MONITORING YEAR 7 ANNUAL/CLOSEOUT 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 2022
Draft Submission Date: November 30, 2022
Final Submission Date: January 3, 2023

PREPARED FOR:

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

PREPARED BY:

Wildlands Engineering, Inc.
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Charlotte, NC 28203
Phone: 704.332.7754
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January 3, 2023

Mr. Matthew Reid
Western Project Manager
Division of Mitigation Services - Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

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 7/Closeout report for the Moores Fork Stream Mitigation Project. The following Wildlands responses to DMS's report comments are noted in italics lettering.

DMS comment: 1.2.1 Vegetation Assessment: Please note that since the project was instituted in 2010, there is no success criteria for vegetation height. Recommend revising the section and state that although there is no MY7 height requirement for the project, the average stem height is 18.2 feet.

Wildlands response: Per correspondence with the DMS Project Manager, the MY7 height requirement is 8 feet as stated in the Moores Fork Stream Mitigation Plan. The text in section 1.2.1 was not changed.

DMS comment: 1.2.2 Vegetation Areas of Concern and Management Activities: One encroachment was identified in 2022 near the bottom of Barn Reach 2. The landowner encroached by a few feet with farm equipment when harvesting corn. The encroachment was discussed with the landowner and has been resolved. Additional posts and signs were installed in the area with tall PVC and horse tape to better demarcate the conservation easement.

Wildlands response: The text in section 1.2.2 has been updated.

DMS comment: Table 2: Please add "Site Instituted – October 2010" as the first entry on the table.

Wildlands response: The entry has been added to Table 2.

DMS comment: CCPV: Thanks for providing updated invasive species polygons. 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.

DMS comment: Table 6G: Two structures are noted in section 3 with integrity issues. Please label the location of these structures on the CCPV (figure 3.6) or update as necessary.

Wildlands response: MY7 visual assessments revealed that these two structures that had previously been identified were no longer displaying piping issues. Table 6g has been updated to indicate that all structures are stable.

DMS comment: Digital Files: No comments

Wildlands response: Noted.

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

Sincerely,

Kirsten Y. Gimbert

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 MY7 activities were completed in September 2022. The following report summarizes the MY7 status of the Site.

This is the seventh and final monitoring report (MY7) as established in the Mitigation Plan (Confluence 2012) and will also serve as the closeout report. Assessments completed over the past seven monitoring years illustrate that most of the Site has met the success criteria as defined in the Mitigation Plan for vegetation, stream morphology, and stream hydrology. The MY7 vegetation survey resulted in an average stem density of 465 planted stems per acre and an average height of 18.2 feet. The Site has met the MY7 density requirement of 210 planted stems per acre, with all 12 plots (100%) individually exceeding this requirement. Additionally, the MY7 visual assessment revealed that invasive plant populations have been reduced due to ongoing treatments and over 99% of the easement acreage is unaffected by invasive populations. In 2021, DMS implemented stream repairs for nine instances of lateral and vertical instability throughout the Site that continue to appear stable and are functioning as designed. Visual assessments reveal that over 95% of enhanced and restored reaches are stable. Overall, surveyed cross-sections along Moores Fork indicate the channel is supporting stable dimensions and functioning as designed. Instances of vertical and lateral instability are represented by some cross-section along Silage Tributary. The performance standard of two recorded bankfull events in separate monitoring years was met for both Moores Fork and Silage Tributary in MY3. In MY7, at least one bankfull event occurred on Moores Fork and on Silage Tributary.

MOORES FORK STREAM MITIGATION PROJECT

Year 7 Monitoring/Closeout Report

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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 Tributary (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 MY7 monitoring activities were completed in September 2022. 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 MY7 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 7 Data Assessment

Annual monitoring was conducted between April and September 2022 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 has been conducted for seven years to provide a project data chronology that facilitates 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 MY7 vegetation survey was completed in September 2022, resulting in an average stem density of 465 planted stems per acre and an average stem height of 18.2 feet. The Site has met the MY7 density requirement of 210 planted stems per acre, with all 12 plots (100%) individually exceeding the requirement. Overall, the Site has met the MY7 height requirement, with 10 of 12 plots (83%) individually exceeding the requirement. A majority (>91%) of the surviving planted stems in vegetation plots are thriving with a health score (vigor) of 3 or 4. Approximately 8% 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 continued to grow to a height where they can likely survive and outcompete herbaceous cover, vines, and deer. In addition, desirable volunteer species such as red maple (*Acer rubrum*), river birch (*Betula nigra*), tag alder (*Alnus serrulata*), flowering dogwood (*Cornus*

florida), persimmon (*Diospyros virginiana*), winged sumac (*Rhus copallinum*), and tulip poplar (*Liriodendron tulipifera*) 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

In 2022, invasive treatments occurred in May, August, and October and have successfully reduced invasive populations throughout the Site. Currently, less than 1% of the easement acreage is mapped with invasive species areas of concern. The remaining invasive species include kudzu (*Pueraria montana*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Multiflora rose (*Rosa multiflora*), and oriental bittersweet (*Celastrus orbiculatus*). Persistent pockets of Kudzu were observed primarily around the conservation easement boundary along the left floodplain of Moores Fork Reach 1, Corn Tributary Reach 1, and the eastern boundary along Barn Tributary Reach 2. Invasive treatments will continue to be treated until December 2023.

As part of the repair efforts completed in March 2021, the conservation easement was remarked by a PLS by adding signage, posts, and fresh paint markings as needed. One encroachment was identified in 2022 near the bottom of Barn Reach 2 where the landowner had encroached by a few feet with farm equipment when harvesting corn. The encroachment was discussed with the landowner and has been resolved. Additional posts and signs were installed in the area with tall PVC and horse tape to better demarcate the conservation easement. In MY7, the rest of the conservation easement appeared well marked and no other encroachments were observed. Vegetation areas of concern are shown in Figures 3.0-3.6 in Appendix B.

1.2.3 Stream Assessment

Morphological surveys for MY7 were conducted in May 2022. Overall, surveyed cross-sections along Moores Fork indicate the channel is supporting stable dimensions and functioning as designed. As first reported in MY5 at riffle cross-section M4, an increase in cross-sectional area is evident due to scour occurring behind the stone toe boulder structure. Otherwise, riffles are maintaining appropriate width-to-depth ratios and max pool depths are providing good aquatic habitat.

Along Silage Tributary, the surveyed cross-sections are indicative of instances of vertical and lateral instability observed throughout Silage Tributary Reach 1 and 2. Downcutting and/or bank scour is present at riffle cross-sections ST1, ST3, and ST6 which has caused an increase in bank height ratio. See section 1.2.4 for further discussion about stream areas of concern along Silage Tributary. Please refer to Appendix D for cross-section plots and morphological summary tables.

Based on a DMS Technical Workgroup memo from 10/19/21 and concurrence received on 10/27/2021 from the DMS project manager for the Site, pebble counts will not be conducted during the remaining monitoring years unless requested by the IRT or deemed necessary by best professional judgement. Refer to Appendix A for the DMS Technical Workgroup memo and the email confirmation from the DMS project manager.

1.2.4 Stream Areas of Concern and Management Activity

DMS contracted with a design firm to develop a repair plan for nine locations throughout the Site and the repair work was completed in March 2021. Please refer to the MY6 annual report for additional documentation and the repair as-built survey. In MY7, repair areas continue to appear stable and functioning as designed with rock steps/sills maintaining vertical stability. In addition, herbaceous cover and live stakes are becoming well established along the repaired banks and planted bare roots were found to be healthy. An updated photolog of the repair work is included in Appendix B.

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 MY7 (STA 23+80, 39+75, 43+10, and 53+00) where woody vegetation has failed to take hold along the banks. Areas of bank instability are isolated along Moores Fork Reach 2 and 3, with 97% and 98%, respectively, of both banks on those reaches are performing as intended.

Along Silage Tributary, four new or expanded areas of bank instability were noted in MY7 (STA 15+00, 18+60, 21+20 and, 24+50). Several structures that were installed for grade control have been undermined by flow piping under or around them and no longer are functioning as designed. Areas of instability are more frequent along Silage Tributary due to the nature of this confined steep valley in combination with flashy runoff during large precipitation events that is accelerated by the gullies forming in sparsely vegetated pasture found directly outside of the project area. While stream stability issues are present along Silage Tributary Reach 1 and Reach 2, 96% and 95% of both banks on those reaches respectively remain stable and performing as intended.

Other stream areas of concern are present in some of the smaller tributaries on the Site. Minor sedimentation continues to be observed along the project start of Pond Tributary, but well-established willows and other woody vegetation along the banks are maintaining the as-built alignment and channel function. At the project start of Corn Tributary, a significant headcut and erosion around the culvert continues to worsen. Beginning in 2019, DMS contracted with a provider to control beaver and dams at the Site. In MY7, 2 beaver dams were removed from the Moores Fork and beaver were trapped in October 2022. 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 April 6, 2022, indicate that at least one bankfull event occurred on Moores Fork and Silage Tributary in MY7. Monthly rainfall data indicate higher than normal rainfall amounts occurred during the months of February, May, June, and August (NCCRONOS, 2022). 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. Seven bankfull events have been documented for Moores Fork and six bankfull events have been documented for Silage Tributary in separate years. Refer to Appendix E for hydrologic data and graphs.

1.3 Monitoring Year 7 Summary

This is the seventh and final monitoring report (MY7) as established in the Mitigation Plan (Confluence 2012) and will also serve as the closeout report. Assessments completed over the past seven monitoring years illustrate that most of the Site has met the success criteria as defined in the Mitigation Plan for vegetation, stream morphology, and stream hydrology. The MY7 vegetation survey resulted in an average stem density of 465 planted stems per acre and an average height of 18.2 feet. The Site has met the MY7 density requirement of 210 planted stems per acre, with all 12 plots (100%) individually exceeding this requirement. Additionally, the MY7 visual assessment revealed that invasive plant populations have been reduced due to ongoing treatments and over 99% of the easement acreage is unaffected by invasive populations. In 2021, DMS implemented stream repairs for nine instances of lateral and vertical instability throughout the Site that continue to appear stable and are functioning as designed. Visual assessments reveal that over 95% of enhanced and restored reaches are stable. Overall, surveyed cross-sections along Moores Fork indicate the channel is supporting stable dimensions and functioning as designed. Instances of vertical and lateral instability are represented by some cross-section along Silage Tributary. The performance standard of two recorded bankfull events in separate

monitoring years was met for both Moores Fork and Silage Tributary in MY3. In MY7, 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). 2022. State Climate Office of North Carolina. Version 2.7.2. MT Airy 2 W. Station ID No. 315890. Accessed October 2022.

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

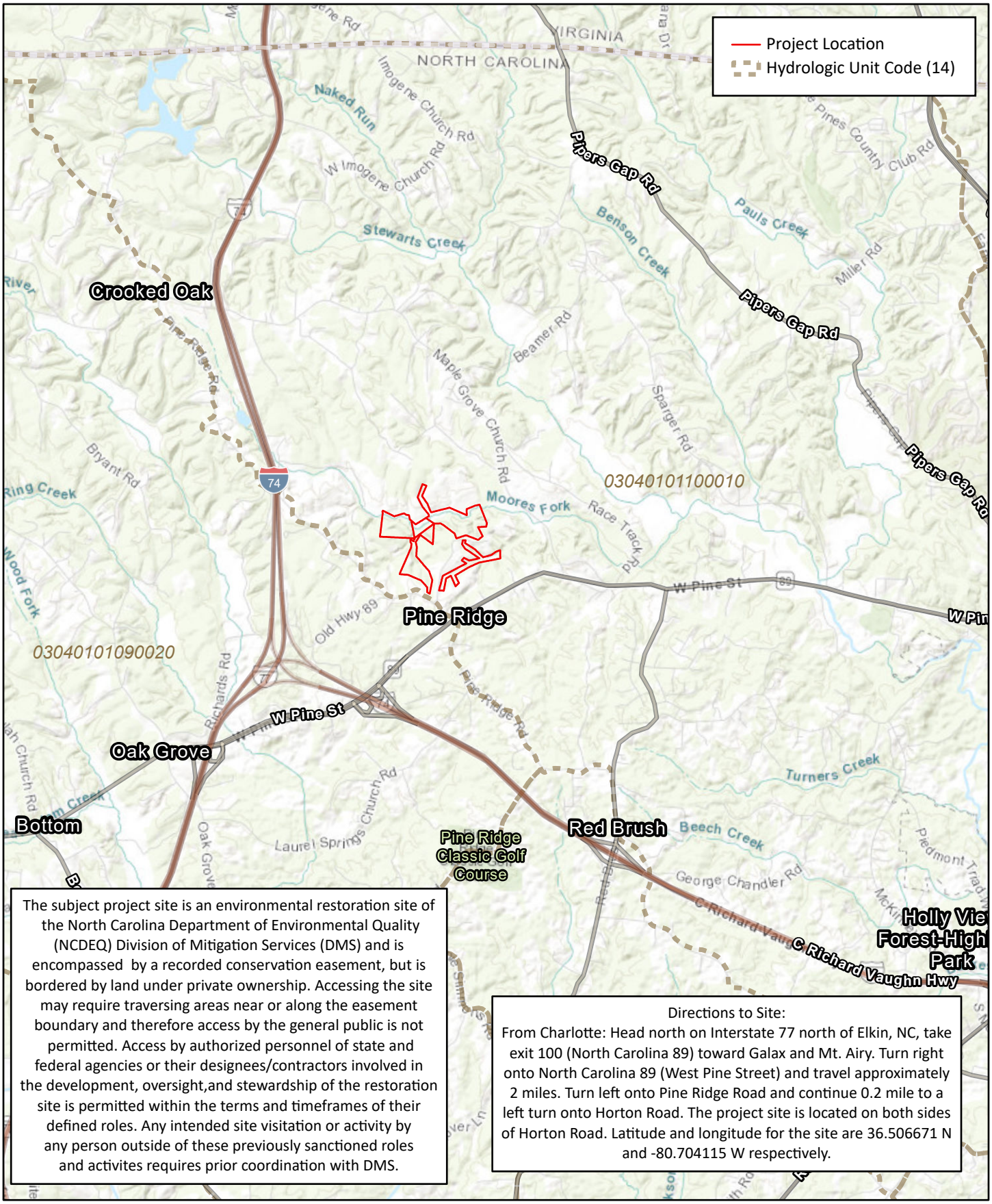
North Carolina Geological Survey (NCGS). 2004. Physiography of North Carolina. Map compiled by the Division of Land Resources. Raleigh.

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.

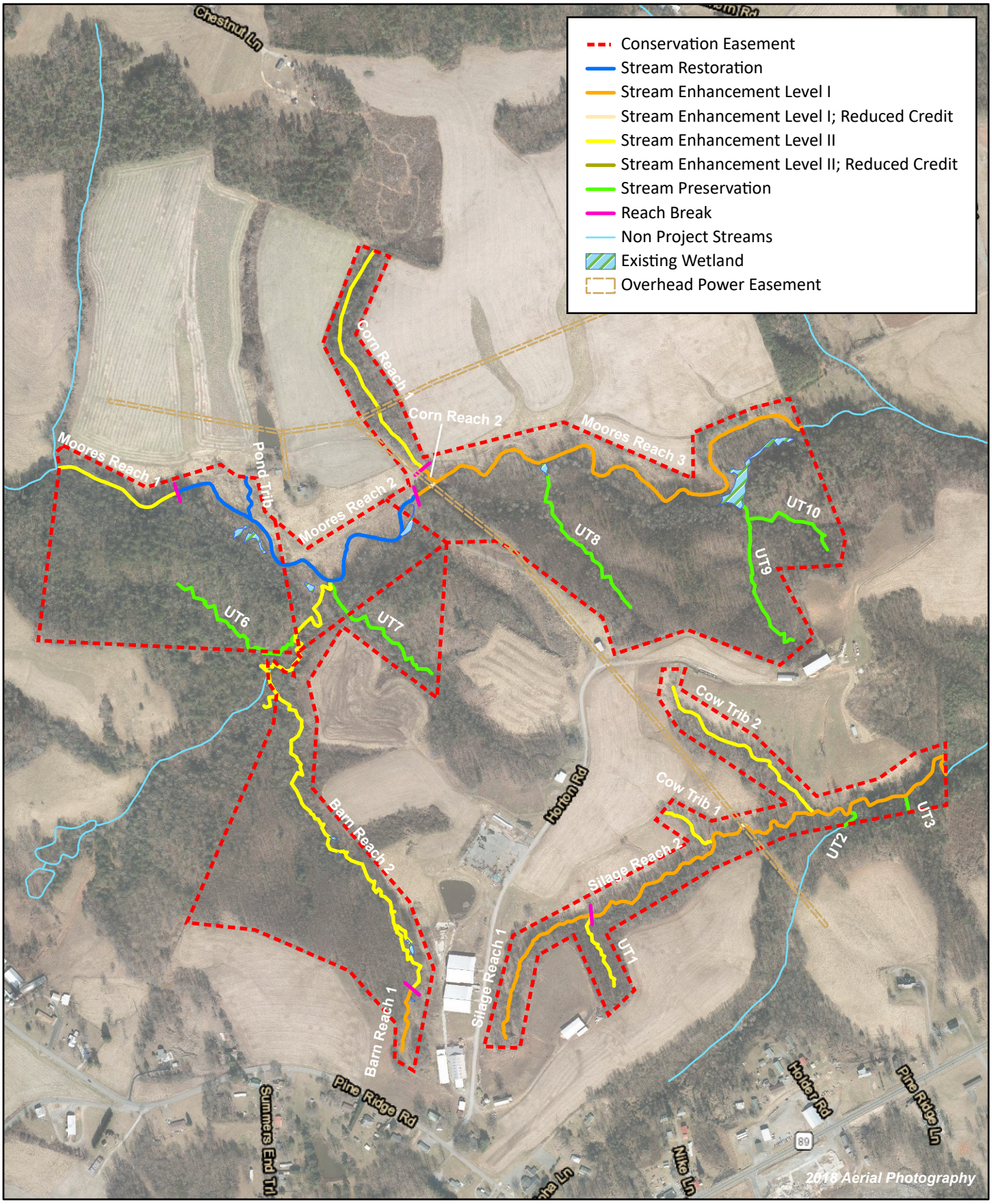
WILDLANDS ENGINEERING

0 0.5 1 Mile

N

Figure 1 Project Vicinity Map
Moores Fork Stream Mitigation Site
DMS Project No. 94709
Monitoring Year 7 - 2022

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 7 - 2022

Surry County, NC

Table 1. Project Components and Mitigation Credits
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

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 7 - 2022

Activity or Deliverable		Data Collection Complete	Completion or Delivery
Site Instituted		N/A	October 2010
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	September 2022	November 2022
	Stream Survey	May 2022	
Beaver/Dam Removal		October 2022	October 2022
Invasive Species Treatment		May, August, October 2022	October 2022

N/A - Not Applicable

Table 3. Project Contacts Table
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

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 7 - 2022

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 7 - 2022

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 7 - 2022

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

To: DMS Technical Workgroup, DMS operations staff

From: Periann Russell, Division of Mitigation Services (DMS)

RE: Pebble count data requirements

Date: October 19, 2021

The DMS Technical Work Group met September 29, 2021 to discuss Interagency Review Team (IRT) and DMS requirements for collecting pebble count data as part of monitoring (MY0-MYx). Agreement was reached between all attending parties that pebble count data will not be required during the monitoring period for all future projects.

