MONITORING YEAR 2

REPORT

Final

MOORES FORK STREAM MITIGATION PROJECT

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

Data Collection Period: June-October 2017
Submission Date: December 20, 2017

PREPARED FOR:

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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 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). The Moores Fork Stream Mitigation Project (the Site) will net 11,602 stream mitigation credits 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 as a priority subwatershed for stream restoration and agricultural BMPs during the initial Upper Yadkin-Ararat River local watershed planning (LWP).

The final design was completed in June of 2013. Construction activities and as-built surveys were completed in December of 2014. Planting of the site took place in February of 2015. 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 one efforts were initiated in late October of 2016. The Monitoring Year 2 monitoring activities were completed in October 2017.

The Site is on track to meet MY2 success criteria for vegetation, geomorphology, and hydrology performance standards. The vegetation survey resulted in an average stem density of 472 planted stems per acre. The Site has met the interim requirement of 320 stems per acre, with 10 of the 12 plots (83%) individually meeting this requirement. The vegetation monitoring and visual assessment revealed growing invasive plant populations in the riparian areas of Moores Fork Reaches 1 and 3, Silage Tributary Reach 2, and Barn Tributary Reach 1. Morphological surveys indicate that the channel dimensions are stable and functioning as designed with minor deviation from the as-built baseline dimensions. At least one bankfull event occurred during the MY2 data collection, which was recorded by the Moores Fork crest gage. The performance standard of two recorded bankfull events in separate monitoring years has been met for Moores Fork and partially met for the Silage Tributary.

MOORES FORK STREAM MITIGATION PROJECT

Year 2 Monitoring Report

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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 Cataloging Unit (CU) 03040101 and the 14-digit Hydrologic Unit Code (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 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 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 11,602 stream mitigation credits through a combination of restoration, enhancement I and II, and preservation. 7.8 stream mitigation credits were removed because of an overhead utility easement that crosses Silage Tributary Reach 2 starting at STA 30+10.49 and ending at STA 30+33.95 as shown in Table 1 of Appendix A. The final design was completed in June of 2013. Construction activities and as-built surveys were completed in December of 2014. Planting of the site took place in March of 2015. 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 one efforts were initiated in late October of 2016. 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 monitoring year two efforts (MY2).

1.1 Project Goals and Objectives

Prior to construction activities, dairy and farming operations on the site had deforested riparian buffers and allowed direct livestock access to the stream, leading to elevated temperatures and nutrients. Channel straightening and dredging throughout much of the project had 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, 10) in a permanent conservation easement.

1.2 Monitoring Year 2 Data Assessment

Annual monitoring was conducted during MY2 to assess the condition of the project. The stream restoration success criteria for the Site follows the approved performance standards presented in the Moores Fork Stream Mitigation Project Final Mitigation Plan (Confluence, 2012). Annual monitoring will be conducted for seven years to provide a project data chronology that will facilitate an understanding of project status and trends.

1.2.1 Vegetation Assessment

Planted woody vegetation is being monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2008). 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 Figure 3 in Appendix B for the vegetation monitoring locations. At the end of year five of the monitoring period, the vegetation success criterion is the survival of 260 planted stems per acre in the riparian corridor along restored and enhanced reaches. The final vegetation success criterion is the survival of 210 planted stems per acre at the end of year seven of the monitoring period. The interim measure of vegetation success for the Site is the survival of at least 320 planted stems per acre at the end of year three of the monitoring period.

The MY2 vegetation survey was completed in August 2017, resulting in an average stem density of 472 planted stems per acre. The Site has met the interim requirement of 320 stems per acre, with 10 of the 12 plots (83%) individually meeting this requirement. Vegetation plots 2 and 3, with both having densities of 283 stems per acre, did not meet the interim success criteria. They however still meet density requirements of 260 planted stems per acre at the end of monitoring year 5. The planted stem mortality was approximately 3% of the MY1 stem count which was 486 stems per acre. There is an average of 12 stems per plot. Approximately 3.8% of the planted stems scored a vigor of 1, indicating that they are unlikely to survive. This low vigor rating is due to damage from drought, insects, suffocation from dense herbaceous cover, vine strangulation, or other unknown factors. Please refer to Appendix B for vegetation plot photographs and Appendix C for vegetation data tables.

1.2.2 Vegetation Areas of Concern

Several vegetation problem areas of invasive plant populations have been identified in MY2 throughout the Site with species including: kudzu (*Pueraria montana*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Multiflora rose (*Rosa multiflora*), English Ivy (*Hedera helix*), Japanese stilt grass (*Microstegium vimineum*). Areas with kudzu and Chinese privet are becoming especially prevalent in the upper portion of Moores Fork Reach 1 and the left riparian area of Moores Fork Reach 3. Additional dense areas of Chinese privet are spreading along Silage Tributary Reach 2. Many planted stems are damaged from vine strangulation along Barn Tributary Reach 1. DMS is currently in the process to contract with a provider for invasive species control and treatment should begin spring 2018.

Generally, the site has a strong herbaceous cover consisting of various species of clover, rye grass, fescue, and sedge. Small isolated bare/poorly vegetated areas were observed along the right bank of Moores Fork Reach 2 near stations 30+50 and 34+50 and the left bank of Moores Fork Reach 3 near stations 48+00 and 52+00. These vegetation areas of concern are shown in Figure 3 in Appendix B.

1.2.3 Stream Assessment

Morphological surveys for MY2 were conducted in June and July 2017. In general, MY2 riffle pebble counts in Moores Fork indicate coarser sediment size distribution as compared to MY0. Cross-section data indicate that channel dimensions for Moores Fork have changed very little since the April 2016 baseline data were collected. Riffle width to depth ratios have changed only modestly, and pool depths are being maintained close to baseline depths. At Moores Fork Cross-Section 6, an increase in bankfull cross-sectional area was observed where a boulder of a stone toe structure has been undermined on the outer bend of the channel.

For the Silage Tributary, MY2 riffle pebble counts indicate similar or coarser sediment size distribution as compared to MY0. For both reaches of the Silage Tributary, MY2 indicates somewhat larger deviations from the baseline in part due to the small channel dimensions, even slight variations in measurement have significant effects on dimensionless ratios. At Silage Tributary Cross-Section 3, the survey data indicates some channel bed scour due to concentrated flow against a small bar that has formed, resulting in an increase in cross-sectional area. For the remaining cross-sections, results indicate that channel dimensions are stable and functioning well. Please refer to Appendix D for cross-section plots and morphological summary tables.

