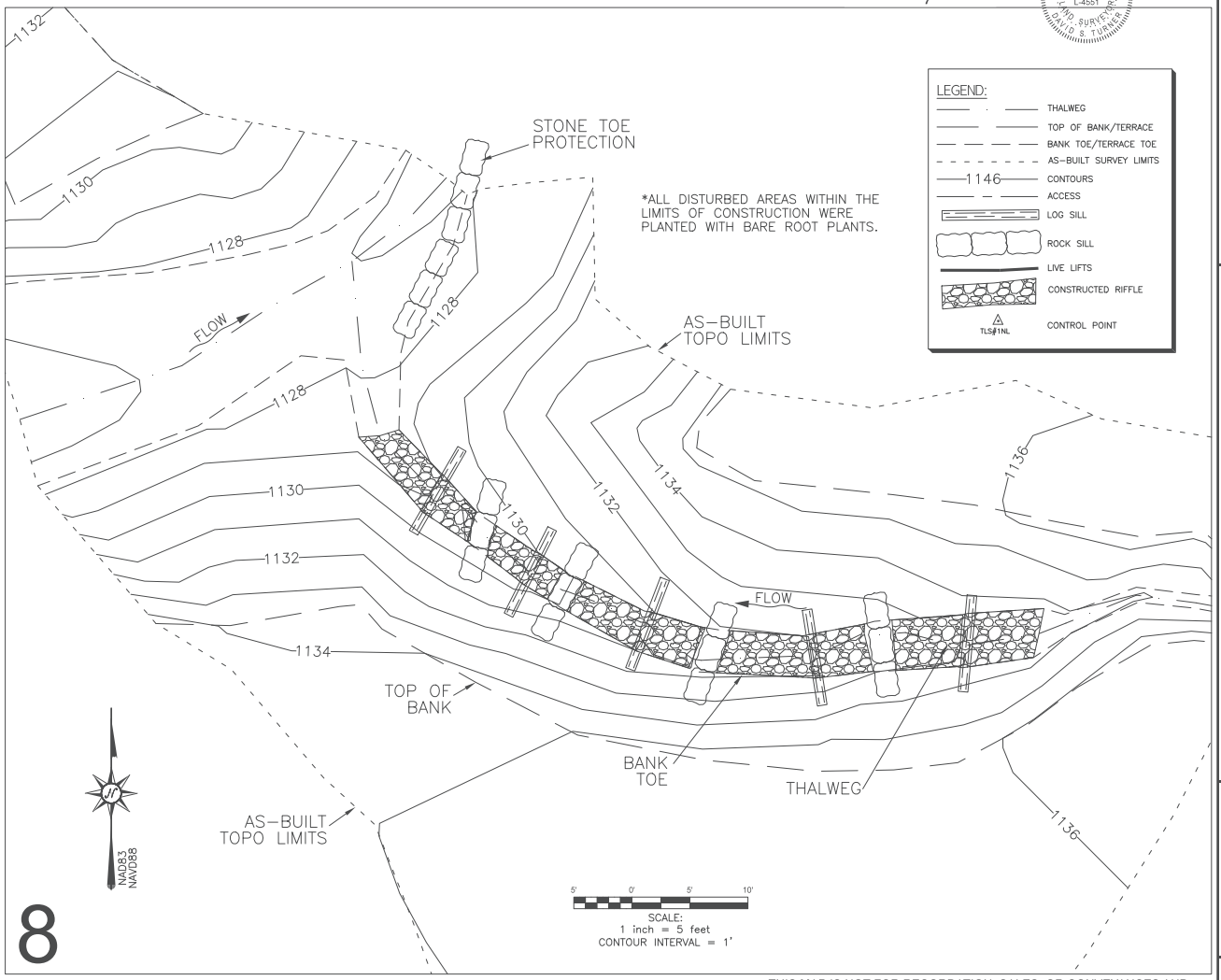

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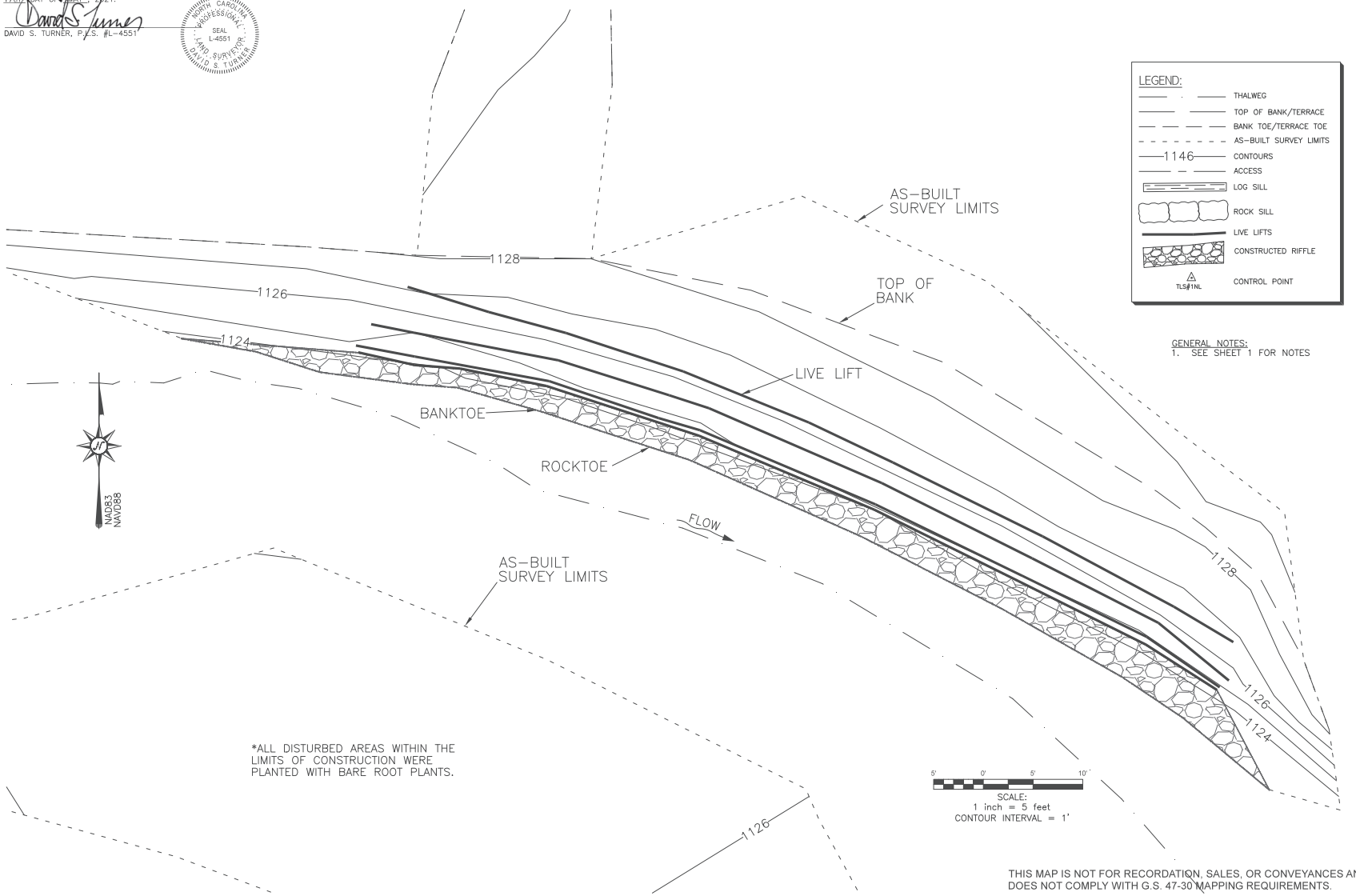
NORTH CAROLINA PROFESSIONAL SEAL L-4551 LAND SURVEYOR DAVID S. TURNER

MOORES FORK REPAIR
AREA 9



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