Sediment data and particle distribution will still be required for the mitigation plan as part of the proposed design explanation and justification.

Pebble counts and/or particle distributions currently being conducted by providers for annual monitoring may be discontinued at the discretion of the DMS project manager. If particle distribution was listed as a performance standard in the project mitigation plan, the provider is required to communicate the intent to cease data collection with the DMS project manager. The absence of pebble count data in future monitoring reports where pebble count data was listed as part of monitoring in the mitigation plan must be documented in the monitoring report. The September 29, 2021 Technical Work Group meeting may be cited as the source of the new policy.

The IRT reserves the right to request pebble count data/particle distributions if deemed necessary during the monitoring period.

Kristi Suggs

From: Reid, Matthew <matthew.reid@ncdenr.gov>
Sent: Wednesday, October 27, 2021 1:26 PM
To: Kristi Suggs
Cc: Mimi Caddell
Subject: RE: [External] FW: Pebble Count Data Requirements

I am absolutely OK with not doing pebble counts anymore!

As stated in the memo, please add a statement in the monitoring reports citing the policy.

Thanks!

Matthew Reid
Project Manager – Western Region
North Carolina Department of Environmental Quality
Division of Mitigation Services

828-231-7912 Mobile
matthew.reid@ncdenr.gov

Western DMS Field Office
5 Ravenscroft Dr
Suite 102
Asheville, NC 28801

From: Kristi Suggs [mailto:ksuggs@wildlandseng.com]
Sent: Wednesday, October 27, 2021 1:24 PM
To: Reid, Matthew <matthew.reid@ncdenr.gov>
Cc: Mimi Caddell <mcaddell@wildlandseng.com>
Subject: [External] FW: Pebble Count Data Requirements

Matthew,

Jason Lorch in our Raleigh Office forwarded this meeting memo to me. It says that conducting pebble counts for DMS monitoring (MY0 – MY7) projects is no longer needed as long as it has been okayed by the DMS PM. Moving forward, are you going to allow us to stop doing them on your projects? If so, will DBB projects be treated the same? Please let me know. Thank you!

Kristi

Kristi Suggs | *Senior Environmental Scientist*
O: 704.332.7754 x110 **M**: 704.579.4828

Wildlands Engineering, Inc.
1430 S. Mint St, Suite 104
Charlotte, NC 28203

From: Jason Lorch <jlorch@wildlandseng.com>
Sent: Monday, October 25, 2021 9:05 AM
To: Kristi Suggs <ksuggs@wildlandseng.com>
Subject: FW: Pebble Count Data Requirements

FYI!

Jason Lorch, GISP | *Senior Environmental Scientist*
O: 919.851.9986 x107 **M**: 919.413.1214

Wildlands Engineering, Inc.
312 West Millbrook Road, Suite 225
Raleigh, NC 27609

From: Russell, Periann <periann.russell@ncdenr.gov>
Sent: Thursday, October 21, 2021 10:05 AM
To: King, Scott <Scott.King@mbakerintl.com>; Catherine Manner <catherine@waterlandsolutions.com>; Tugwell, Todd J CIV USARMY CESAW (US) <Todd.J.Tugwell@usace.army.mil>; adam.spiller@kci.com; Brad Breslow <bbreslow@res.us>; Davis, Erin B <erin.davis@ncdenr.gov>; gginn@wolfcreekeng.com; grant lewis <glewis@axiomenvironmental.org>; Jeff Keaton <jkeaton@wildlandseng.com>; katie mckeithan <Katie.McKeithan@mbakerintl.com>; Kayne Van Stell <kayne@waterlandsolutions.com>; Kevin Tweedy <ktweedy@eprusa.net>; Reid, Matthew <matthew.reid@ncdenr.gov>; Ryan Smith <rsmith@lmgroup.net>; Melia, Gregory <gregory.melia@ncdenr.gov>; Allen, Melonie <melonie.allen@ncdenr.gov>; Famularo, Joseph T <Joseph.Famularo@ncdenr.gov>; Rich@mogmit.com; Bryan Dick <Bryan.Dick@freese.com>; Ryan Medric <rmedric@res.us>; Kim Browning <Kimberly.D.Browning@usace.army.mil>; Kayne Van Stell <kayne@waterlandsolutions.com>; Worth Creech <worth@restorationsystems.com>; Jason Lorch <jlorch@wildlandseng.com>
Cc: Crocker, Lindsay <Lindsay.Crocker@ncdenr.gov>; Wiesner, Paul <paul.wiesner@ncdenr.gov>; Tsomides, Harry <harry.tsomides@ncdenr.gov>; Reid, Matthew <matthew.reid@ncdenr.gov>; Dow, Jeremiah J <jeremiah.dow@ncdenr.gov>; Horton, Jeffrey <jeffrey.horton@ncdenr.gov>; Ullman, Kirsten J <Kirsten.Ullman@NCDENR.gov>; Ackerman, Anjie <anjie.ackerman@ncdenr.gov>; Blackwell, Jamie D <james.blackwell@ncdenr.gov>; Xu, Lin <lin.xu@ncdenr.gov>; Mir, Danielle <Danielle.Mir@ncdenr.gov>; Corson, Kristie <kristie.corson@ncdenr.gov>; Russell, Periann <periann.russell@ncdenr.gov>; Sparks, Kimberly L <Kim.sparks@ncdenr.gov>
Subject: Pebble Count Data Requirements

Please review the attached memo documenting the agreed upon policy for pebble count data requirements.
Please reply (me only) to this email if accept that this memo represents (or misrepresents) our discussion on Sept 29.
Thank you.

Periann Russell
Geomorphologist
Division of Mitigation Services, Science and Analysis
NC Department of Environmental Quality

919 707 8306 office
919 208 1426 mobile
periann.russell@ncdenr.gov

Mailing: 1652 Mail Service Center Raleigh, NC 27699-1652
Physical: 217 West Jones Street Raleigh, NC 27603

APPENDIX B. Visual Assessment Data

- Conservation Easement
- Overhead Power Line Easement
- Stream Restoration
- Stream Enhancement Level I
- Stream Enhancement Level I; Reduced Credit
- Stream Enhancement Level II
- Stream Enhancement Level II; Reduced Credit
- Stream Preservation
- Reach Break
- Non Project Streams
- Existing Wetland
- Photo Point
- Crest Gage
- Cross-Section

Vegetation Monitoring Plots (VP) - MY7

- Criteria Met

Vegetation Areas of Concern - MY7

- Chinese Privet
- Japanese Honeysuckle
- Kudzu
- Morning Glory
- Multiflora Rose
- Oriental Bittersweet
- English Ivy
- Bare/Poor Herbaceous Cover

Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
Corn Reach 1
Corn Reach 2
Moores Reach 1
Moores Reach 2
Moores Reach 3
Pond Trib
UT6
UT7
UT8
UT9
UT10
Barn Reach 1
Barn Reach 2
Silage Reach 1
Silage Reach 2
Cow Trib 1
Cow Trib 2
UT1
UT2
UT3
Grove Church Rd
Horton Rd
Pine Ridge Rd
W Cleve St
Solla Ln
W Pine St
Fast Track Ln
Tallwood Way
Holder Rd
Naple Grove Church Rd
2018 Aerial Imagery

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 7 - 2022

Surry County, NC

Structures
- Constructed Riffle
- Brushmat
- Geolift
- Debris Plug
- Bridge
- Gully Stabilization
- Fascines

Structures
- Root Wad
- J-Hook
- Rock Vane
- Log Vane
- Step
- Stone Toe

- Conservation Easement
- Overhead Power Line Easement
- Stream Restoration
- Stream Enhancement Level I
- Stream Enhancement Level I; Reduced Credit
- Stream Enhancement Level II
- Stream Enhancement Level II; Reduced Credit
- Stream Preservation
- Reach Break
- Non Project Streams
- Top of Bank
- Existing Wetland
- Photo Point (PP)
- Crest Gage
- Cross-Section

Vegetation Monitoring Plots (VP) - MY7
- Criteria Met

Vegetation Areas of Concern - MY7
- Chinese Privet
- Japanese Honeysuckle
- Kudzu
- Morning Glory
- Multiflora Rose
- Oriental Bittersweet
- English Ivy
- Bare/Poor Herbaceous Cover

Stream Areas of Concern - MY7
- Aggradation
- Erosion
- Headcut

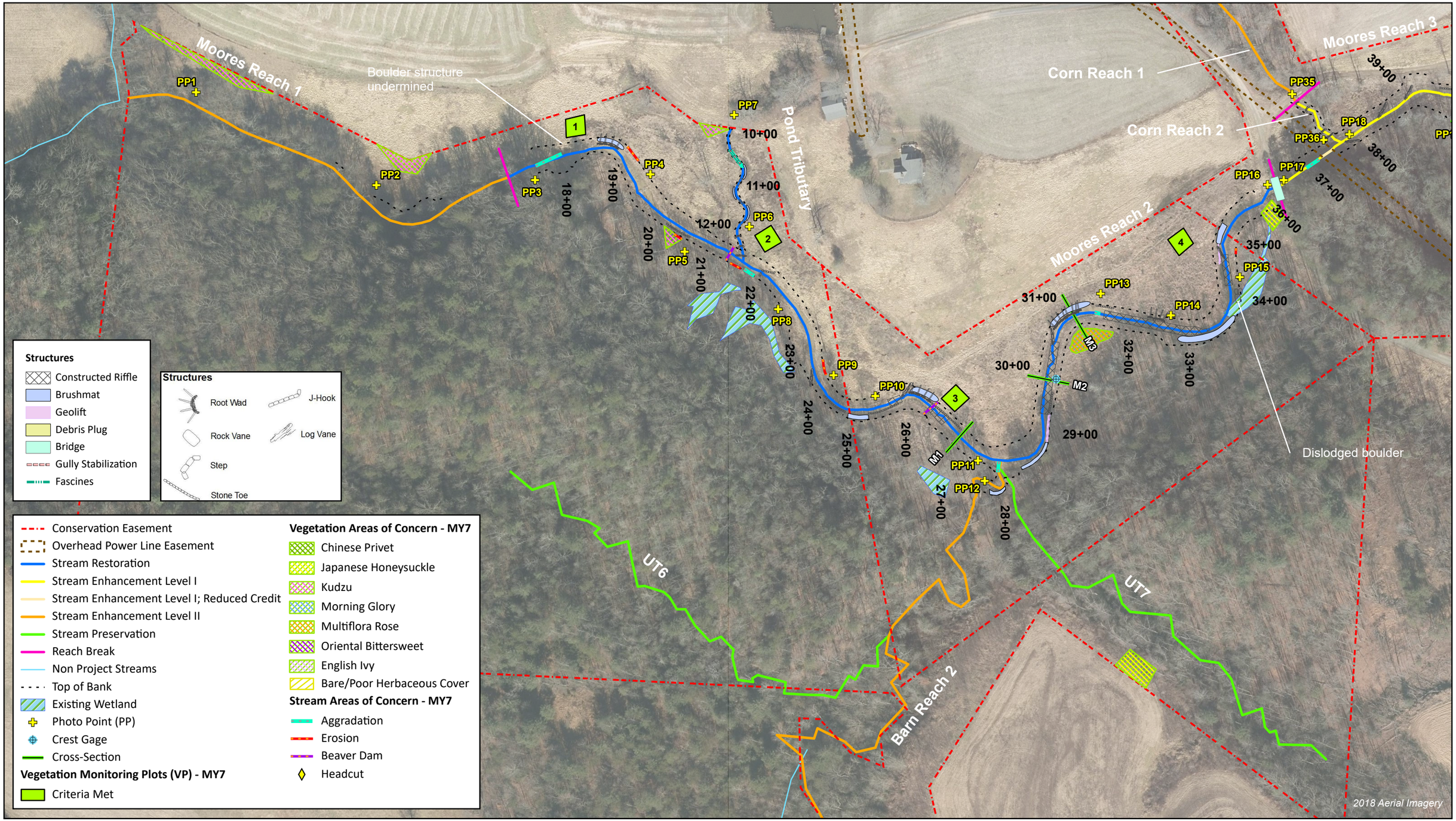
Headcut/erosion at crossing
Corn Reach 1
Corn Reach 2
Moores Reach 2
Moores Reach 3
Log vane structure piping
PP13
PP14
PP15
PP16
PP17
PP18
PP19
PP20
PP21
PP34
PP35
PP36
M2
M3
M4
4
5
UT8
29+00
30+00
31+00
32+00
33+00
34+00
35+00
36+00
37+00
38+00
39+00
40+00
41+00
42+00
43+00
44+00
2018 Aerial Imagery