1.2.4 Stream Areas of Concern

Stream areas of concern included instances of bank erosion and sediment deposition. Moores Fork Reach 3 has localized areas of bank erosion at STA 49+00 and near the confluence of UT8 (STA 44+50). There is piping visible under a log vane structure (STA 41+10) and a stone toe boulder structure is undermined (STA 47+40) on Moores Fork Reach 3. Also, a headcut is visible at the confluence of UT8 and Moores Fork Reach 3. Silage Tributary Reach 2 has new or expanded bank erosion (STA 22+30, 30+30, 31+20, and 34+50). A log step and boulder step both on Silage Tributary Reach 2 show signs of being undermined. These areas will continue to be monitored in future years for signs of accelerated instability. Stream areas of concern are indicated in Table 6 and Figure 3 in Appendix B.

1.2.5 Hydrology Assessment

Crest gage data collected from Moores Fork Reach 2 and the Silage Tributary Reach 2 on July 10, 2017 indicate that a bankfull event occurred. A bankfull measurement was documented for Moores Fork but no indicator was evident for the Silage Tributary. A nearby rain gage station recorded approximately 21 inches of rain between May and August of 2017 (NCCRONOS, 2017). NCCRONOS daily rainfall data suggest that the bankfull event may have occurred around May 25, 2017. In order to meet project performance standards, one additional bankfull event measurement will be required for the Silage

Tributary. Two bankfull flow events must be documented on restoration reaches within the seven-year monitoring period and must occur in separate years. Therefore, the performance standard has been partially met in MY2. Refer to Appendix E for hydrologic data and graphs.

1.3 Monitoring Year 2 Summary

The Moores Fork Stream Mitigation Project is on track to meet monitoring success criteria for vegetation, geomorphology, and hydrology performance standards. The MY2 vegetation survey resulted in an average stem density of 472 planted stems per acre. The Site has met the interim requirement of 320 planted stems per acre, with 10 of the 12 plots (83%) individually meeting this requirement. The MY2 vegetation monitoring and visual assessment revealed growing invasive plant populations in the riparian areas of Moores Fork Reaches 1 and 3, Silage Tributary Reach 2, and Barn Tributary Reach 1. Morphological surveys indicate that the channel dimensions are stable and functioning as designed with minor deviation from the as-built baseline dimensions. At least one bankfull event occurred during MY2, and was recorded by the Moores Fork crest gage. The performance standard of two recorded bankfull events in separate monitoring years has been met for Moores Fork and partially met for the 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 DMS's 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 MY2 are based on standard guidance and procedures documents (Rosgen 1996 and USACE 2003).

- Cross-section data were collected throughout four reaches using a total station survey. Sixteen cross-sections were surveyed. Cross-sections were permanently marked with capped rebar and PVC conduit.
- Sixty-nine permanent photo points were established throughout the project to visually monitor stream stability and vegetation.
- Wolman pebble counts were conducted at ten representative riffle cross-sections to evaluate particle size distribution over time. A minimum of 100 particles were selected at random and measured (Harrelson 1994).
- Vegetation monitoring included documenting species composition and survival of planted stems within twelve randomly located vegetation plots. Each 0.0247 acre vegetation plot was permanently marked with rebar and PVC conduit at all four corners.
- Two crest gages were installed and were checked during semi-annual visits to determine if a bankfull event has occurred. The crest gages were installed and surveyed at riffles on Moores Fork and Silage Tributary.
- Visual assessments were performed on all stream and buffer restoration areas on a semi-annual basis. Problem areas were noted, including channel instability (lateral and/or vertical instability, structure failure/instability and/or piping, headcuts), vegetation health (low stem density, vegetation mortality, invasive species or encroachment), beaver activity, and livestock access. Areas of concern were mapped, photographed, and described in this monitoring report.

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). 2016. State Climate Office of North Carolina. Version 2.7.2. MT Airy 2 W. Station ID No. 315890. Accessed October 2017.

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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

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

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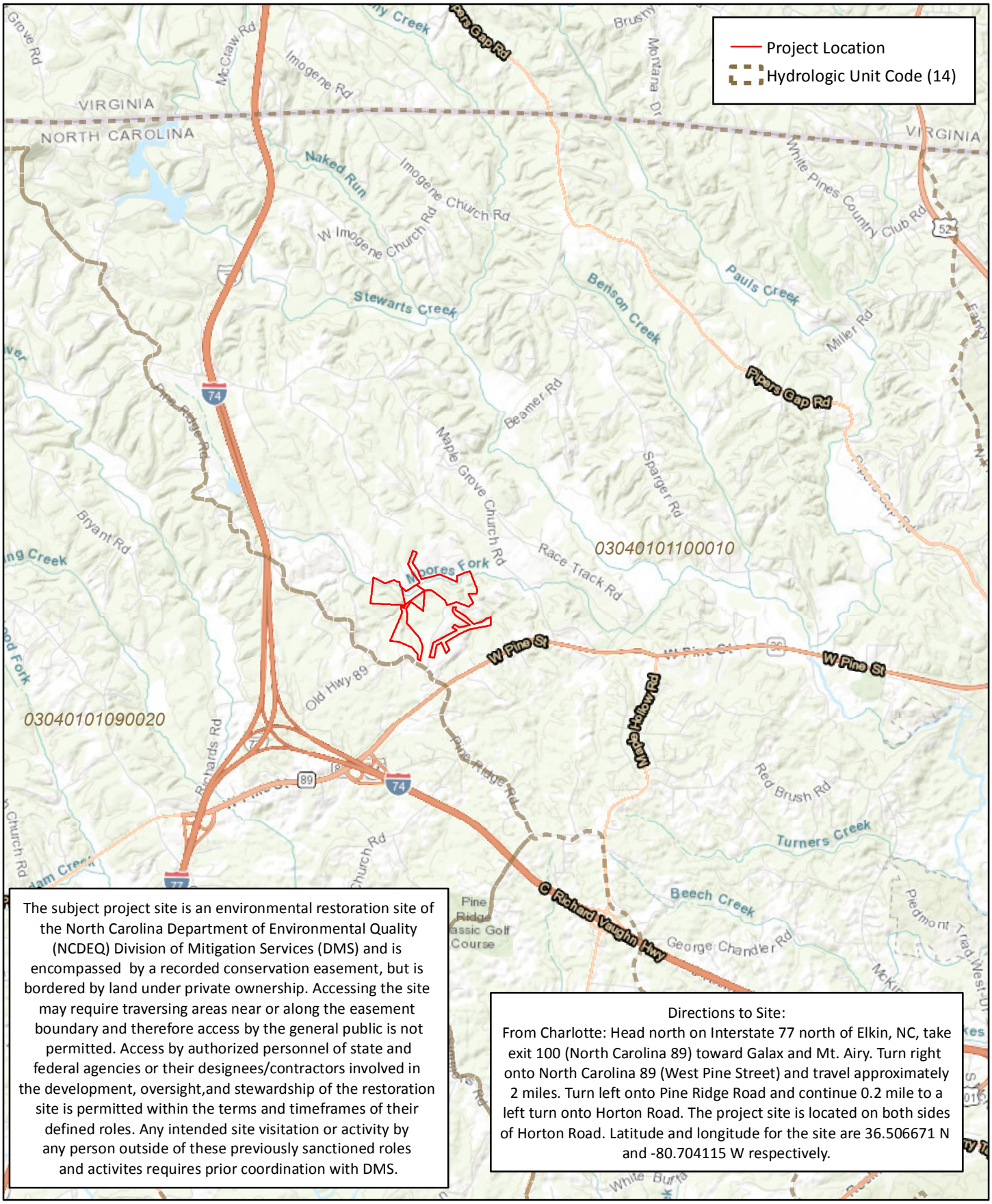
APPENDIX A. General Tables and Figures