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 7 - 2022

Surry County, NC



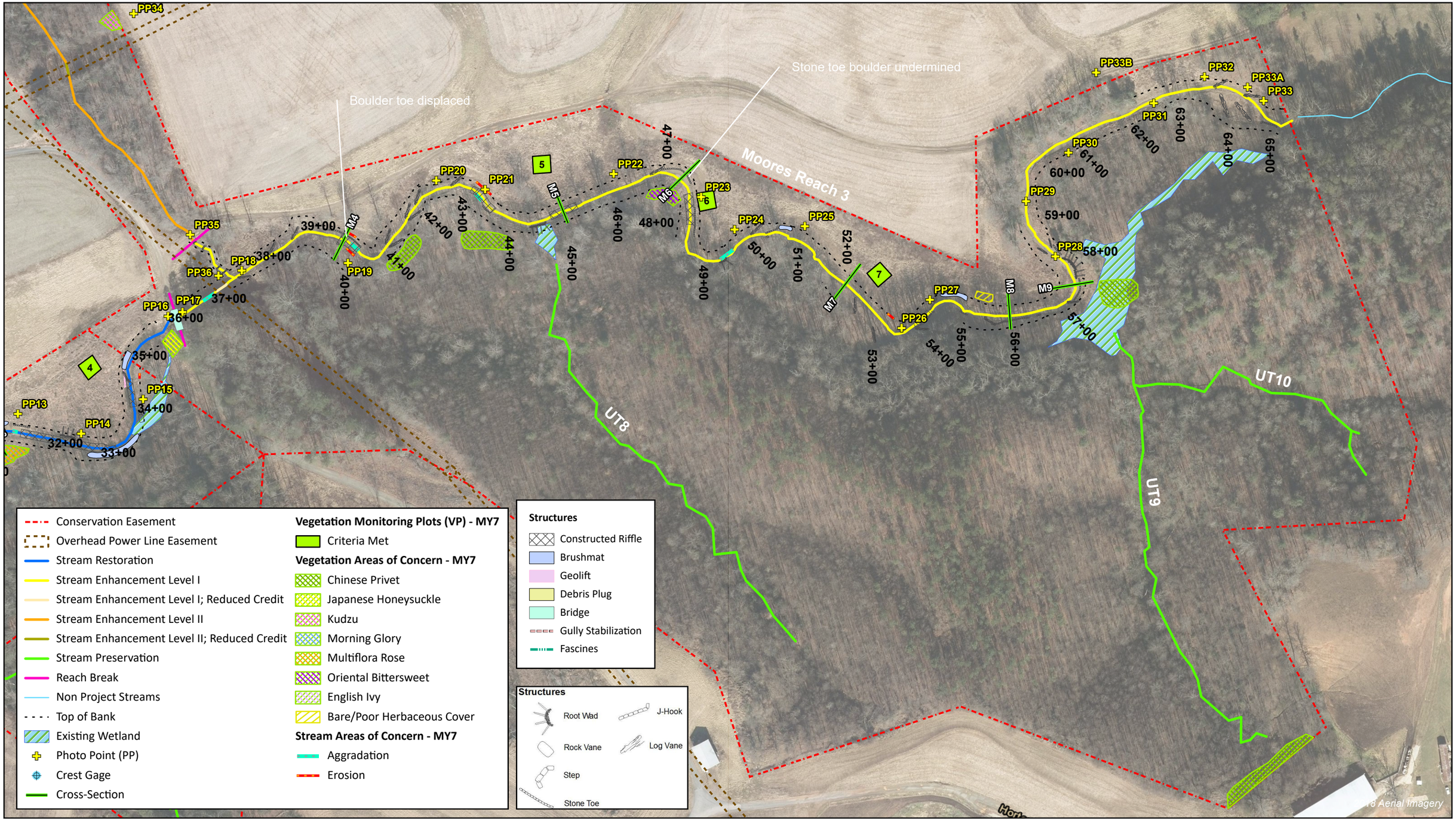
WILDLANDS ENGINEERING

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 7 - 2022

Surry County, NC



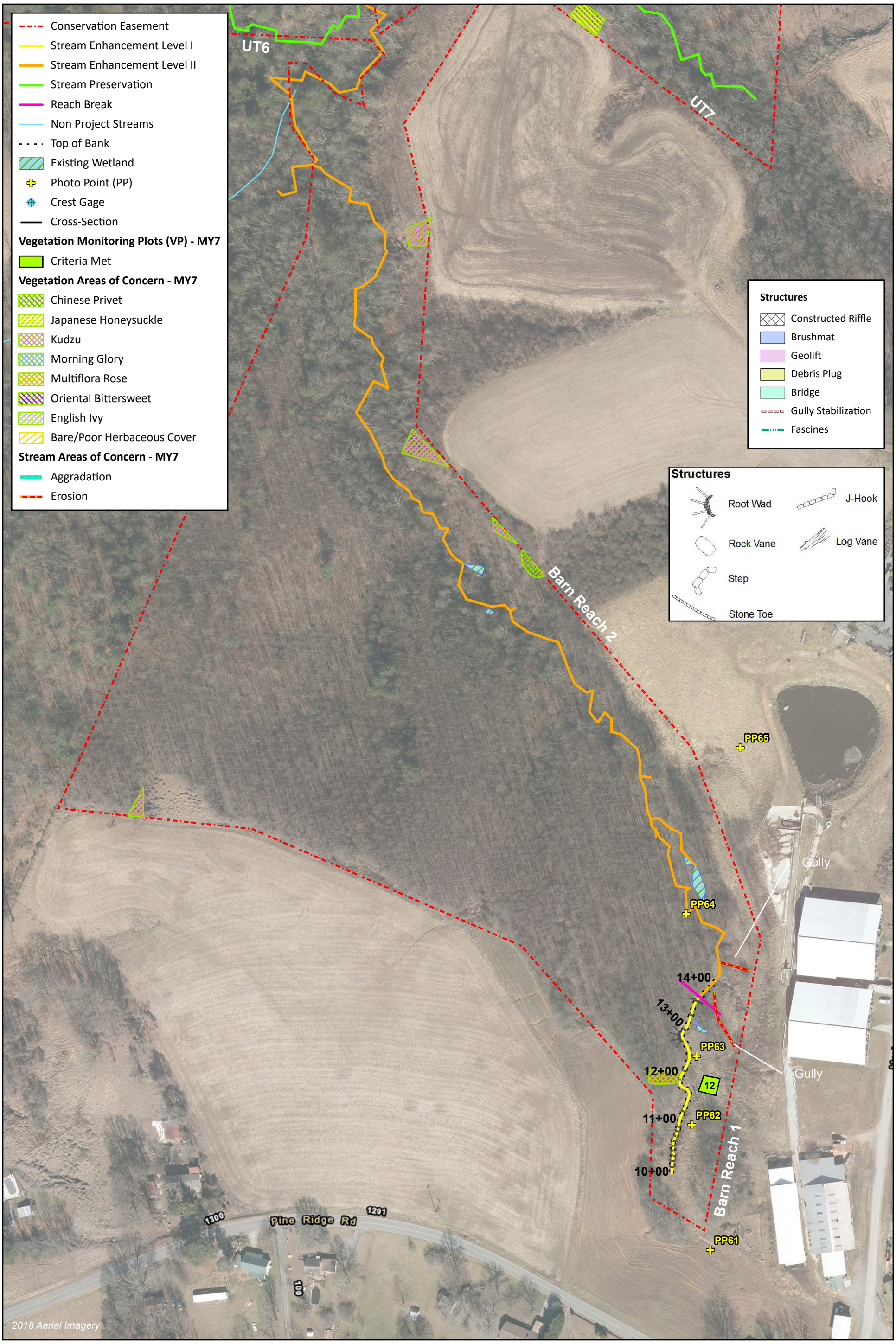
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.3 Current Condition Plan View (Sheet 3 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Surry County, NC



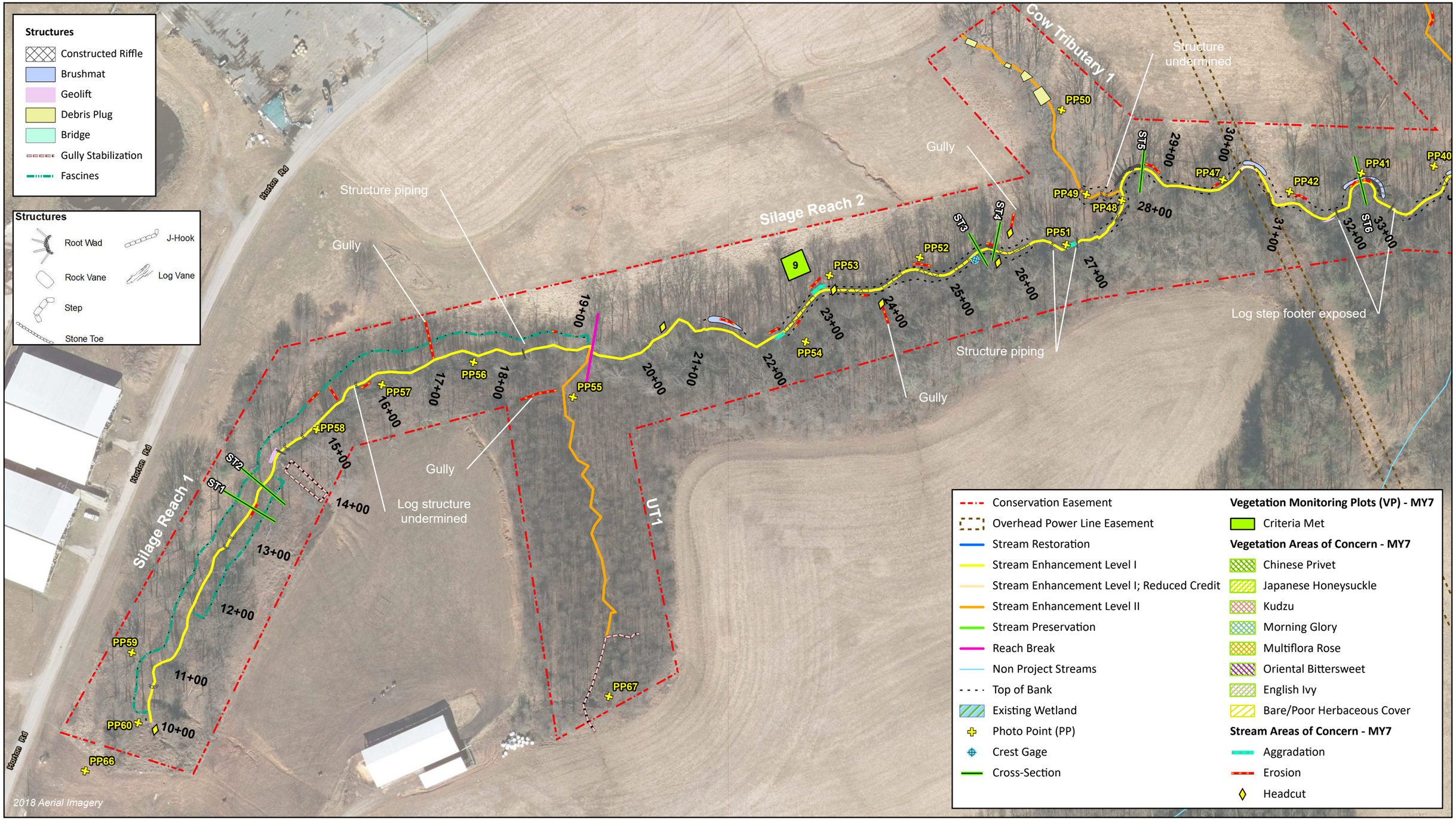
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.4 Current Condition Plan View (Sheet 4 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Surry County, NC

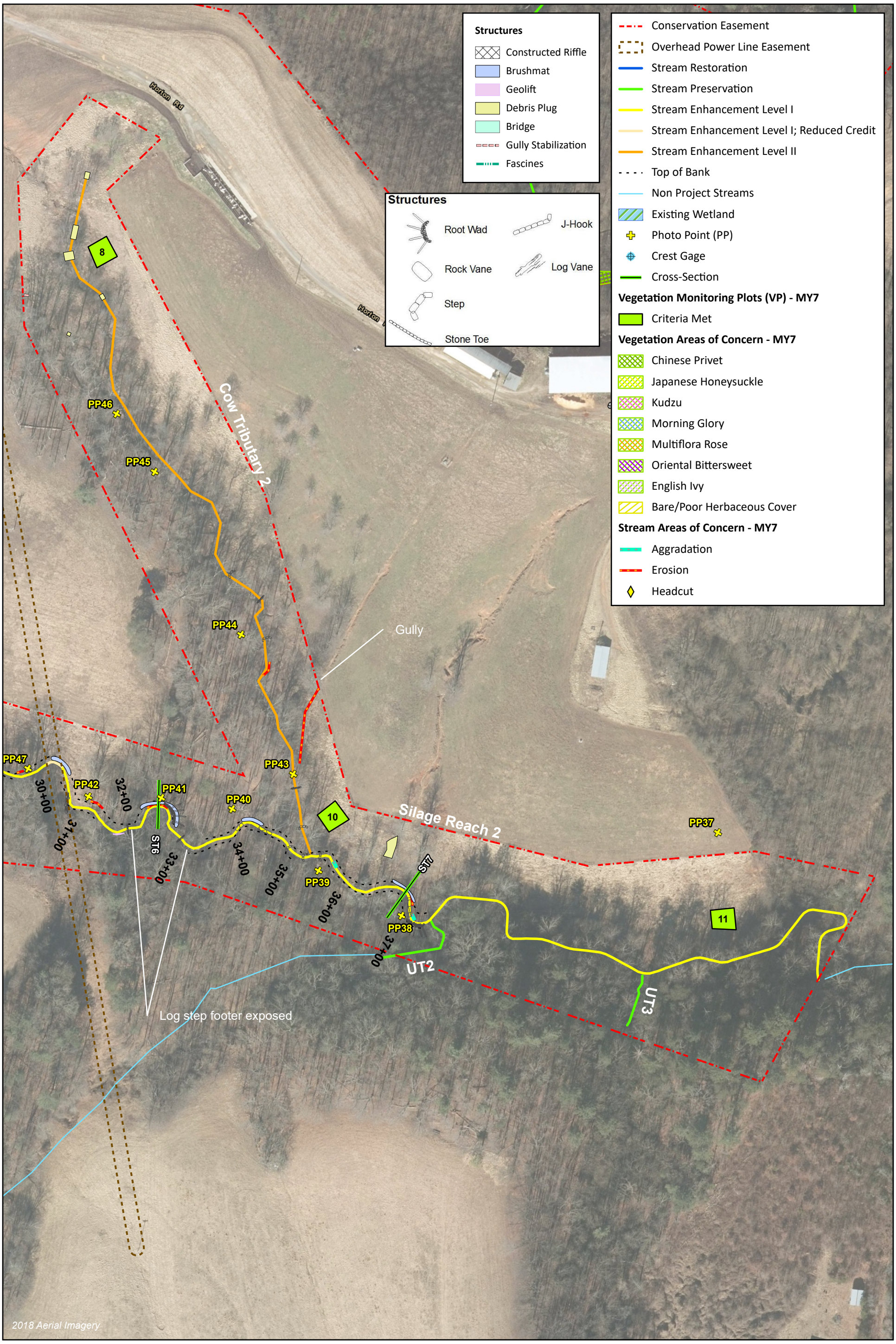


WILDLANDS ENGINEERING

0 125 250 Feet

Figure 3.5 Current Condition Plan View (Sheet 5 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Surry County, NC



WILDLANDS ENGINEERING

0 125 250 Feet

Figure 3.6 Current Condition Plan View (Sheet 6 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Surry County, NC

Table 6a. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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)			3	78	96%			
		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	102	97%	2	35	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	5	102	97%	2	35	98%
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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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)			4	93	97%			
		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			4	89	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	4	89	98%	0	0	98%
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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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			4	67	96%	0	0	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	4	67	96%	0	0	96%
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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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	225	95%	1	15	95%
	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	225	95%	1	15	95%
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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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	23	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	23	99%	0	0	99%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	24	24			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	24	24			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	24	24			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 6h. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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 7 - 2022

Date of Visual Assessments: April 2022, September 2022

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.	0.01 acres	Cross Hatch Yellow	1	0.01	0.1%
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	1	0.01	0.1%
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	1	0.01	0.1%

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)	22	0.8	0.5%
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
MY0 - MY7

	
PP1 – Moores Reach 1, looking upstream *(06/15/2016)*	**PP1** – Moores Reach 1, looking upstream *(04/05/2022)*
	
PP2 – Moores Reach 1, looking downstream *(06/15/2016)*	**PP2** – Moores Reach 1, looking downstream *(04/05/2022)*
	
PP3 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP3** – Moores Reach 2, looking downstream *(04/05/2022)*

	
PP4 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP4 –** Moores Reach 2, looking downstream *(04/05/2022)*
	
PP5 – Moores Reach 2, looking upstream *(06/15/2016)*	**PP5** – Moores Reach 2, looking upstream *(04/05/2022)*
	
PP6 – Pond Tributary, looking downstream *(06/15/2016)*	**PP6** – Pond Tributary, looking downstream *(04/05/2022)*

	
PP7 – Pond Tributary, looking downstream *(06/15/2016)*	**PP7** – Pond Tributary, looking downstream *(04/05/2022)*
	
PP8 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP8** – Moores Reach 2, looking downstream *(04/05/2022)*
	
PP9 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP9** – Moores Reach 2, looking downstream *(04/05/2022)*

	
PP10 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP10** – Moores Reach 2, looking downstream *(04/05/2022)*
	
PP11 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP11** – Moores Reach 2, looking downstream *(04/05/2022)*
	
PP12 – Barn Reach 2, looking upstream *(06/15/2016)*	**PP12 –** Barn Reach 2, looking upstream *(04/05/2022)*

	
PP13 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP13** – Moores Reach 2, looking downstream *(04/05/2022)*
	
PP14 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP14 –** Moores Reach 2, looking downstream *(04/05/2022)*
	
PP15 – Moores Reach 2, looking downstream *(06/15/2016)*	**PP15 –** Moores Reach 2, looking downstream *(04/05/2022)*

	
PP16 – Moores Reach 2, looking upstream *(06/15/2016)*	**PP16 –** Moores Reach 2, looking upstream *(04/05/2022)*
	
PP17 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP17 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP18 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP18 –** Moores Reach 3, looking downstream *(04/05/2022)*

	
PP19 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP19 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP20 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP20 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP21 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP21 –** Moores Reach 3, looking downstream *(04/05/2022)*

	
PP22 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP22 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP23 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP23 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP24 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP24 –** Moores Reach 3, looking downstream *(04/05/2022)*

	
PP25 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP25 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP26 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP26 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP27 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP27 –** Moores Reach 3, looking downstream *(04/05/2022)*

	
PP28 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP28 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP29 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP29 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP30 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP30 –** Moores Reach 3, looking downstream *(04/05/2022)*

	
PP31 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP31 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP32 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP32 –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP33 – Moores Reach 3, looking downstream *(06/15/2016)*	**PP33 –** Moores Reach 3, looking downstream *(04/05/2022)*

	
PP33a – Moores Reach 3, looking upstream *(06/15/2016)*	**PP33a –** Moores Reach 3, looking upstream *(04/05/2022)*
	
PP33b – Moores Reach 3, looking downstream *(06/15/2016)*	**PP33b –** Moores Reach 3, looking downstream *(04/05/2022)*
	
PP34 – Corn Reach 1, looking downslope *(06/15/2016)*	**PP34 –** Corn Reach 1, looking downslope *(04/05/2022)*

	
PP35 – Corn Reach 2, looking downstream *(06/15/2016)*	**PP35 –** Corn Reach 2, looking downstream *(04/05/2022)*
	
PP36 – Corn Reach 2, looking upstream *(06/15/2016)*	**PP36 –** Corn Reach 2, looking upstream *(04/05/2022)*
	
PP37 – Silage Reach 2, looking downslope *(06/15/2016)*	**PP37 –** Silage Reach 2, looking downslope *(04/06/2022)*

	
PP38 – Silage Reach 2, looking downstream *(06/15/2016)*	**PP38 –** Silage Reach 2, looking downstream *(04/06/2022)*
	
PP39 – Silage Reach 2, looking upstream *(06/15/2016)*	**PP39 –** Silage Reach 2, looking upstream *(04/06/2022)*
	
PP40 – Silage Reach 2, looking downstream *(06/15/2016)*	**PP40 –** Silage Reach 2, looking downstream *(04/06/2022)*

	
PP41 – Silage Reach 2, looking downstream *(06/15/2016)*	**PP41 –** Silage Reach 2, looking downstream *(04/06/2022)*
	
PP42 – Silage Reach 2, looking downstream *(06/15/2016)*	**PP42 –** Silage Reach 2, looking downstream *(04/06/2022)*
	
PP43 – Cow Tributary 2, looking downstream *(06/15/2016)*	**PP43 –** Cow Tributary 2, looking downstream *(04/06/2022)*

	
PP44 – Cow Tributary 2, looking downstream *(06/15/2016)*	**PP44 –** Cow Tributary 2, looking downstream *(04/06/2022)*
	
PP45 – Cow Tributary 2, looking downstream *(06/15/2016)*	**PP45 –** Cow Tributary 2, looking downstream *(04/06/2022)*
	
PP46 – Cow Tributary 2, looking upstream *(06/15/2016)*	**PP46 –** Cow Tributary 2, looking upstream *(04/06/2022)*

	
PP47 – Silage Reach 2, looking downstream *(06/15/2016)*	**PP47 –** Silage Reach 2, looking downstream *(04/06/2022)*
	
PP48 – Silage Reach 2, looking upstream *(06/15/2016)*	**PP48 –** Silage Reach 2, looking upstream *(04/06/2022)*
	
PP49 – Cow Tributary 1, looking upstream *(06/15/2016)*	**PP49 –** Cow Tributary 1, looking upstream *(04/06/2022)*

	
PP50 – Cow Tributary 1, looking upstream *(06/15/2016)*	**PP50 –** Cow Tributary 1, looking upstream *(04/06/2022)*
	
PP51 – Silage Reach 2, looking downstream *(06/15/2016)*	**PP51 –** Silage Reach 2, looking downstream *(04/06/2022)*
	
PP52 – Silage Reach 2, looking upstream *(06/15/2016)*	**PP52 –** Silage Reach 2, looking upstream *(04/06/2022)*

	
PP53 – Silage Reach 2, looking downstream *(06/15/2016)*	**PP53 –** Silage Reach 2, looking downstream *(04/06/2022)*
	
PP54 – Silage Reach 2, looking upstream *(06/15/2016)*	**PP54 –** Silage Reach 2, looking upstream *(04/06/2022)*
	
PP55 – UT1, looking upstream *(06/15/2016)*	**PP55 –** UT1, looking upstream *(04/06/2022)*

	
PP56 – Silage Reach 1, looking downstream *(06/15/2016)*	**PP56 –** Silage Reach 1, looking downstream *(04/06/2022)*
	
PP57 – Silage Reach 1, looking upstream *(06/15/2016)*	**PP57 –** Silage Reach 1, looking upstream *(04/06/2022)*
	
PP58 – Silage Reach 1, looking upstream *(06/15/2016)*	**PP58 –** Silage Reach 1, looking upstream *(04/06/2022)*

	
PP59 – Silage Reach 1, looking downstream *(06/15/2016)*	**PP59 –** Silage Reach 1, looking downstream *(04/06/2022)*
	
PP60 – Silage Reach 1, looking downstream *(06/15/2016)*	**PP60 –** Silage Reach 1, looking downstream *(04/06/2022)*
	
PP61 – Barn Reach 1, looking downslope *(06/15/2016)*	**PP61 –** Barn Reach 1, looking downslope *(04/06/2022)*

	
PP62 – Barn Reach 1, looking downstream *(06/15/2016)*	**PP62 –** Barn Reach 1, looking downstream *(04/06/2022)*
	
PP63 – Barn Reach 1, looking downstream *(06/15/2016)*	**PP63 –** Barn Reach 1, looking downstream *(04/06/2022)*
	
PP64 – Barn Reach 2, looking downstream *(06/15/2016)*	**PP64 –** Barn Reach 2, looking downstream *(04/06/2022)*

	
PP65 – Barn Reach 2, looking downslope *(06/15/2016)*	**PP65 –** Barn Reach 2, looking downslope *(04/06/2022)*
	
PP66 – Silage Reach 1, looking upslope *(06/15/2016)*	**PP66 –** Silage Reach 1, looking upslope *(04/06/2022)*
	
PP67 – UT1, looking downstream *(06/15/2016)*	**PP67 –** UT1, looking downstream *(04/06/2022)*

Repair Areas Photo Log

	
Moores Fork Reach 2 STA 35+40 left bank repair – 4/19/2021	Moores Fork Reach 2 STA 35+40 left bank repair – 4/05/2022
	
UT8/Wetland outlet repair at confluence with Moores Fork – 4/19/2021	UT8/Wetland outlet repair at confluence with Moores Fork – 4/05/2022
	
UT10/Wetland outlet repair at confluence with Moores Fork – 4/19/2021	UT10/Wetland outlet repair at confluence with Moores Fork – 4/05/2022

	
UT10/Wetland outlet repair – 4/19/2021	UT10/Wetland outlet repair – 4/05/2022
	
Moores Fork Reach 3 STA 64+10 left bank repair – 4/19/2021	Moores Fork Reach 3 STA 64+10 left bank repair – 4/05/2022
	
Silage Reach 1 STA 10+40 gully stabilization – 4/19/2021	Silage Reach 1 STA 10+40 gully stabilization – 4/06/2022

	
Silage Reach 1 STA 19+00 right bank repair – 4/20/2021	Silage Reach 1 STA 19+00 right bank repair – 4/06/2022
	
UT1 downstream repair near confluence with Silage Reach 1 – 4/20/2021	UT1 downstream repair near confluence with Silage Reach 1 – 4/06/2022
	
Upper UT1 repair area gully stabilization – 4/20/2021	Upper UT1 repair area gully stabilization – 4/06/2022

	
Silage Reach 1 STA 30+30 left bank repair – 4/20/2021	Silage Reach 1 STA 30+30 left bank repair – 4/06/2022
	
Upper Cow Trib 2 repair area gully stabilization – 4/20/2021	Upper Cow Trib 2 repair area gully stabilization – 4/06/2022
	
Upper Cow Trib 2 repair area – 4/20/2021	Upper Cow Trib 2 repair area – 4/06/2022

Vegetation Photographs
MY0 – MY7

Vegetation Plot 1 – *(06/01/2016)*

Vegetation Plot 1 – *(09/26/2022)*

Vegetation Plot 2 – *(06/01/2016)*

Vegetation Plot 2 – *(09/26/2022)*

Vegetation Plot 3 – *(06/01/2016)*

Vegetation Plot 3 – *(09/26/2022)*

	
Vegetation Plot 4 – *(06/01/2016)*	**Vegetation Plot 4** – *(09/26/2022)*
	
Vegetation Plot 5 – *(06/01/2016)*	**Vegetation Plot 5** – *(09/26/2022)*
	
Vegetation Plot 6 – *(06/01/2016)*	**Vegetation Plot 6** – *(09/26/2022)*

	
Vegetation Plot 7 – *(06/01/2016)*	**Vegetation Plot 7** – *(09/26/2022)*
	
Vegetation Plot 8 – *(06/02/2016)*	**Vegetation Plot 8** – *(09/26/2022)*
	
Vegetation Plot 9 – *(06/02/2016)*	**Vegetation Plot 9** – *(09/26/2022)*

	
Vegetation Plot 10 – *(06/02/2016)*	**Vegetation Plot 10** – *(09/26/2022)*
	
Vegetation Plot 11 – *(06/02/2016)*	**Vegetation Plot 11** – *(09/26/2022)*
	
Vegetation Plot 12 – *(06/01/2016)*	**Vegetation Plot 12** – *(09/26/2022)*

APPENDIX C. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

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 7 - 2022

Database Name	cvs-eep-entrytool-v2.5.0 Moores MY7.mdb
Database Location	L:\Active Projects\005-02153 Moores Monitoring\Monitoring\Monitoring Year 7 (2022)\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 7 - 2022

Current Plot Data (MY7 2022)																				
			94709-01-0001			94709-01-0002			94709-01-0003			94709-01-0004			94709-01-0005			94709-01-0006		
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**
Acer negundo	Box Elder	Tree																		
Acer rubrum	Red Maple	Tree																		1
Alnus serrulata	Tag Alder	Shrub Tree																		2
Betula nigra	River Birch, Red Birch	Tree										1	1	1	2	2	3			1
Cercis canadensis	Redbud	Shrub Tree							1	1	1									
Cornus florida	Flowering dogwood	Tree																		
Diospyros virginiana	American Persimmon	Tree	3	3	3	1	1	1										1	1	2
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree										5	5	5	1	1	2	1	1	1
Juglans nigra	Black Walnut	Tree																		
Liriodendron tulipifera	Tulip Poplar	Tree							3	3	3							1	1	1
Nyssa sylvatica	Black Gum	Tree																2	2	2
Platanus occidentalis	Sycamore	Tree							1	1	1	4	4	4	9	9	9	2	2	2
Prunus serotina	Black Cherry	Tree																		
Pyrus calleryana	Bradford Pear	Tree															4			
Quercus lyrata	Overcup Oak	Tree	5	5	5	3	3	3				2	2	2				3	3	3
Quercus montana	Rock Chestnut Oak	Tree				1	1	1	1	1	1							2	2	2
Quercus nigra	Water Oak	Tree	3	3	3	1	1	1				1	1	1	1	1	1			
Quercus phellos	Willow Oak	Tree										1	1	1	2	2	2			
Quercus rubra	Northern Red Oak	Tree							1	1	1									
Rhus copallinum	Winged Sumac	Shrub Tree																		
Rhus glabra	Smooth Sumac	Shrub Tree																		
Salix nigra	Black Willow	Tree																		1
	Stem count		11	11	11	6	6	6	7	7	7	14	14	14	15	15	21	12	12	18
	size (ares)		1			1			1			1			1			1		
	size (ACRES)		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	6	7	7	11
	Stems per ACRE		445	445	445	243	243	243	283	283	283	567	567	567	607	607	850	486	486	728

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 7 - 2022

Current Plot Data (MY7 2022)																				
			94709-01-0007			94709-01-0008			94709-01-0009			94709-01-0010			94709-01-0011			94709-01-0012		
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**
Acer negundo	Box Elder	Tree									1									
Acer rubrum	Red Maple	Tree						1			1			25			9			
Alnus serrulata	Tag Alder	Shrub Tree																		
Betula nigra	River Birch, Red Birch	Tree																		
Cercis canadensis	Redbud	Shrub Tree				1	1	1												
Cornus florida	Flowering dogwood	Tree												5						
Diospyros virginiana	American Persimmon	Tree							1	1	3	4	4	4	1	1	3	6	6	6
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	5	5	5													1	1	1
Juglans nigra	Black Walnut	Tree																		
Liriodendron tulipifera	Tulip Poplar	Tree				1	1	2			4			40						2
Nyssa sylvatica	Black Gum	Tree	2	2	4	2	2	2	1	1	1	4	4	4	5	5	5			
Platanus occidentalis	Sycamore	Tree	7	7	7													1	1	1
Prunus serotina	Black Cherry	Tree																		
Pyrus calleryana	Bradford Pear	Tree						1						2						
Quercus lyrata	Overcup Oak	Tree				4	4	4	6	6	6				3	3	3	1	1	1
Quercus montana	Rock Chestnut Oak	Tree							1	1	1				5	5	5			
Quercus nigra	Water Oak	Tree				1	1	1	6	6	6	3	3	3						
Quercus phellos	Willow Oak	Tree							1	1	1									
Quercus rubra	Northern Red Oak	Tree												1						
Rhus copallinum	Winged Sumac	Shrub Tree						9												
Rhus glabra	Smooth Sumac	Shrub Tree																		
Salix nigra	Black Willow	Tree																		
		Stem count	14	14	16	9	9	21	16	16	24	11	11	84	14	14	25	9	9	11
		size (ares)	1			1			1			1			1			1		
		size (ACRES)	0.02471			0.02471			0.02471			0.02471			0.02471			0.02471		
		Species count	3	3	3	5	5	8	6	6	9	3	3	8	4	4	5	4	4	5
		Stems per ACRE	567	567	647	364	364	850	647	647	971	445	445	3399	567	567	1012	364	364	445

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 10c. Planted and Total Stem Counts
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Annual Stem Counts & Means																											
			MY7 (2022)			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**
Acer negundo	Box Elder	Tree			1																					
Acer rubrum	Red Maple	Tree			37			33			144			10			20			7						
Alnus serrulata	Tag Alder	Shrub Tree			2			2																		
Betula nigra	River Birch, Red Birch	Tree	3	3	5	3	3	7	1	1	5	1	1	3			1	1	1	3			2			
Cercis canadensis	Redbud	Shrub Tree	2	2	2	2	2	3	2	2	4			1			1									
Cornus florida	Flowering dogwood	Tree			5			2			2															
Diospyros virginiana	American Persimmon	Tree	17	17	22	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	13	13	14	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						2																		
Liriodendron tulipifera	Tulip Poplar	Tree	5	5	52	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	16	16	18	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	24	24	24	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			7			3						2												
Quercus lyrata	Overcup Oak	Tree	27	27	27	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	10	10	10	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	16	16	16	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	4	4	4	7	7	7	7	7	7
Quercus rubra	Northern Red Oak	Tree	1	1	2	1	1	1	1	1	2															
Rhus copallinum	Winged Sumac	Shrub Tree			9			4			1															
Rhus glabra	Smooth Sumac	Shrub Tree												2			5			2			1			
Salix nigra	Black Willow	Tree			1			3																		
		Stem count	138	138	258	143	143	257	142	142	350	136	136	191	136	136	213	140	140	221	146	146	154	149	149	149
		size (ares)		12			12			12			12			12			12			12		12	
		size (ACRES)		0.29653			0.29653			0.29653			0.29653			0.29653			0.29653			0.29653		0.29653	
		Species count	12	12	19	12	12	19	12	12	16	10	10	14	9	9	13	10	10	12	9	9	11	9	9	9
		Stems per ACRE	465	465	870	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

Table 10d. Planted Stem Average Heights
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Average Stem Height (ft) by Plot						
	MY2	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Vegetation Plot 1	5.1	7.3	9.6	12.9	18.3	23.2
Vegetation Plot 2	5.0	6.5	9.9	10.4	11.6	14.0
Vegetation Plot 3	3.4	6.7	9.1	9.9	15.9	19.6
Vegetation Plot 4	7.8	11.9	15.3	20.4	24.2	25.7
Vegetation Plot 5	8.0	12.6	15.9	21.2	24.9	31.6
Vegetation Plot 6	2.3	2.7	3.4	4.9	5.9	6.2
Vegetation Plot 7	4.9	7.6	10.1	15.3	17.5	22.1
Vegetation Plot 8	4.8	6.9	9.0	11.8	13.7	17.5
Vegetation Plot 9	4.0	5.9	8.3	11.8	15.7	20.5
Vegetation Plot 10	2.8	3.7	5.2	7.4	9.0	10.3
Vegetation Plot 11	3.2	3.7	4.4	5.6	6.0	7.9
Vegetation Plot 12	4.8	7.0	9.4	10.7	15.8	19.3
Site Average	**4.7**	**6.9**	**9.1**	**11.9**	**14.9**	**18.2**

Table 10e. Stems Per Plot Across All Years
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Plot	MY7 (2022)			MY6 (2021)			MY5 (2020)			MY4 (2019)		
	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac
1	11	11	445	12	12	486	12	12	486	12	12	486
2	6	6	243	7	7	283	7	7	283	6	7	283
3	7	7	283	7	7	283	7	7	283	5	5	202
4	14	14	567	17	17	688	17	17	688	17	17	688
5	15	21	850	15	19	769	14	17	688	14	18	728
6	12	18	728	12	20	809	11	12	486	13	13	526
7	14	16	648	13	15	607	13	14	567	12	12	486
8	9	21	850	9	15	607	9	14	567	7	12	486
9	16	24	971	16	17	688	16	20	809	16	16	648
10	11	84	3,399	11	98	3,966	11	201	8,134	10	53	2,145
11	14	25	1,012	14	18	728	14	18	728	14	16	648
12	9	11	445	10	12	486	11	11	445	10	10	405