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.

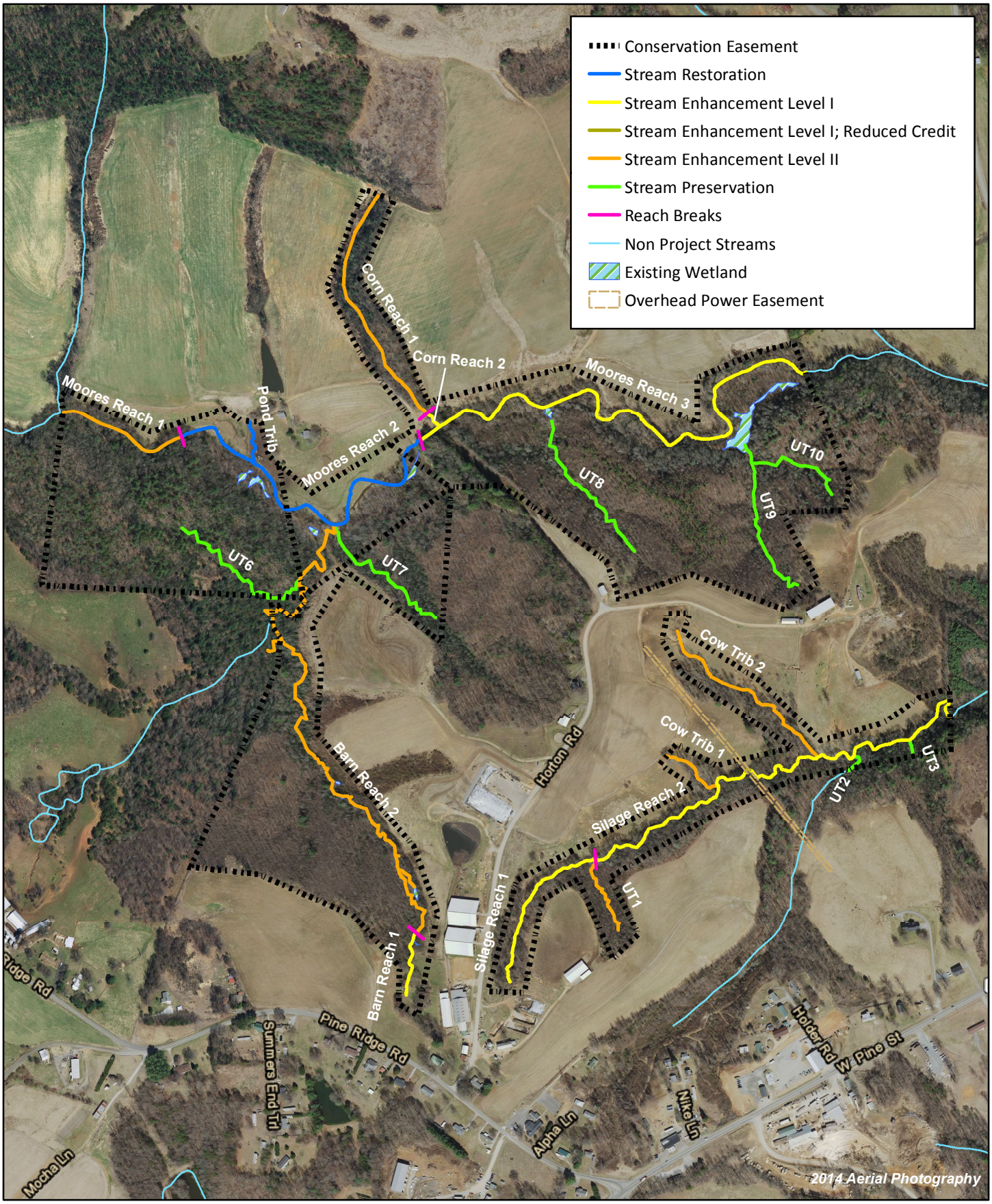
Directions to Site:
From Charlotte: Head north on Interstate 77 north of Elkin, NC, take exit 100 (North Carolina 89) toward Galax and Mt. Airy. Turn right onto North Carolina 89 (West Pine Street) and travel approximately 2 miles. Turn left onto Pine Ridge Road and continue 0.2 mile to a left turn onto 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

Figure 1 Project Vicinity Map
Moores Fork Stream Mitigation Site
DMS Project No. 94709
Monitoring Year 2 - 2017