Plot	MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)		
	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac	Planted Stems	Total Stems	Total Stems/Ac
1	12	14	567	12	12	486	13	13	526	12	12	486
2	7	7	283	7	7	283	6	6	243	7	7	283
3	6	6	243	7	7	283	7	7	283	7	7	283
4	15	15	607	17	17	688	16	16	648	17	17	688
5	14	16	648	14	16	648	13	16	648	14	14	567
6	14	14	567	13	13	526	19	19	769	21	21	850
7	12	16	648	12	13	526	13	13	526	14	14	567
8	6	14	567	8	12	486	8	13	526	8	8	324
9	16	20	809	16	18	728	16	16	648	16	16	648
10	10	65	2,631	10	81	3,278	9	9	364	8	8	324
11	14	16	648	14	14	567	14	14	567	13	13	526
12	10	10	405	10	11	445	12	12	486	12	12	486

APPENDIX D. Morphological Summary Data and Plots

Table 11a. Baseline Stream Data Summary
Moores Fork Stream Mitigation Project
DMS Project No.94709
Monitoring Year 7 - 2022

Moores Reach 1, Reach 2, & Reach 3; Silage Reach 1 & Reach 2

		PRE-RESTORATION CONDITION								REFERENCE REACH DATA		DESIGN								AS-BUILT/BASELINE							
Parameter	**Gage**	**Moores Fork Reaches 1/2**		**Moores Fork Reach 3**		**Silage Reach 1**		**Silage Reach 2**		**Mill Branch**		**Moores Fork Reaches 1/2**		**Moores Fork Reach 3**		**Silage Reach 1**		**Silage Reach 2**		**Moores Fork Reaches 1/2**		**Moores Fork Reach 3**		**Silage Reach 1**		**Silage Reach 2**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																											
Bankfull Width (ft)		27.3	30.6	24.9	34.2	6.7	6.9	18.2		27.2	33.6	36.5		37.0		8.8		12.5		31.8	33.2	30.2	52.2	4.2		10.6	14.6
Floodprone Width (ft)		109.0	137.7	104.0	125.0	11	16.0	100.0		72.1	72.5	145		124		19		28		145		124		9.4		23	30
Bankfull Mean Depth		1.7	2.6	2.3	2.9	0.8	1.2	1.7		1.9	2.2	2.2		2.3		0.6		1.00		2.1	2.2	1.9	2.6	0.7		0.6	0.8
Bankfull Max Depth		3.0	3.4	4.0		1.2	1.7	2.3		2.4	2.7	3.5		3.6		0.8		1.50		3.3	3.5	3.3	4.1	1.2		1.3	1.5
Bankfull Cross-sectional Area (ft^2)	N/A	46.9	78.2	73.3	77.6	5.6	8.4	31.6		50.8	72.4	82.1		85.3		5.1		13.1		67.2	74.1	72.5	101.1	2.8		6.9	9.3
Width/Depth Ratio		12.0	15.9	8.4	15.1	5.7	8.0	10.5		14.5	15.6	16.2		16.0		15.1		11.9		14.9	15	12.5	26.9	6.4		16.2	22.7
Entrenchment Ratio		4.0	4.5	3.7	4.2	1.6	2.3	5.5		2.7		5.0		4.0		2.2		2.2		4.4	4.6	2.5	4.1	4.5		1.3	2.6
Bank Height Ratio		1.2	1.4	1.2	1.9	1.0	1.6	3.1		1.0	1.1	1.0		1.0		1.0		1.5		1.0		1.0		1.0		1.0	
D50 (mm)		29		30		4		23		20		29		30		4		23		11	25	13	28	16		6	14
Riffle Length (ft)		---		---		---		---		---		50	70	10	195	---		16	63	32	178	26.0	199.0	---		13.12	55.95
Riffle Slope (ft/ft)		---		---		---		---		---		0.0059	0.0180	0.0038	0.02	---		0.0492	0.0514	0.0045	0.0158	0.0027	0.0180	---		0.0017	0.0554
Pool Length (ft)	N/A	---		---		---		---		---		42	140	40	112	---		15	35	63	170	81.0	139.0	---		10	19
Pool Max Depth (ft)		---		---		---		---		---		5.0		5.5		---		---		3.0	6.0	4.3	8.5	1.2		1.4	2.4
Pool Spacing (ft)		---		---		---		---		---		130	270	78	334	20	23	15	75	118	295	106	325	13.3	171.5	21	79
Pattern																											
Channel Beltwidth (ft)		52	161	43	208	---		---		86		55	165	53	267	---		---		7	84	8	59	7	36	8	59
Radius of Curvature (ft)		65.8	102.7	41	94	---		---		19.6	25.8	53	124	58	74	---		---		25	58	13	24	9	25	13	24
Rc:Bankfull Width (ft/ft)	N/A	2.4	3.4	1.7	2.8	---		---		0.7	0.9	2.0	6.0	1.7	4.0	---		---		0.8	1.8	0.4	0.8	2.1	6.0	1.2	2.3
Meander Length (ft)		N/A		N/A		---		---		N/A		N/A		N/A		---		---		123	210	63	158	61	100	63	158
Meander Width Ratio		1.9	5.3	1.7	6.1	---		---		3.2		1.9	5.7	1.7	8.6	---		---		3.9	6.6	2.1	5.2	14.5	23.8	5.9	14.9
Substrate, Bed and Transport Parameters																											
Ri%/Ru%/P%/G%/S%																											
SC%/Sa%/G%/C%/B%/Be%																											
d50/d84/d95	N/A	28/67/89 and 29/43/56		---		---		---		40/89/133		---		---		---		---		25/58/90 and 11/38/110		8; 28/62/150; 13/28/51; 2		16/35/61		9.8/37/64 and 6/31/72	
Max part size (mm) mobilized at bankfull																											
Stream Power (Capacity) W/m^2																											
Additional Reach Parameters																											
Drainage Area (SM)		1.9		2.39		0.070		0.24		5		1.90		2.34		0.070		0.24		1.90		2.34		0.070		0.24	
Watershed Impervious Cover Estimate (%)		<5%		<5%		<5%		<5%		---		<5%		<5%		<5%		<5%		<5%		<5%		<5%		<5%	
Rosgen Classification		C4		C4		G4/B4		E4		C4		C4		C4		B4		E4		C4		C4		B4		E4	
Bankfull Velocity (fps)		4.1	5.3	4.6	5.2	5.4	6.6	6.3		5.0	5.5	5.0		4.9		4.5		4.5		4.4	4.6	4.2	5.1	5.0		4.5	5.1
Bankfull Discharge (cfs)		193.9	411.4	380.1	358.4	30.2	55.1	197.5		N/A		250-260		260		24		60		297.6	340.8	348.4	468.7	13.8		31.2	44.3
Q-USGS NC HR1 (2-yr)	N/A	237-278		278		29		63		385		237-278		278		29		63		237-278		278		29		63	
Valley Length (ft)		2227		2234		1079		1200		4730		2227		2234		1079		1200		2227		2234		1079		1200	
Channel Thalweg Length (ft)		2393		2847		1198		1441		327		2578		2825		1198		1441		2,628		2,856		1,198		1,441	
Sinuosity		1.07		1.27		1.11		1.20		1.26		1.16		1.26		1.11		1.20		1.2		1.3		1.11		1.20	
Water Surface Slope $(ft/ft)^2$		0.0077		0.0067		0.0357		0.0294		0.0101		0.0076		0.0064		0.0357		0.0294		0.005541		0.005511		0.0389		0.02758	
Bankfull Slope (ft/ft)		---		---		---		---		---		---		---		---		---		0.005265		0.006112		0.0404		0.02740	

(---): Data was not provided
N/A: Not Applicable

Table 11b. Baseline Stream Data Summary
Moores Fork Stream Mitigation Project
DMS Project No.94709
Monitoring Year 7 - 2022

Barn Trib, Corn Trib, Pond Trib

		PRE-RESTORATION CONDITION						REFERENCE REACH DATA				DESIGN						AS-BUILT/BASELINE					
Parameter	**Gage**	**Barn**		**Corn**		**Pond**		**Barn Trib Pres Rch**		**Corn Trib Pres Rch**		**Barn (Reach 1)**		**Corn**		**Pond**		**Barn (Reach 1)**		**Corn (Reach 2)**		**Pond**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																							
Bankfull Width (ft)	N/A	1.6		4.6		16.3		7.0		4.1		6.0		6.6		8.0		---		---		---	
Floodprone Width (ft)		4.0		7.8		50.0		9.9		13.7		19		20		25		---		---		---	
Bankfull Mean Depth		0.6		0.5		1.5		0.7		0.4		0.5		0.4		0.7		---		---		---	
Bankfull Max Depth		0.8		0.7		2.6		1.1		0.5		0.8		0.6		1.0		---		---		---	
Bankfull Cross-sectional Area (ft^2)		0.9		2.4		24.4		4.6		1.5		3.2		2.9		5.5		---		---		---	
Width/Depth Ratio		2.9		8.9		10.9		10.6		11.2		11.3		15.1		11.6		---		---		---	
Entrenchment Ratio		2.5		1.7		3.1		1.4		3.3		3.2		3.0		3.1		---		---		---	
Bank Height Ratio		7.6		3.8		1.1		1.6		1.7		1.0		1.0		1.0		---		---		---	
D50 (mm)		---		---		---		46		46		---		---		---		---		---		---	
Riffle Length (ft)	N/A	---		---		---		---		---		---		---		5	31	---		12.0		8.4	27.3
Riffle Slope (ft/ft)		---		---		---		---		---		---		---		0.02	0.0538	---		0.0498		0.0136	0.0241
Pool Length (ft)		---		---		---		---		---		8	13	---		10	30	---		17.5	32.9	27.8	37.9
Pool Max Depth (ft)		---		---		---		---		---		---		---		---		---		2.6	3.6	0.7	1.4
Pool Spacing (ft)		---		---		---		---		---		8	10	---		15	54	6.11	77.7	9	56	22	43
Pool Volume (ft^3)		---		---		---		---		---		---		---		---							
Pattern																							
Channel Beltwidth (ft)	N/A	---		---		---		---		---		---		---		---		13	26	20	22	24	24
Radius of Curvature (ft)		---		---		---		---		---		---		---		---		12	30	12	29	15	21
Rc:Bankfull Width (ft/ft)		---		---		---		---		---		---		---		---		---		---		---	
Meander Length (ft)		---		---		---		---		---		---		---		---		71	85	49	61	66	78
Meander Width Ratio		---		---		---		---		---		---		---		---		---		---		---	
Substrate, Bed and Transport Parameters																							
Ri%/Ru%/P%/G%/S%	N/A																						
SC%/Sa%/G%/C%/B%/Be%																							
d50/d84/d95																							
Max part size (mm) mobilized at bankfull																							
Stream Power (Capacity) W/m^2																							
Additional Reach Parameters																							
Drainage Area (SM)	N/A	0.01		0.05		0.04		0.08		0.05		0.01		0.05		0.040		0.01		0.05		0.040	
Watershed Impervious Cover Estimate (%)		<5%		<5%		<5%		<5%		<5%		<5%		<5%		<5%		<5%		<5%		<5%	
Rosgen Classification		G4		G4		C4b (trampled)		B4		E4b		E4b		B4		C4b		E4b		B4		C4b	
Bankfull Velocity (fps)		2.70		5.01		7.4		3.84		2.7		3.31		4.7		3.93		---		---		---	
Bankfull Discharge (cfs)		2.5		12.0		181.4		17.7		4.0		11		---		19		---		---		---	
Q-USGS NC HR1 (2-yr)		8		---		20		---		---		8		---		20							
Q-Mannings		11		---		19		---		---		11		---		19		11		---		19	
Valley Length (ft)		622		84		187		622		---		330		84		187		330		84		187	
Channel Thalweg Length (ft)		250		97		194		84		28		350		97		243		350		112		243	
Sinuosity		0.40		1.15		1.04		0.14		---		1.06		1.15		1.30		1.06		1.3		1.3	
Water Surface Slope ($ft/ft)^2$		0.0206		0.0567		0.029		0.0211		0.0243		0.0206		0.0567		0.0176		0.0478	0.1124	0.0425		0.0118	
Bankfull Slope (ft/ft)		---		---		---		---		---		---		---		---		0.0463	0.1005	0.0478		0.0129	

(---): Data was not provided
N/A: Not Applicable

Table 12a. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)

Moores Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 7 - 2022

Moores Fork

	Cross-Section M1 (Riffle)								Cross-Section M2 (Riffle)								Cross-Section M3 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**
bankfull elevation (ft)	1150.4	1150.4	1150.4	1150.5		1150.7		1150.9	1148.7	1148.7	1148.7	1149.1		1149.3		1149.5	1148.4	1148.4	1148.4	1148.4		1149.0		1149.3
low bank elevation (ft)	1150.4	1150.5	1150.4	1150.3		1150.4		1150.5	1148.7	1148.7	1148.6	1148.8		1149.4		1149.5	1148.4	1148.3	1148.4	1148.4		1149.0		1149.3
Bankfull Width (ft)	33.2	34.2	34.1	36.0		32.4		31.0	31.8	32.5	32.5	38.5		33.8		29.5	39.1	39.3	38.9	38.0		40.4		37.8
Floodprone Width (ft)	145.0	145.0	145.0	145.0		145.0		145.0	145.0	145.0	145.0	145.0		145.0		145.0	---	---	---	---		---		---
Bankfull Mean Depth (ft)	2.2	2.2	2.1	2.1		2.0		2.0	2.1	2.0	1.9	1.7		2.1		2.3	2.3	2.3	2.3	2.2		2.4		2.5
Bankfull Max Depth (ft)	3.3	3.2	3.4	3.5		3.3		3.6	3.5	3.4	3.4	3.7		4.0		4.1	5.2	5.1	5.2	5.1		5.5		5.4
Bankfull Cross-Sectional Area (ft^2)	74.1	74.3	71.9	74.1		65.3		62.1	67.2	65.6	62.0	67.2		70.5		66.4	91.8	90.1	87.8	81.8		95.5		94.8
Bankfull Width/Depth Ratio	14.9	15.7	16.1	17.5		16.0		15.5	15.0	16.1	17.0	22.1		16.2		13.1	16.6	17.2	17.2	17.6		17.1		15.1
Bankfull Entrenchment Ratio	4.4	4.2	4.3	4.0		4.5		4.7	4.6	4.5	4.5	3.8		4.3		4.9	---	---	---	---		---		---
Bankfull Bank Height Ratio	1.0	1.0	1.0	<1.0		<1.0		<1.0	1.0	1.0	1.0	<1.0		1.0		1.0	---	---	---	---		---		---

	Cross-Section M4 (Riffle)								Cross-Section M5 (Riffle)								Cross-Section M6 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**
bankfull elevation (ft)	1142.3	1142.3	1142.3	1142.5		1142.5		1142.5	1139.5	1139.5	1139.5	1139.5		1139.5		1139.5	1138.6	1138.6	1138.6	1138.7		1138.3		1138.4
low bank elevation (ft)	1142.3	1141.6	1141.6	1142.2		1142.3		1142.8	1139.5	1139.4	1139.7	1139.7		1139.9		1139.3	1138.6	1138.5	1138.5	1138.7		1138.3		1138.4
Bankfull Width (ft)	52.2	51.6	52.3	52.3		52.4		55.7	32.0	31.6	32.6	32.7		34.7		33.6	39.3	39.1	39.3	48.1		39.9		39.5
Floodprone Width (ft)	124.0	124.0	124.0	124.0		124.0		124.0	124.0	124.0	124.0	124.0		124.0		124.0	---	---	---	---		---		---
Bankfull Mean Depth (ft)	1.9	1.9	1.8	1.6		1.7		2.1	2.3	2.3	2.2	2.2		2.5		2.0	2.7	2.7	2.9	2.4		2.7		2.5
Bankfull Max Depth (ft)	3.3	3.2	3.7	3.2		4.0		4.9	3.5	3.6	3.6	3.8		4.4		3.7	5.1	5.5	5.2	5.2		5.8		4.9
Bankfull Cross-Sectional Area (ft^2)	101.1	97.4	95.8	83.8		89.9		117.2	73.0	72.4	72.8	73.0		84.7		66.5	106.1	106.2	115.6	116.7		107.7		99.5
Bankfull Width/Depth Ratio	26.9	27.3	28.6	32.7		30.5		26.5	14.0	13.8	14.6	14.6		14.1		17.0	14.5	14.4	13.3	19.8		14.8		15.7
Bankfull Entrenchment Ratio	2.4	2.4	2.4	2.4		2.4		2.2	3.9	3.9	4.1	3.8		3.6		3.7	---	---	---	---		---		---
Bankfull Bank Height Ratio	1.0	<1.0	<1.0	<1.0		<1.0		1.1	1.0	1.0	1.1	1.0		1.1		1.0	---	---	---	---		---		---

	Cross-Section M7 (Run)								Cross-Section M8 (Riffle)								Cross-Section M9 (Pool)							
Dimension and Substrate	**Base[1]**	**MY1**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base**	**MY1[1]**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2[1]**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**
bankfull elevation (ft)	1134.9	1134.9	1134.9	1135.0		1135.1		1135.4	1132.4	1132.4	1132.4	1132.4		1132.5		1132.4	1132.1	1132.1	1132.1	1132.1		1132.2		1132.3
low bank elevation (ft)	1134.9	1134.9	1135.0	1134.8		1134.9		1135.0	1132.4	1132.3	1132.3	1132.2		1132.6		1132.5	1132.1	1132.1	1132.1	1132.1		1132.2		1132.3
Bankfull Width (ft)	49.5	49.2	49.6	51.0		48.5		49.7	34.6	34.0	33.5	36.5		35.9		34.8	52.0	53.7	54.3	57.9		55.0		56.0
Floodprone Width (ft)	124.0	124.0	124.0	124.0		124.0		124.0	124.0	124.0	124.0	124.0		124.0		124.0	---	---	---	---		---		---
Bankfull Mean Depth (ft)	2.4	2.4	2.4	2.3		2.2		2.0	2.6	2.7	2.7	2.5		2.7		2.7	2.8	2.8	2.7	2.5		2.4		2.6
Bankfull Max Depth (ft)	3.5	3.5	3.8	4.0		3.7		4.2	4.1	4.3	4.2	4.3		4.9		5.3	6.3	6.3	6.5	6.2		6.6		6.8
Bankfull Cross-Sectional Area (ft^2)	118.1	117.0	117.7	118.1		105.4		100.4	91.5	91.5	89.2	91.5		96.6		92.6	146.3	149.5	146.1	146.1		133.3		147.7
Bankfull Width/Depth Ratio	20.7	20.7	20.9	22.0		22.3		24.6	13.1	12.6	12.6	14.6		13.3		13.1	18.5	19.3	20.1	23.0		22.7		21.2
Bankfull Entrenchment Ratio	2.5	2.5	2.5	2.4		2.6		2.5	3.6	3.6	3.7	3.4		3.5		3.6	---	---	---	---		---		---
Bankfull Bank Height Ratio	1.0	1.0	1.0	<1.0		<1.0		<1.0	1.0	1.0	1.0	1.0		1.0		1.0	---	---	---	---		---		---

[1]Adjustment in survey points included in bankfull calculations resulting in change to previous monitoring year bankfull dimensions.