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 2 - 2017

Surry County, NC

Table 1. Project Components and Mitigation Credits
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Mitigation Credit Summaries [1]				
Type	**Restoration**	**Enhancement I**	**Enhancement II**	**Preservation**
Total	2071	5,768	2907	856

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	-
Moores Reach 2	STA 1750-3578	1,636	1,828	P2	R	1:1	1,828	-
Moores Reach 3	STA 3578-6410	2,856	2,832	P2/3	EI	1:1	2,832	-
Silage Reach 1	STA 1000-1900	900	900	P1	EI	1:1	900	-
Silage Reach 2	STA 1900-4348	2,448	2,448	P3	EI	1.5:1	1,624	Reduction in 7.8 SMU because of 20' overhead powerline easement.
Cow Trib 1	STA 1219-1386	167	167	P4	EII	1.5:1	111	-
Cow Trib 2	STA 1331-2098	767	767	P4	EII	1.5:1	511	-
Pond Trib	STA 1000-1243	194	243	P2	R	1:1	243	-
Barn Reach 1	STA 1000-1300	300	300	P3	EI	1:1	300	-
Barn Reach 2	STA 1350-3746; STA 4069-4757	3,134	3,134	N/A	EII	2.5:1	1,254	-
Corn Reach 1	STA 1000-2350	1,350	1,350	N/A	EII	2.5:1	540	-
Corn Reach 2	STA 2350-2462	112	112	P3	EI	1:1	112	-
UT1	STA 1000-1466	466	466	N/A	EII	2.5:1	186	-
Preservation Reaches	UTs 2,3,6,7,8,9,10	4,279	4,279	N/A	P	5:1	856	-

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 2 - 2017

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

N/A - Not Applicable

Table 3. Project Contacts Table

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Designer	Wildlands Engineering, Inc. 167-B Haywood Road Asheville, NC 28806
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
Stream Monitoring POC	Kirsten Gimbert 704-332-7754, ext 110
Vegetation Monitoring POC	Kirsten Gimbert 704-332-7754, ext 110

Table 4a. Project Baseline Information and Attributes
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

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 Trib	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 2 - 2017

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 2 - 2017

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

APPENDIX B. Visual Assessment Data

WILDLANDS ENGINEERING

0 300 600 Feet

N

Figure 3.0 Integrated Current Condition Plan View (Key)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Surry County, NC

Conservation Easement
Stream Restoration
Stream Preservation
Stream Enhancement Level I
Stream Enhancement Level II
Reach Breaks
Top of Bank
Existing Wetland
Photo Point
Crest Gage
Cross-Section

Vegetation Monitoring Plots (VP) - MY2

Criteria Met
Criteria Not Met

Vegetation Areas of Concern - MY2

Invasive Plant Population
Bare/Poor Herbaceous Cover

Stream Areas of Concern - MY2

Aggradation
Erosion

Structures

Constructed Riffle
Brushmat
Geolift
Debris Plug
Bridge
Gully Stabilization
Facines

Structures

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

Corn Reach 1
Scattered Chinese privet along stream banks
Corn Reach 2
Headcut at wetland outlet
Stone toe boulder undermined
Chinese Privet & Kudzu
Kudzu and Japanese honeysuckle
Moores Reach 3
Concentrated flow with gully erosion
Moores Reach 2
Log vane structure piping
Pond Tributary
UT8
2014 Aerial Imagery

WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.1 Integrated Current Condition Plan View (Sheet 1 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Surry County, NC

Kudzu encroaching from upslope property

Upper channel choked with sediment and vegetation

Kudzu and Japanese honeysuckle

Chinese privet & Kudzu

Chinese privet along left bank

Log vane structure piping

Concentrated flow / gully erosion

Moores Reach 1

Moores Reach 2

Moores Reach 3

Corn Reach 1

Corn Reach 2

Pond Tributary

Barn Reach 2

UT6

UT7

- Conservation Easement
- Stream Restoration
- Stream Enhancement Level I
- Stream Enhancement Level II
- Stream Preservation
- Reach Breaks
- Top of Bank
- Existing Wetland
- Photo Point
- Crest Gage
- Cross-Section

Vegetation Monitoring Plots (VP) - MY2

- Criteria Met
- Criteria Not Met

Vegetation Areas of Concern - MY2

- Invasive Plant Population
- Bare/Poor Herbaceous Cover

Stream Areas of Concern - MY2

- Aggradation
- Erosion

Structures

- Constructed Riffle
- Brushmat
- Geolift
- Debris Plug
- Bridge
- Gully Stabilization
- Facines