[2]Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation. For MY3-MY7, Bank Height Ratio is calculated based on the As-built (Base) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the low bank elevation.

[3]MY4 and MY6 are reduced monitoring years. No geomorphic data collected.

Table 12b. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)

Moores Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 7 - 2022

Silage Tributary

	Cross-Section ST1 (Riffle)								Cross-Section ST2 (Pool)								Cross-Section ST3 (Riffle)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base**	**MY1[1]**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2[1]**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**
bankfull elevation (ft)	1234.6	1234.6	1234.6	1234.1		1234.1		1234.2	1233.4	1233.4	1233.4	1233.5		1233.6		1234.1	1193.0	1193.0	1193.0	1192.8		1192.6		1192.8
low bank elevation (ft)	1234.6	1234.6	1234.6	1234.4		1234.6		1234.8	1233.4	1233.4	1233.5	1233.5		1233.6		1234.1	1193.0	1192.9	1192.7	1192.7		1192.9		1192.9
Bankfull Width (ft)	4.2	4.0	4.5	4.2		5.4		6.5	5.1	4.5	5.3	5.1		5.7		6.6	9.6	10.2	10.2	6.5		7.9		6.9
Floodprone Width (ft)	9.4	9.2	9.6	10.7		9.7		11.0	---	---	---	---		---		---	15.0	15.0	22.1	20.0		21.0		20.5
Bankfull Mean Depth (ft)	0.7	0.6	0.9	0.7		0.9		1.0	0.6	0.6	0.6	0.8		1.0		1.5	0.5	0.4	0.6	0.7		0.8		0.9
Bankfull Max Depth (ft)	1.2	1.1	1.5	0.9		1.3		1.4	1.2	1.2	1.1	1.2		1.7		2.3	0.9	0.9	1.5	1.3		1.3		1.3
Bankfull Cross-Sectional Area (ft^2)	2.8	2.3	4.1	2.8		5.1		6.3	3.2	2.8	3.0	4.1		5.6		10.2	4.9	4.2	6.5	4.8		6.6		6.2
Bankfull Width/Depth Ratio	6.4	6.7	4.8	6.2		5.8		6.7	8.0	7.2	9.2	6.4		5.8		4.3	18.7	24.9	15.9	8.9		9.4		7.7
Bankfull Entrenchment Ratio	2.2	2.3	2.2	2.6		1.8		1.7	---	---	---	---		---		---	1.6	1.5	2.2	3.1		2.7		3.0
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.3		1.6		1.8	---	---	---	---		---		---	1.0	<1.0	<1.0	1.0		1.2		1.2

	Cross-Section ST4 (Pool)								Cross-Section ST5 (Pool)								Cross-Section ST6 (Riffle)							
Dimension and Substrate	**Base[1]**	**MY1[1]**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**
bankfull elevation (ft)	1193.1	1193.1	1193.1	1193.1		1192.5		1192.5	1185.1	1185.1	1185.1	1184.7		1185.0		1185.0	1175.4	1175.4	1175.4	1175.4		1174.9		1175.2
low bank elevation (ft)	1193.1	1192.9	1192.9	1193.1		1192.5		1192.5	1185.1	1184.9	1185.0	1184.7		1185.0		1185.0	1175.4	1175.3	1175.3	1175.4		1175.7		1175.8
Bankfull Width (ft)	13.9	14.9	14.7	16.5		13.9		14.8	7.8	8.7	8.4	8.2		10.1		10.2	9.6	8.4	8.7	8.3		8.3		11.4
Floodprone Width (ft)	---	---	---	---		---		---	---	---	---	---		---		---	28.0	28.0	28.0	28.0		28.0		28.0
Bankfull Mean Depth (ft)	1.1	1.3	1.1	1.2		0.8		1.0	1.0	0.9	1.0	0.9		1.0		1.2	0.7	0.7	0.8	0.8		1.6		1.2
Bankfull Max Depth (ft)	2.4	2.7	2.3	2.5		1.7		1.9	1.4	1.5	1.6	1.3		1.4		1.7	1.3	1.5	1.5	1.5		2.2		1.8
Bankfull Cross-Sectional Area (ft^2)	15.5	19.4	16.0	19.1		10.8		14.1	7.9	8.1	8.7	7.1		9.7		12.6	6.8	6.1	7.3	7.0		13.2		14.2
Bankfull Width/Depth Ratio	12.5	11.4	13.4	14.3		17.9		15.6	7.7	9.4	8.1	9.4		10.5		8.2	13.5	11.6	10.4	9.9		5.2		9.1
Bankfull Entrenchment Ratio	---	---	---	---		---		---	---	---	---	---		---		---	2.9	3.3	3.2	3.4		3.4		2.5
Bankfull Bank Height Ratio	---	---	---	---		---		---	---	---	---	---		---		---	1.0	<1.0	<1.0	1.0		1.6		1.6

	Cross-Section ST7 (Riffle)							
Dimension and Substrate	**Base[1]**	**MY1[1]**	**MY2**	**MY3[2]**	**MY4[3]**	**MY5**	**MY6**	**MY7**
bankfull elevation (ft)	1164.7	1164.7	1164.7	1164.7		1164.7		1164.8
low bank elevation (ft)	1164.7	1164.6	1164.6	1164.6		1165.0		1164.9
Bankfull Width (ft)	10.3	10.5	10.8	8.7		10.5		9.6
Floodprone Width (ft)	29.6	31.8	33.6	31.0		34.0		33.5
Bankfull Mean Depth (ft)	0.9	0.9	0.9	1.0		1.1		1.0
Bankfull Max Depth (ft)	1.5	1.6	1.8	1.6		1.9		1.7
Bankfull Cross-Sectional Area (ft^2)	8.8	9.3	9.6	8.3		12.0		9.3
Bankfull Width/Depth Ratio	12.0	12.0	12.1	9.1		9.2		9.9
Bankfull Entrenchment Ratio	2.9	3.0	3.1	3.6		3.2		3.5
Bankfull Bank Height Ratio	1.0	<1.0	1.0	<1.0		1.2		1.0

[1]Adjustment in survey points included in bankfull calculations resulting in change to previous monitoring year bankfull dimensions.

[2]Prior to MY3, bankfull dimensions were calculated using a fixed bankfull elevation. For MY3-MY7, Bank Height Ratio is calculated based on the As-built (Base) cross-sectional area as described in the Standard Measurement of the BHR Monitoring Parameter document provided by the NCIRT and NCDMS (9/2018). The remainder of the cross-section dimension parameters were calculated based on the low bank elevation.

[3]MY4 and MY6 are reduced monitoring years. No geomorphic data collected.

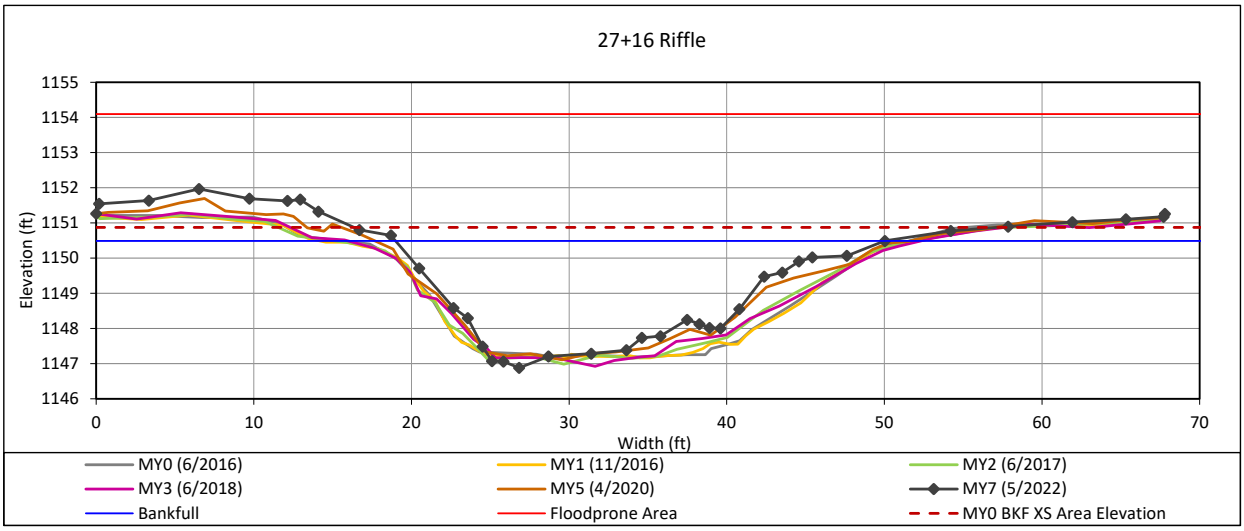
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M1- Moores Fork



Bankfull Dimensions	
62.1	x-section area (ft.sq.)
31.0	width (ft)
2.0	mean depth (ft)
3.6	max depth (ft)
32.6	wetted perimeter (ft)
1.9	hydraulic radius (ft)
15.5	width-depth ratio
145.0	W flood prone area (ft)
4.7	entrenchment ratio
0.9	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

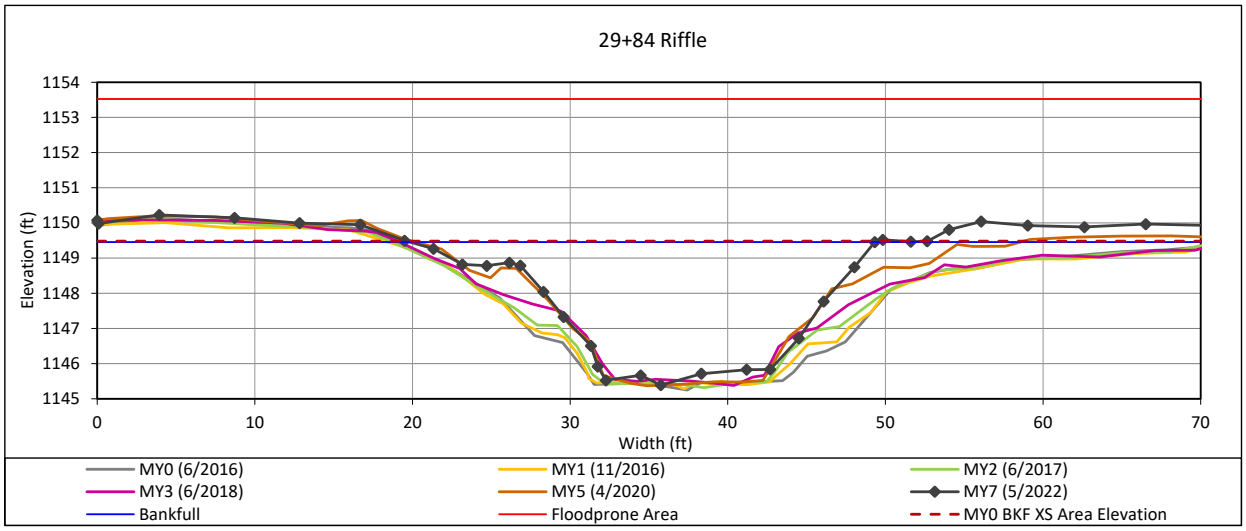
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M2- Moores Fork



Bankfull Dimensions	
66.4	x-section area (ft.sq.)
29.5	width (ft)
2.3	mean depth (ft)
4.1	max depth (ft)
31.6	wetted perimeter (ft)
2.1	hydraulic radius (ft)
13.1	width-depth ratio
145.0	W flood prone area (ft)
4.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

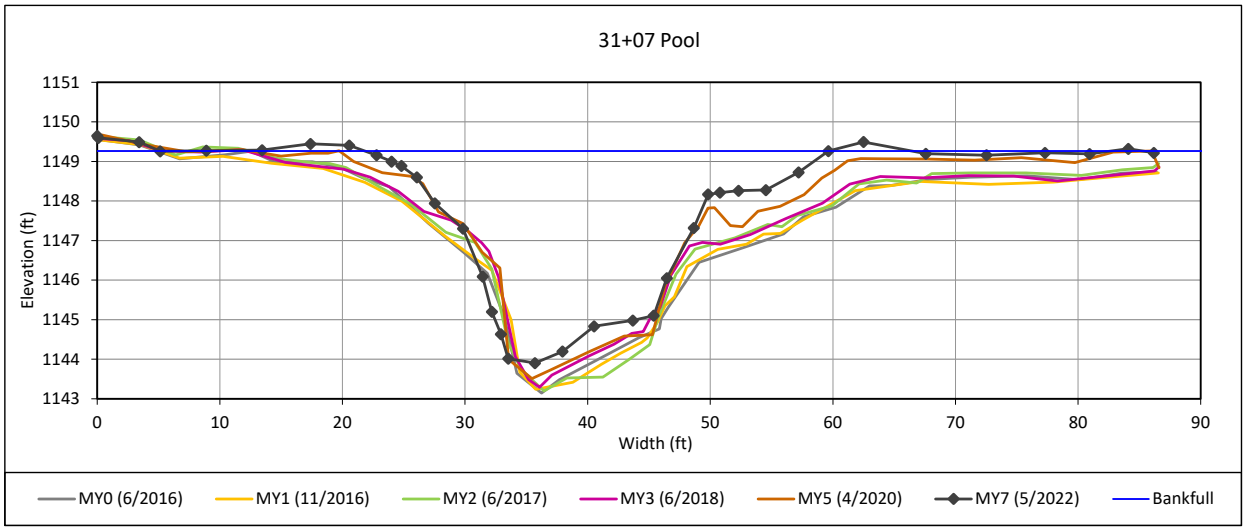
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M3- Moores Fork



Bankfull Dimensions	
94.8	x-section area (ft.sq.)
37.8	width (ft)
2.5	mean depth (ft)
5.4	max depth (ft)
40.5	wetted perimeter (ft)
2.3	hydraulic radius (ft)
15.1	width-depth ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

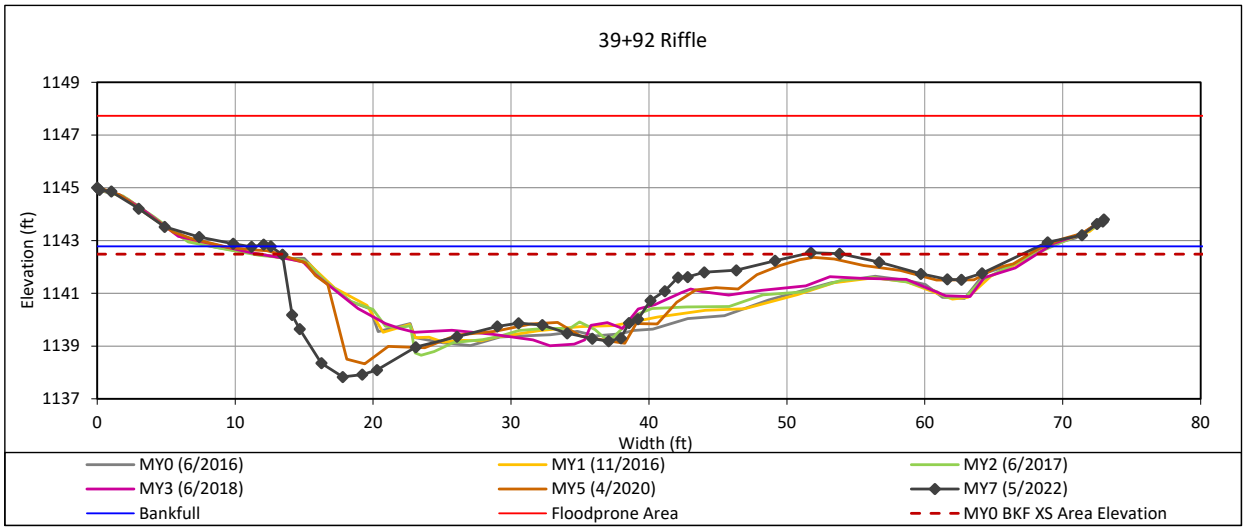
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M4- Moores Fork



Bankfull Dimensions	
117.2	x-section area (ft.sq.)
55.7	width (ft)
2.1	mean depth (ft)
4.9	max depth (ft)
59.4	wetted perimeter (ft)
2.0	hydraulic radius (ft)
26.5	width-depth ratio
124.0	W flood prone area (ft)
2.2	entrenchment ratio
1.1	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

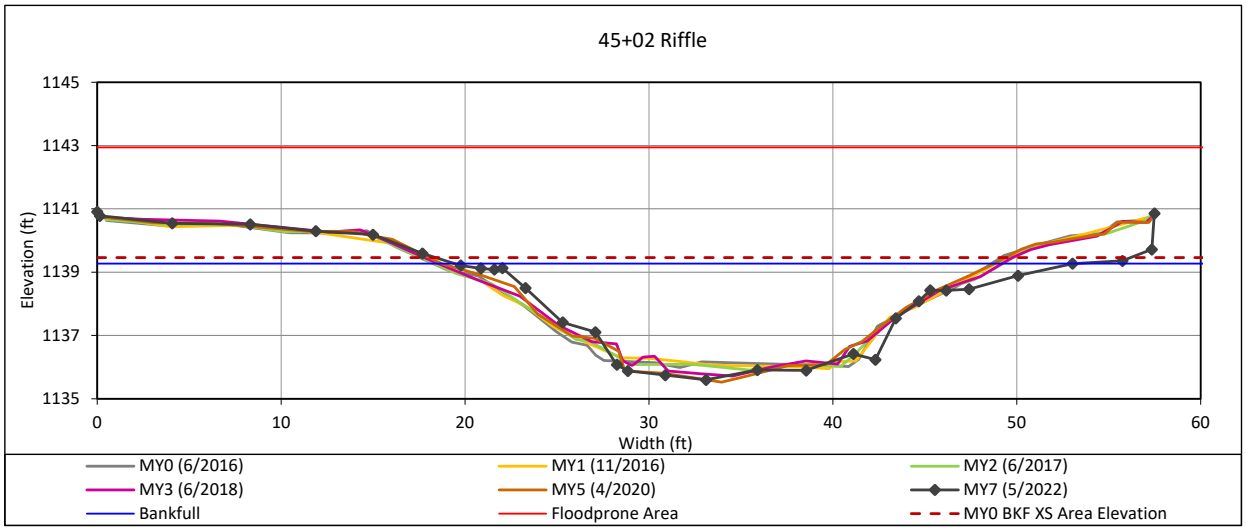
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M5- Moores Fork



Bankfull Dimensions	
66.5	x-section area (ft.sq.)
33.6	width (ft)
2.0	mean depth (ft)
3.7	max depth (ft)
35.4	wetted perimeter (ft)
1.9	hydraulic radius (ft)
17.0	width-depth ratio
124.0	W flood prone area (ft)
3.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

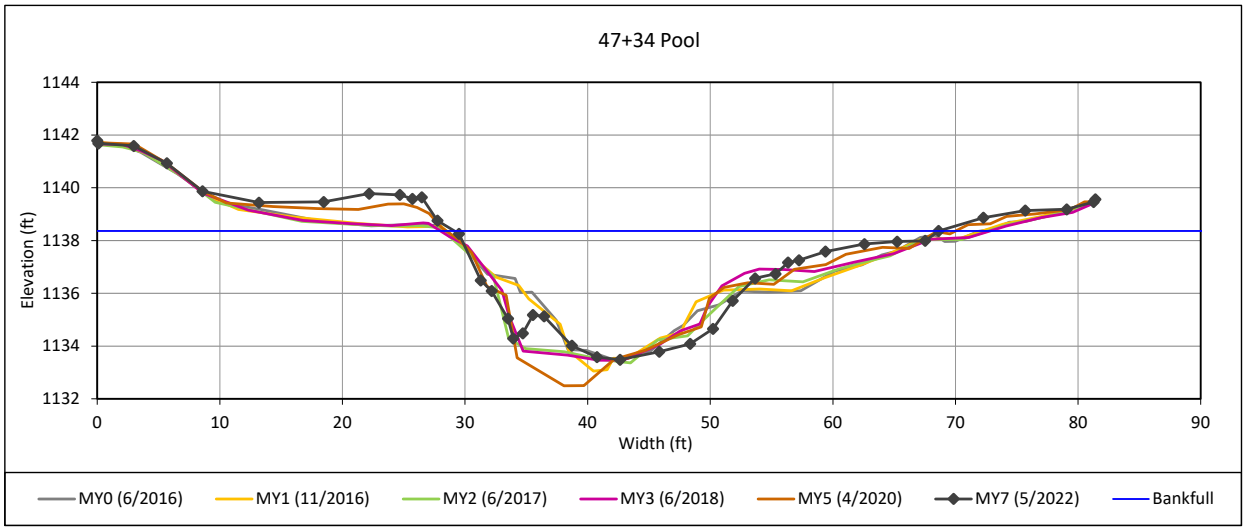
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M6- Moores Fork



Bankfull Dimensions	
99.5	x-section area (ft.sq.)
39.5	width (ft)
2.5	mean depth (ft)
4.9	max depth (ft)
42.5	wetted perimeter (ft)
2.3	hydraulic radius (ft)
15.7	width-depth ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

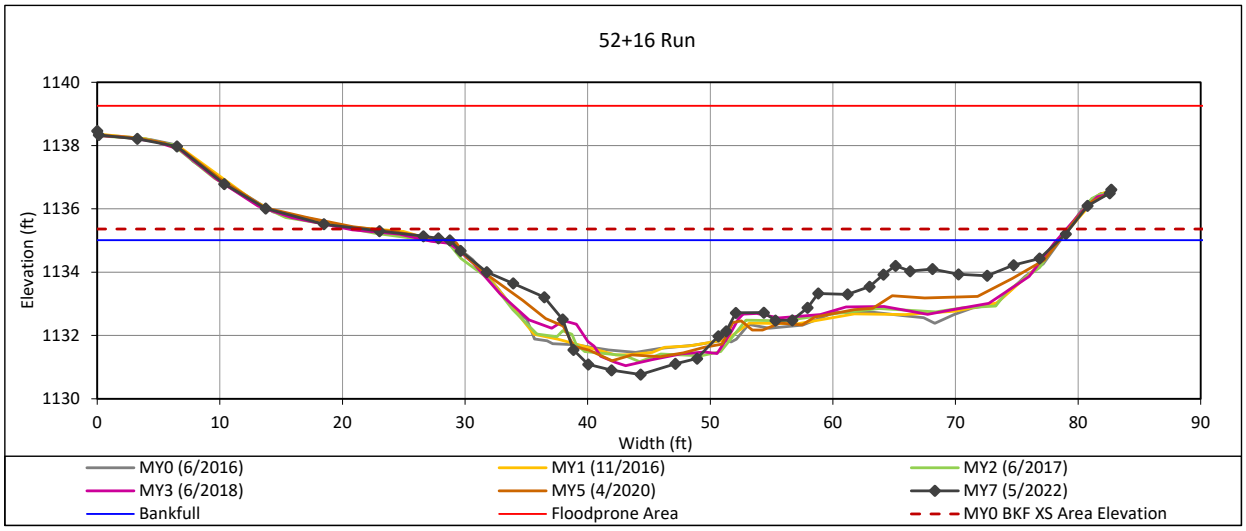
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M7- Moores Fork



Bankfull Dimensions	
100.4	x-section area (ft.sq.)
49.7	width (ft)
2.0	mean depth (ft)
4.2	max depth (ft)
51.5	wetted perimeter (ft)
2.0	hydraulic radius (ft)
24.6	width-depth ratio
124.0	W flood prone area (ft)
2.5	entrenchment ratio
0.9	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

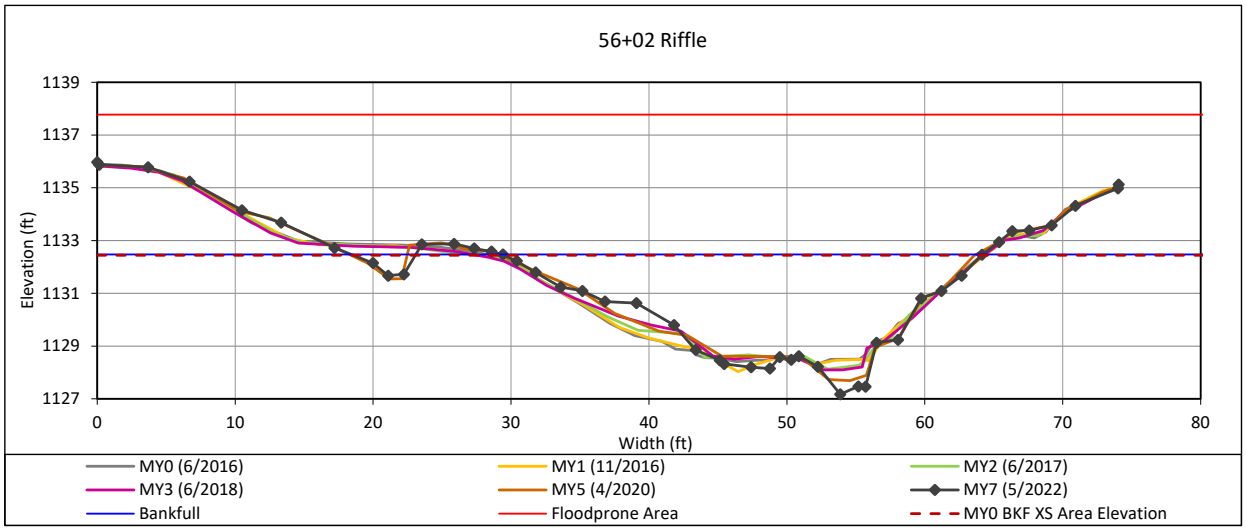
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M8- Moores Fork



Bankfull Dimensions	
92.6	x-section area (ft.sq.)
34.8	width (ft)
2.7	mean depth (ft)
5.3	max depth (ft)
38.0	wetted perimeter (ft)
2.4	hydraulic radius (ft)
13.1	width-depth ratio
124.0	W flood prone area (ft)
3.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

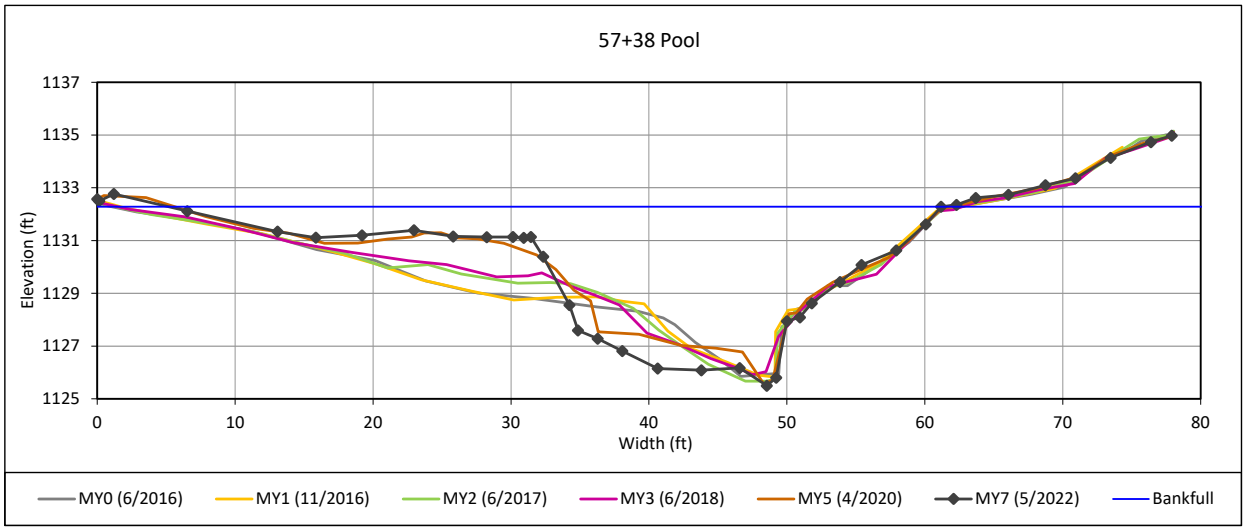
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section M9- Moores Fork



Bankfull Dimensions	
147.7	x-section area (ft.sq.)
56.0	width (ft)
2.6	mean depth (ft)
6.8	max depth (ft)
60.4	wetted perimeter (ft)
2.4	hydraulic radius (ft)
21.2	width-depth ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

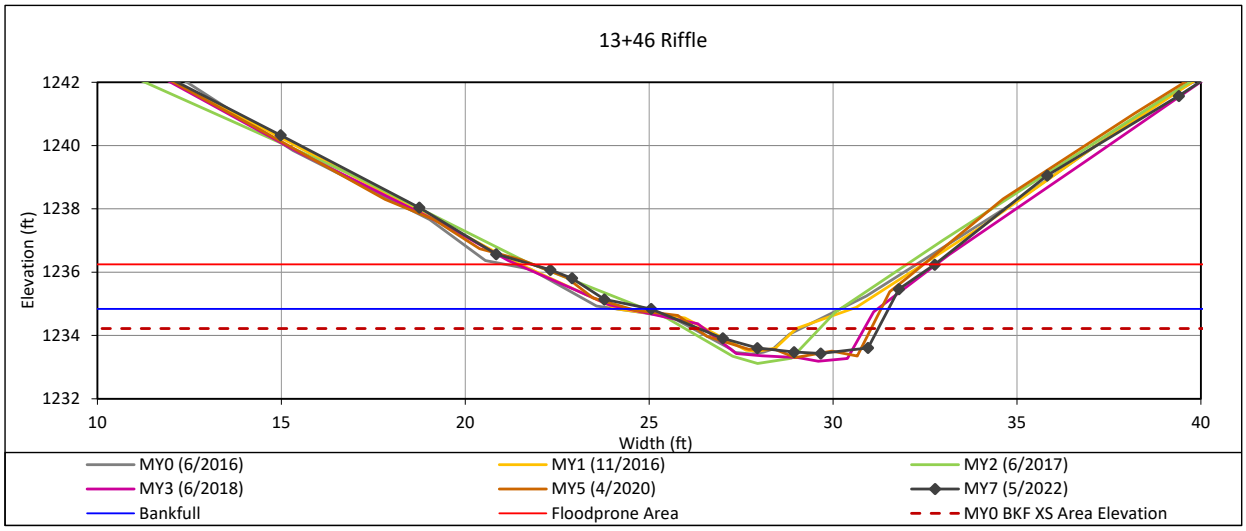
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section ST1- Silage Trib



Bankfull Dimensions	
6.3	x-section area (ft.sq.)
6.5	width (ft)
1.0	mean depth (ft)
1.4	max depth (ft)
7.5	wetted perimeter (ft)
0.8	hydraulic radius (ft)
6.7	width-depth ratio
11.0	W flood prone area (ft)
1.7	entrenchment ratio
1.8	low bank height ratio

Survey Date: 5/2022

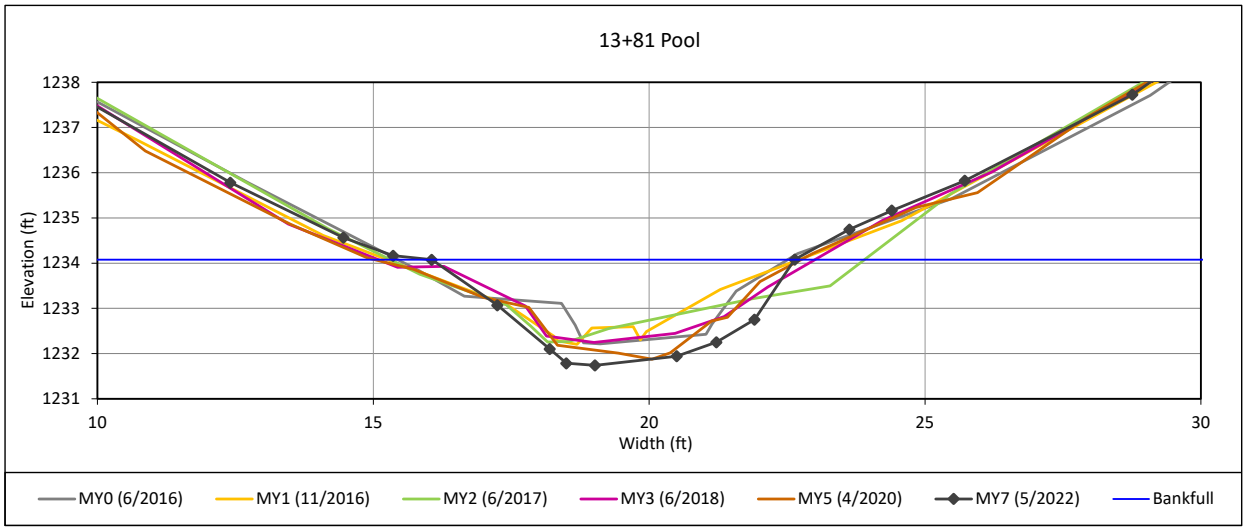
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Cross Section ST2- Silage Trib