Structures

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

2014 Aerial Imagery

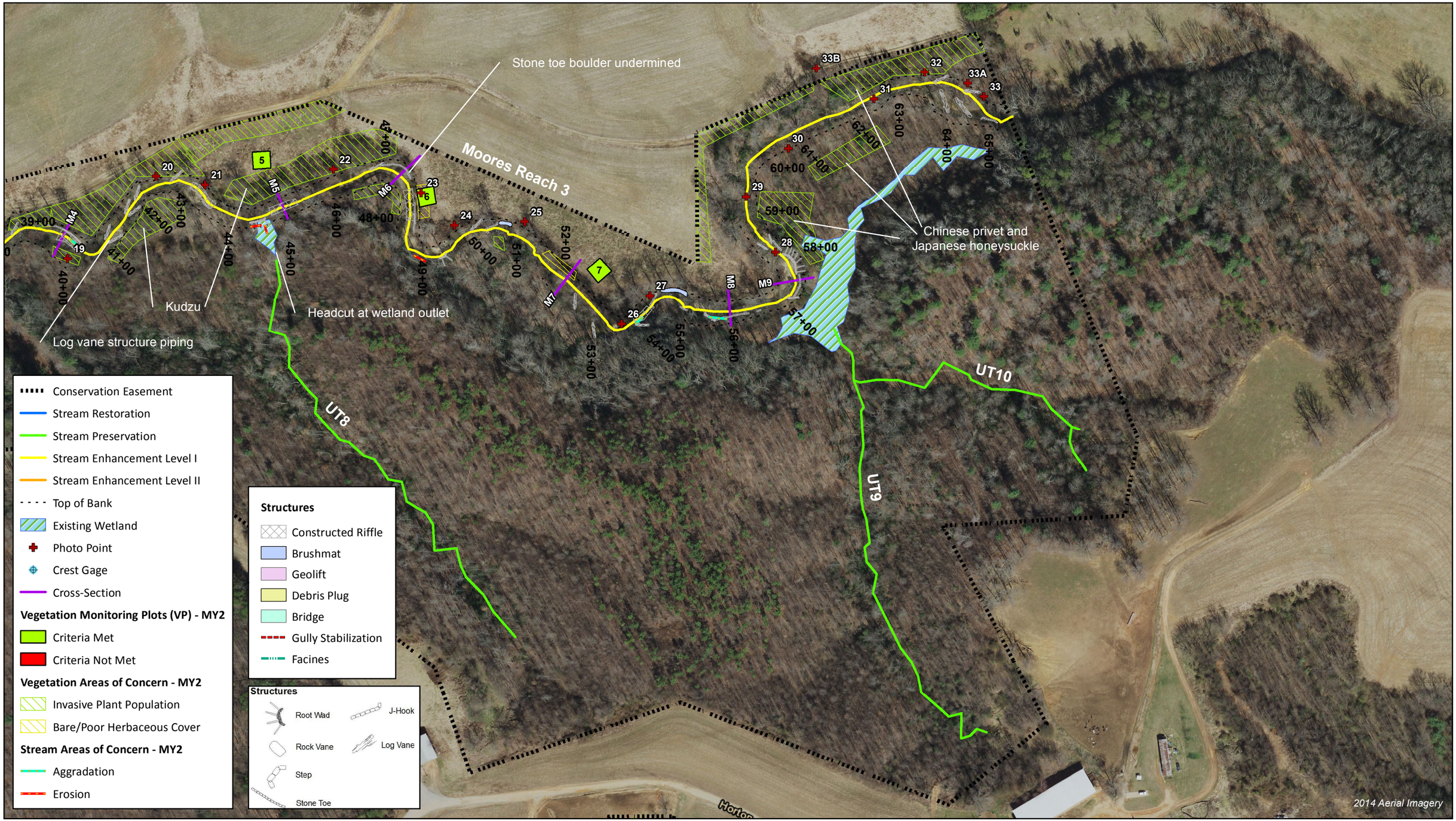
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.2 Integrated Current Condition Plan View (Sheet 2 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Surry County, NC



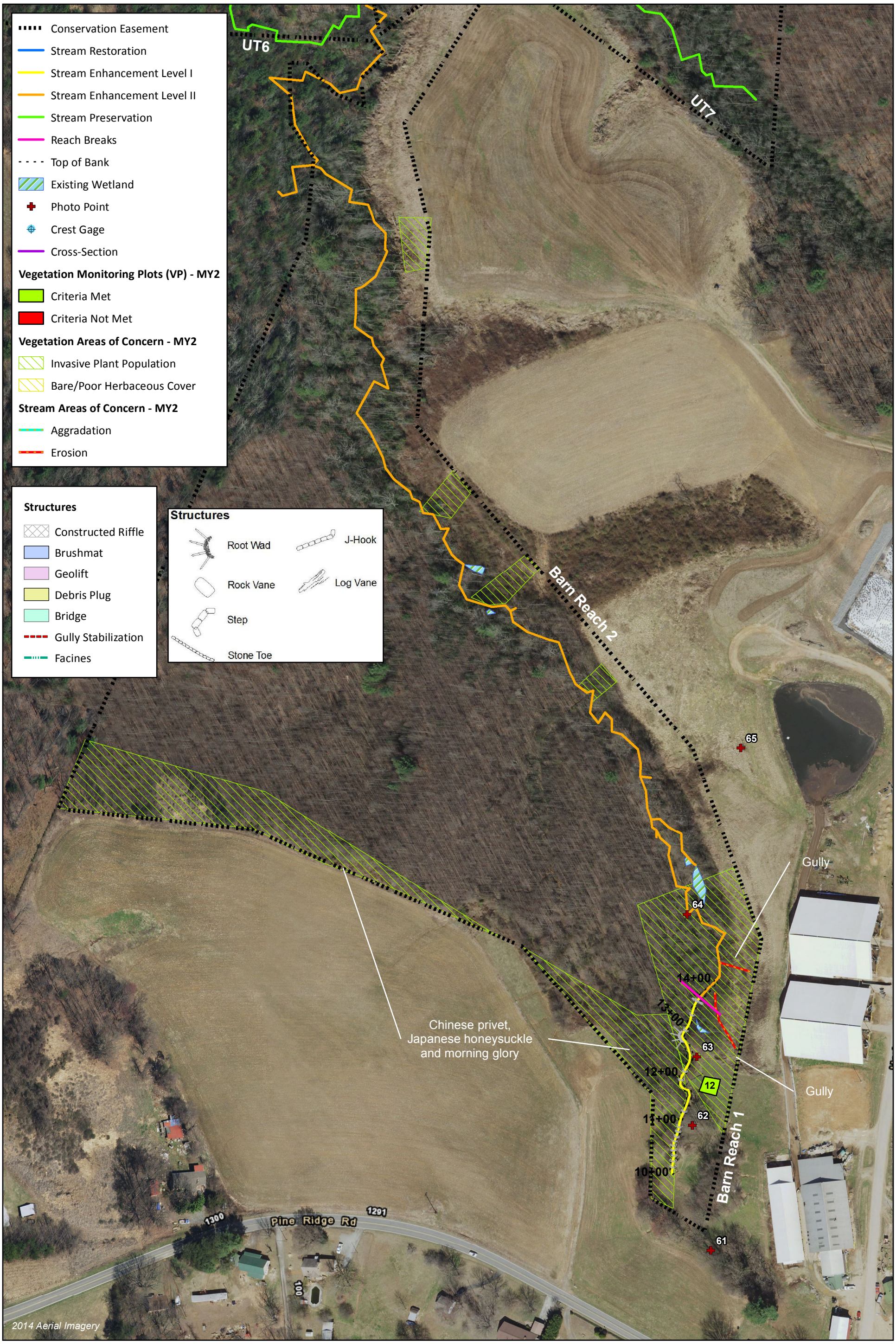
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.3 Integrated Current Condition Plan View (Sheet 3 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Surry County, NC



WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.4 Integrated Current Condition Plan View (Sheet 4 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Surry County, NC

Conservation Easement
Stream Restoration
Stream Enhancement Level I
Stream Enhancement Level I; Reduced Credit
Stream Enhancement Level II
Stream Preservation
ReachBreaks
Top of Bank
Existing Wetland
Overhead Power Easement
Photo Point
Crest Gage
Cross-Section

Vegetation Monitoring Plots (VP) - MY2

Criteria Met
Criteria Not Met

Vegetation Areas of Concern - MY2

Invasive Plant Population
Bare/Poor Herbaceous Cover

Stream Areas of Concern - MY2

Aggradation
Erosion

Structures

Constructed Riffle
Brushmat
Geolift
Debris Plug
Bridge
Gully Stabilization
Facines

Structures

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

Horton Rd
599
Gully
Cow Tributary 2
Scattered Chinese privet and multiflora rose
Gully
Chinese privet and multiflora rose
Cow Tributary 1
Scattered Chinese privet
Gully
Silage Reach 2
Log step footer exposed
Gully
Gully
Chinese privet
UT1
Gully
Fallen Tree Over Channel
Silage Reach 1
Fallen Tree Over Channel
Multiflora rose, Chinese privet
Kudzu, Chinese privet, and English ivy
2014 Aerial Imagery

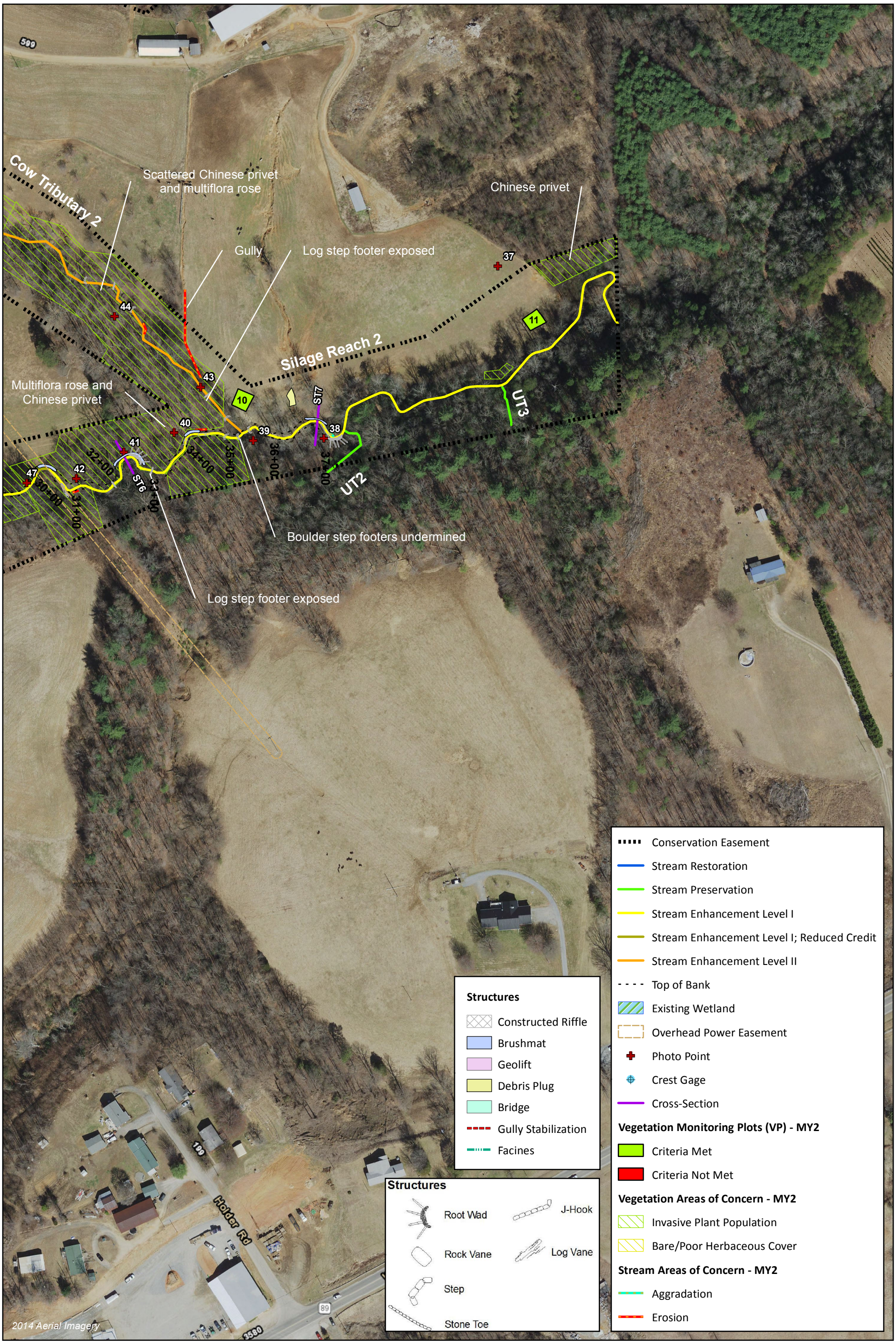
WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.5 Integrated Current Condition Plan View (Sheet 5 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Surry County, NC



WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.6 Integrated Current Condition Plan View (Sheet 6 of 6)
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Surry County, NC

Table 6a. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

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 2 - 2017

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	75	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)	6	7			86%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	6	7			86%			
	4.Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	6	7			86%			
		2. Thalweg centering at downstream of meander (Glide)	6	7			86%			
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	15	99%	1	10	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	1	15	99%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	16	16			100%			
	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.	16	16			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)	9	9			100%			
	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 2 - 2017

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	100	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			2	30	99%	0	0	99%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	2	30	99%	0	0	99%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	25	27			93%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	25	27			93%			
	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)	18	18			100%			
	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 2 - 2017

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			1	15	99%	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	1	15	99%	0	0	100%
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	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.	8	8			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)	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 2 - 2017

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)			2	20	99%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	15	15			100%			
	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			5	80	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	5	80	98%	0	0	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.	14	16			88%			
	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)	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 2 - 2017

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			N/A	N/A	N/A	0	0	N/A
	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.			N/A	N/A	N/A	0	0	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse			N/A	N/A	N/A	0	0	N/A
				Totals	0	0	N/A	0	0	N/A
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	13	13			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	13	13			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	13	13			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 6g. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