Bankfull Dimensions	
10.2	x-section area (ft.sq.)
6.6	width (ft)
1.5	mean depth (ft)
2.3	max depth (ft)
8.5	wetted perimeter (ft)
1.2	hydraulic radius (ft)
4.3	width-depth ratio

Survey Date: 5/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
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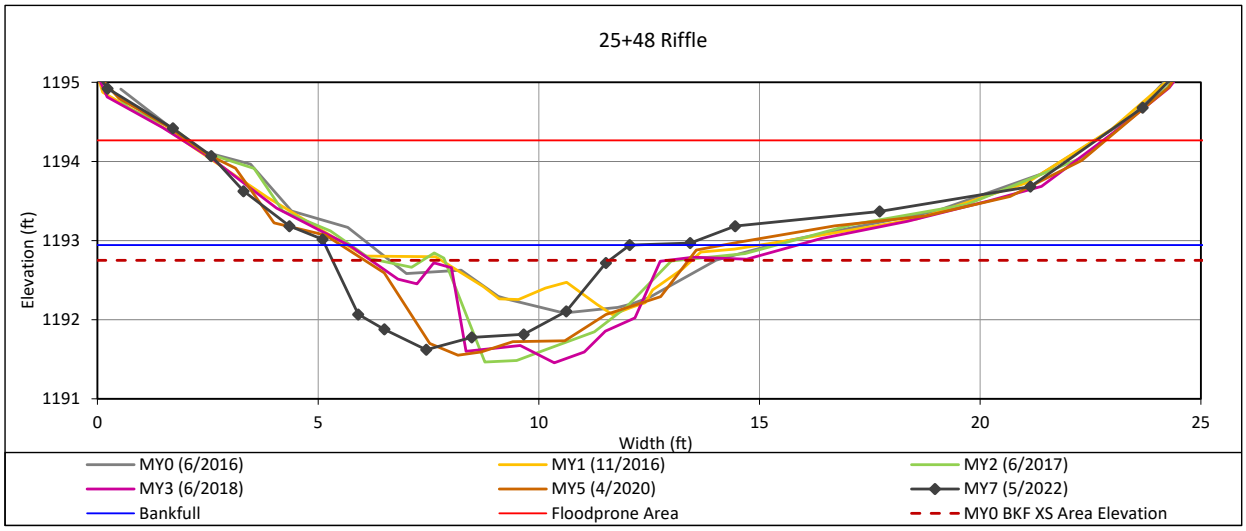
Cross Section ST3 - Silage Trib



Bankfull Dimensions	
6.2	x-section area (ft.sq.)
6.9	width (ft)
0.9	mean depth (ft)
1.3	max depth (ft)
7.7	wetted perimeter (ft)
0.8	hydraulic radius (ft)
7.7	width-depth ratio
20.5	W flood prone area (ft)
3.0	entrenchment ratio
1.2	low bank height ratio

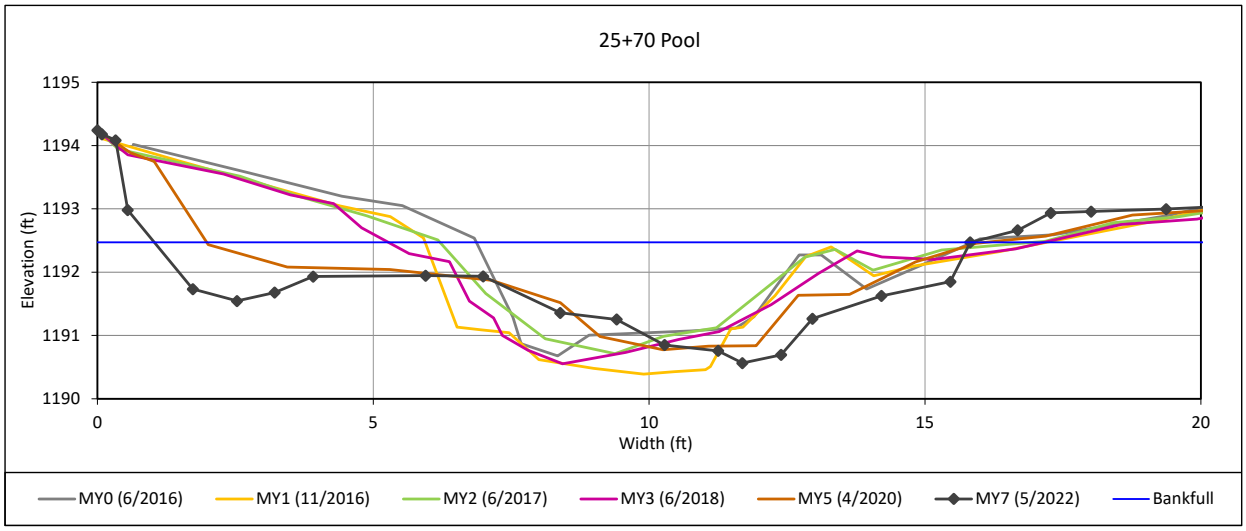
Survey Date: 5/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Cross Section ST4 - Silage Trib



Bankfull Dimensions	
14.1	x-section area (ft.sq.)
14.8	width (ft)
1.0	mean depth (ft)
1.9	max depth (ft)
16.1	wetted perimeter (ft)
0.9	hydraulic radius (ft)
15.6	width-depth ratio

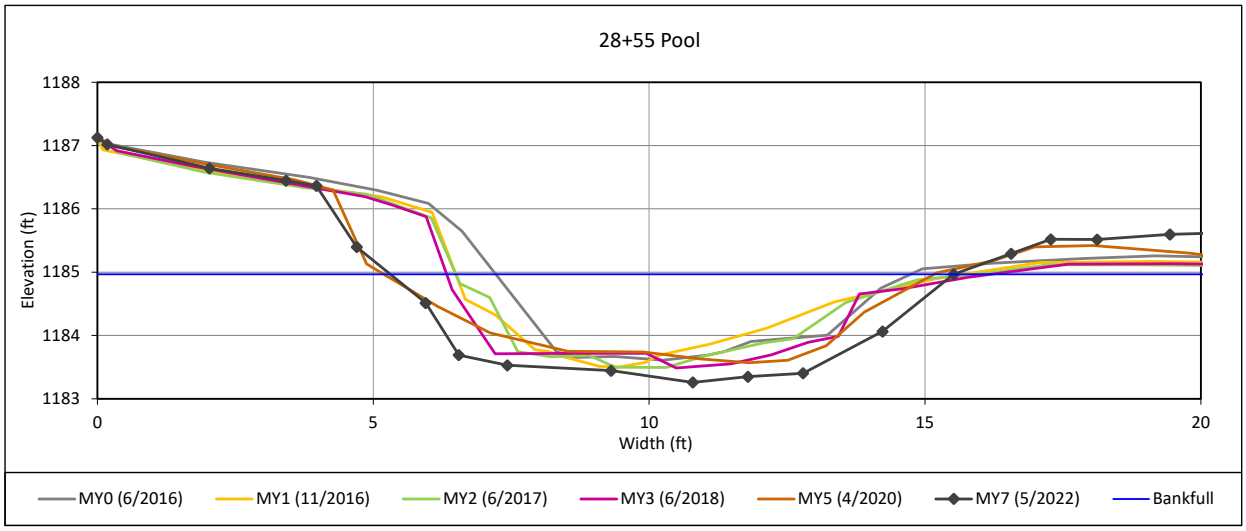
Survey Date: 5/2022
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

Cross Section ST5 - Silage Trib



Bankfull Dimensions	
12.6	x-section area (ft.sq.)
10.2	width (ft)
1.2	mean depth (ft)
1.7	max depth (ft)
11.2	wetted perimeter (ft)
1.1	hydraulic radius (ft)
8.2	width-depth ratio

Survey Date: 5/2022
Field Crew: Kee Mapping & Surveying

View Downstream

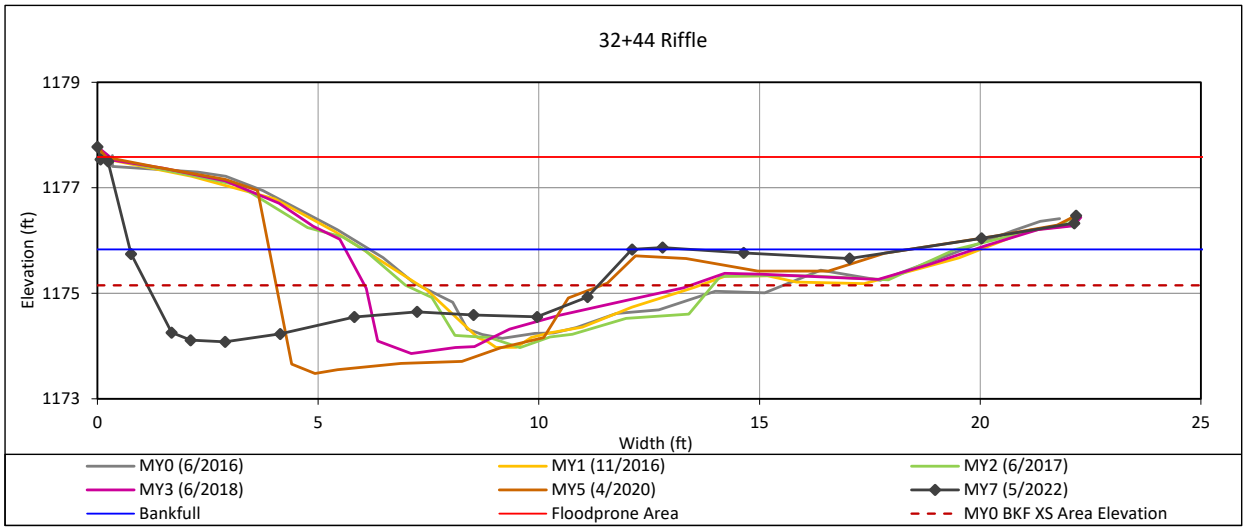
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

Cross Section ST6 - Silage Trib



Bankfull Dimensions	
14.2	x-section area (ft.sq.)
11.4	width (ft)
1.2	mean depth (ft)
1.8	max depth (ft)
12.7	wetted perimeter (ft)
1.1	hydraulic radius (ft)
9.1	width-depth ratio
28.0	W flood prone area (ft)
2.5	entrenchment ratio
1.6	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying

View Downstream

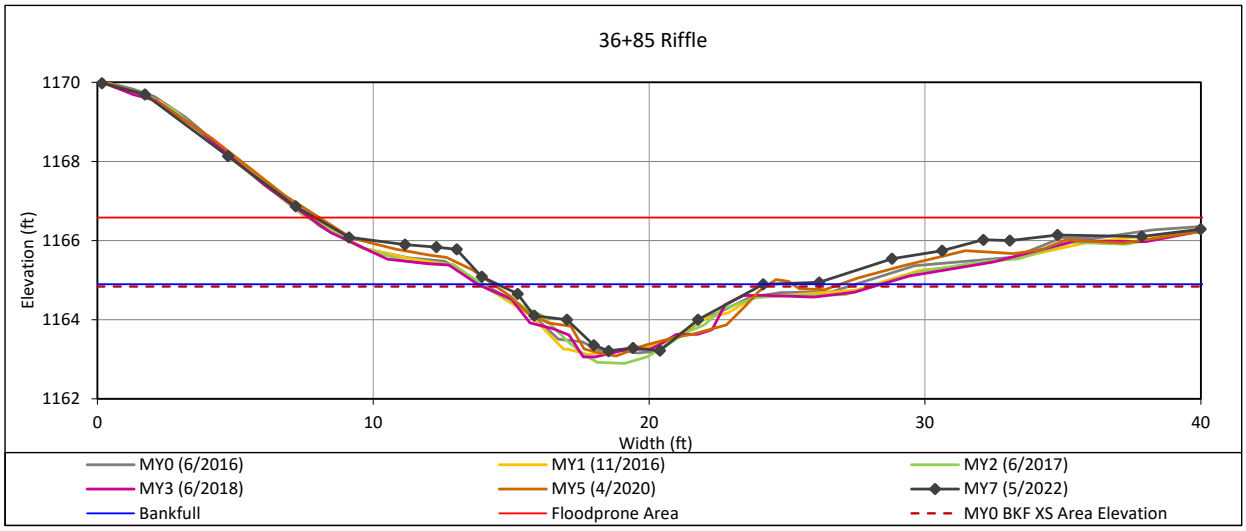
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 7 - 2022

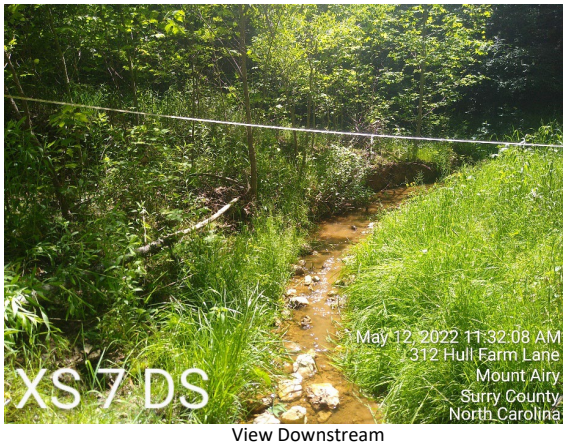
Cross Section ST7- Silage Trib



Bankfull Dimensions	
9.3	x-section area (ft.sq.)
9.6	width (ft)
1.0	mean depth (ft)
1.7	max depth (ft)
10.5	wetted perimeter (ft)
0.9	hydraulic radius (ft)
9.9	width-depth ratio
33.5	W flood prone area (ft)
3.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2022

Field Crew: Kee Mapping & Surveying



View Downstream

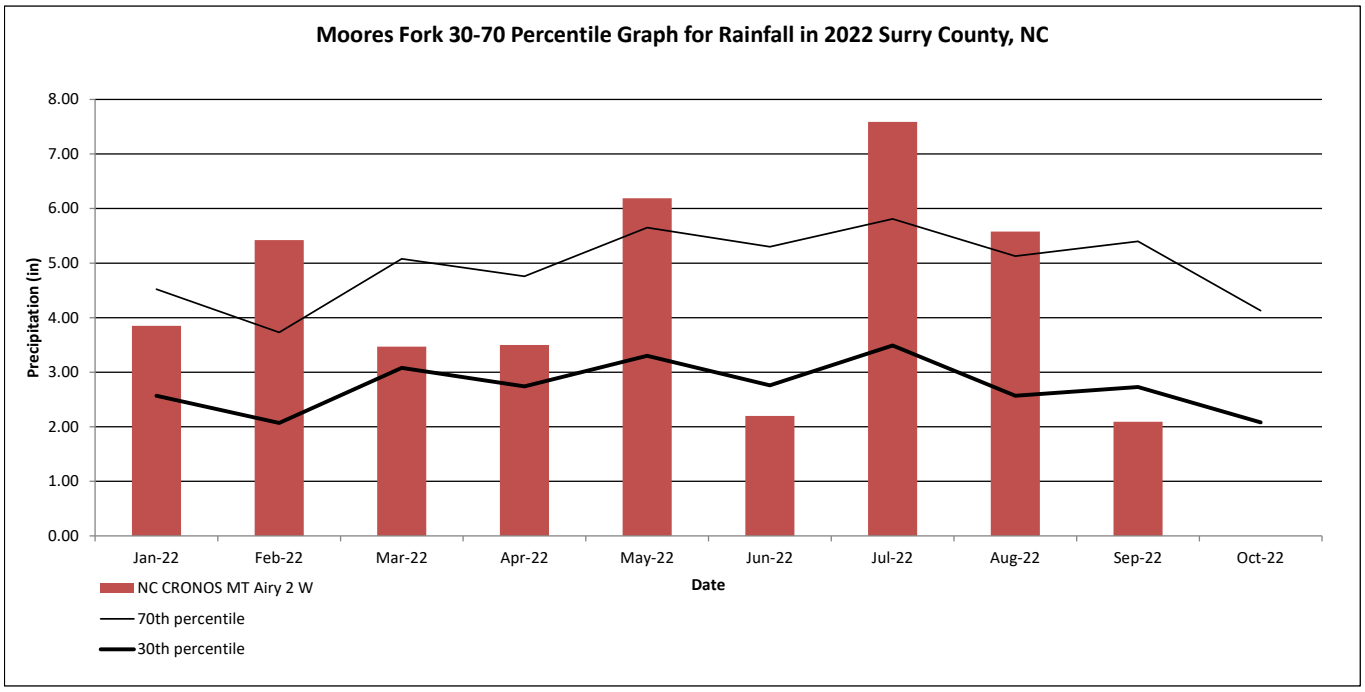
APPENDIX E. Hydrology Summary Data and Plots

Table 13. Verification of Bankfull Events
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022

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
	MY7	4/6/2022	~3/24/2022	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
	MY7	4/6/2022	~3/24/2022	Debris wracklines	N/A

Monthly Rainfall Data

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 7 - 2022



[1] 2022 rainfall collected from NC CRONOS Station Name: MT AIRY 2 W (NCCRONOS, 2022)

[2] 30th and 70th percentile rainfall data collected from weather station MT AIRY 2 W, NC (NCCRONOS, 2022)