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			0	0	100%	N/A	N/A	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			1	20	99%	0	0	99%
				Totals	1	20	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.	21	24			88%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	21	24			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)	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 2 - 2017

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	30	88%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	N/A	N/A	Channel largely overgrown with vegetation. No discernible facets in some segments of channel.		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 2 - 2017

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	Channel largely overgrown with vegetation. No discernible facets in some segments of channel.		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 2 - 2017

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. Visual Stream Morphology Stability Assessment Table

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

Planted Acreage **15.4**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Cross Hatch Yellow	5	0.23	1.5%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	5	0.12	0.8%
			Total	10	0.35	2.3%
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	Pattern and Color	0	0.00	0.0%
			Cumulative Total	10	0.35	2.3%

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 Green	43	19.3	13.8%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	None	Pattern and Color	0	0.00	0.0%

Stream Photographs

PP1 – Moores Reach 1, looking upstream *(07/06/2017)*

PP2 – Moores Reach 1, looking downstream *(07/06/2017)*

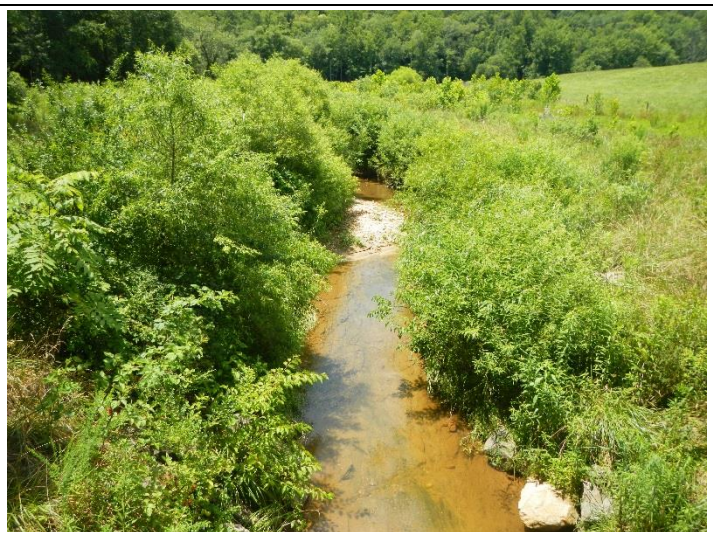
PP3 – Moores Reach 2, looking downstream *(07/06/2017)*

PP4 – Moores Reach 2, looking downstream *(07/06/2017)*

PP5 – Moores Reach 2, looking upstream *(07/06/2017)*

PP6 – Pond Tributary, looking downstream *(07/06/2017)*

	
PP7 – Pond Tributary, looking downstream *(07/06/2017)*	**PP8** – Moores Reach 2, looking downstream *(07/06/2017)*
	
PP9 – Moores Reach 2, looking downstream *(07/06/2017)*	**PP10** – Moores Reach 2, looking downstream *(07/06/2017)*
	
PP11 – Moores Reach 2, looking downstream *(07/06/2017)*	**PP12 –** Barn Reach 2, looking upstream *(07/06/2017)*

	
PP13 – Moores Reach 2, looking downstream *(07/06/2017)*	**PP14 –** Moores Reach 2, looking downstream *(07/06/2017)*
	
PP15 – Moores Reach 2, looking downstream *(07/06/2017)*	**PP16 –** Moores Reach 2, looking upstream *(07/06/2017)*
	
PP17 – Moores Reach 3, looking downstream *(07/06/2017)*	**PP18 –** Moores Reach 3, looking downstream *(07/06/2017)*

	
PP19 – Moores Reach 3, looking downstream *(07/06/2017)*	**PP20 –** Moores Reach 3, looking downstream *(07/06/2017)*
	
PP21 – Moores Reach 3, looking downstream *(07/06/2017)*	**PP22 –** Moores Reach 3, looking downstream *(07/06/2017)*
	
PP23 – Moores Reach 3, looking downstream *(07/06/2017)*	**PP24 –** Moores Reach 3, looking downstream *(07/06/2017)*

PP25 – Moores Reach 3, looking downstream *(07/06/2017)*

PP26 – Moores Reach 3, looking downstream *(07/06/2017)*

PP27 – Moores Reach 3, looking downstream *(07/06/2017)*

PP28 – Moores Reach 3, looking downstream *(07/06/2017)*

PP29 – Moores Reach 3, looking downstream *(07/06/2017)*

PP30 – Moores Reach 3, looking downstream *(07/06/2017)*

PP31 – Moores Reach 3, looking downstream *(07/06/2017)*

PP32 – Moores Reach 3, looking downstream *(07/06/2017)*

PP33 – Moores Reach 3, looking downstream *(07/06/2017)*

PP33a – Moores Reach 3, looking upstream *(07/06/2017)*

PP33b – Moores Reach 3, looking downstream *(09/07/2017)*

PP34 – Corn Reach 1, looking downslope *(07/06/2017)*

PP35 – Corn Reach 2, looking downstream *(07/06/2017)*

PP36 – Corn Reach 2, looking upstream *(07/06/2017)*

PP37 – Silage Reach 2, looking downslope *(07/11/2017)*

PP38 – Silage Reach 2, looking downstream *(07/11/2017)*

PP39 – Silage Reach 2, looking upstream *(07/11/2017)*

PP40 – Silage Reach 2, looking downstream *(07/11/2017)*

PP41 – Silage Reach 2, looking downstream *(07/11/2017)*

PP42 – Silage Reach 2, looking downstream *(07/11/2017)*

PP43 – Cow Tributary 2, looking downstream *(07/11/2017)*

PP44 – Cow Tributary 2, looking downstream *(07/11/2017)*

PP45 – Cow Tributary 2, looking downstream *(07/11/2017)*

PP46 – Cow Tributary 2, looking upstream *(07/11/2017)*

	
PP47 – Silage Reach 2, looking downstream *(07/11/2017)*	**PP48 –** Silage Reach 2, looking upstream *(07/11/2017)*
	
PP49 – Cow Tributary 1, looking upstream *(07/11/2017)*	**PP50 –** Cow Tributary 1, looking upstream *(07/11/2017)*
	
PP51 – Silage Reach 2, looking downstream *(07/11/2017)*	**PP52 –** Silage Reach 2, looking upstream *(07/11/2017)*

	
PP53 – Silage Reach 2, looking downstream *(07/11/2017)*	**PP54 –** Silage Reach 2, looking upstream *(07/11/2017)*
	
PP55 – UT1, looking upstream *(07/11/2017)*	**PP56 –** Silage Reach 1, looking downstream *(07/11/2017)*
	
PP57 – Silage Reach 1, looking upstream *(07/11/2017)*	**PP58 –** Silage Reach 1, looking upstream *(07/11/2017)*

PP59 – Silage Reach 1, looking downstream *(07/11/2017)*

PP60 – Silage Reach 1, looking downstream *(07/11/2017)*

PP61 – Barn Reach 1, looking downslope *(07/11/2017)*

PP62 – Barn Reach 1, looking downstream *(07/11/2017)*

PP63 – Barn Reach 1, looking downstream *(07/11/2017)*

PP64 – Barn Reach 2, looking downstream *(07/11/2017)*

PP65 – Barn Reach 2, looking downslope *(07/11/2017)*

PP66 – Silage Reach 1, looking upslope *(07/11/2017)*

PP67 – UT1, looking downstream *(07/11/2017)*

Vegetation Photographs

	
Vegetation Plot 1 – *(08/23/2017)*	**Vegetation Plot 2** – *(08/23/2017)*
	
Vegetation Plot 3 – *(08/23/2017)*	**Vegetation Plot 4** – *(08/23/2017)*
	
Vegetation Plot 5 – *(08/23/2017)*	**Vegetation Plot 6** – *(08/23/2017)*

Vegetation Plot 7 – *(08/23/2017)*

Vegetation Plot 8 – *(08/24/2017)*

Vegetation Plot 9 – *(08/24/2017)*

Vegetation Plot 10 – *(08/24/2017)*

Vegetation Plot 11 – *(08/24/2017)*

Vegetation Plot 12 – *(08/24/2017)*

APPENDIX C. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Plot	MY4 Success Criteria Met (Y/N)	Tract Mean
1	Y	83%
2	N	
3	N	
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 2 - 2017

Database Name	cvs-eep-entrytool-v2.5.0 Moores MY2.mdb
Database Location	Q:\ActiveProjects\005-02153 Moores Monitoring\Monitoring\Monitoring Year 2\Vegetation Assessment
Computer Name	BULLPEN
File Size	73928704
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 10. Planted and Total Stem Counts
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

			Current Plot Data (MY2 2017)																				
			94709-01-0001			94709-01-0002			94709-01-0003			94709-01-0004			94709-01-0005			94709-01-0006			94709-01-0007		
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**
Acer rubrum	Red Maple	Tree																					
Betula nigra	River Birch, Red Birch	Tree										1	1	1			2						
Diospyros virginiana	American Persimmon	Tree	3	3	3	1	1	1										1	1	1			
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree										8	8	8	2	2	2	1	1	1	2	2	3
Liriodendron tulipifera	Tulip Poplar	Tree							3	3	3							1	1	1			
Nyssa sylvatica	Black Gum	Tree																2	2	2	2	2	2
Platanus occidentalis	Sycamore	Tree							1	1	1	4	4	4	9	9	9	2	2	2	7	7	7
Quercus lyrata	Overcup Oak	Tree	6	6	6	4	4	4				2	2	2				3	3	3			
Quercus montana	Rock Chestnut Oak	Tree				1	1	1	3	3	3							3	3	3	1	1	1
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						
Rhus glabra	Smooth Sumac	Shrub Tree																					
		Stem count	12	12	12	7	7	7	7	7	7	17	17	17	14	14	16	13	13	13	12	12	13
		size (ares)	1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	3	3	3	4	4	4	3	3	3	6	6	6	4	4	5	7	7	7	4	4	4
		Stems per ACRE	486	486	486	283	283	283	283	283	283	688	688	688	567	567	647	526	526	526	486	486	526

			Current Plot Data (MY2 2017)															Annual Means								
			94709-01-0008			94709-01-0009			94709-01-0010			94709-01-0011			94709-01-0012			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 rubrum	Red Maple	Tree			1						6									7						
Betula nigra	River Birch, Red Birch	Tree																1	1	3			2			
Diospyros virginiana	American Persimmon	Tree				1	1	1	3	3	3	1	1	1	6	6	7	16	16	17	14	14	14	14	14	14
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree													2	2	2	15	15	16	13	13	13	14	14	14
Liriodendron tulipifera	Tulip Poplar	Tree			1						65							4	4	70	4	4	8	4	4	4
Nyssa sylvatica	Black Gum	Tree	2	2	2	1	1	1	5	5	5	5	5	5				17	17	17	20	20	20	19	19	19
Platanus occidentalis	Sycamore	Tree													1	1	1	24	24	24	25	25	26	26	26	26
Quercus lyrata	Overcup Oak	Tree	5	5	5	6	6	6				3	3	3	1	1	1	30	30	30	28	28	28	29	29	29
Quercus montana	Rock Chestnut Oak	Tree				1	1	1				5	5	5				14	14	14	21	21	21	22	22	22
Quercus nigra	Water Oak	Tree	1	1	1	6	6	8	2	2	2							15	15	17	14	14	14	14	14	14
Quercus phellos	Willow Oak	Tree				1	1	1										4	4	4	7	7	7	7	7	7
Rhus glabra	Smooth Sumac	Shrub Tree			2															2			1			
		Stem count	8	8	12	16	16	18	10	10	81	14	14	14	10	10	11	140	140	221	146	146	154	149	149	149
		size (ares)	1			1			1			1			1			12			12			12		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.30			0.30			0.30		
		Species count	3	3	6	6	6	6	3	3	5	4	4	4	4	4	4	10	10	12	9	9	11	9	9	9
		Stems per ACRE	324	324	486	647	647	728	405	405	3278	567	567	567	405	405	445	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 pla
P-all: Number of planted stems including live stakes
T: Total stems

APPENDIX D. Morphological Summary Data and Plots

Table 11a. Baseline Stream Data Summary
Moores Fork Stream Mitigation Project
DMS Project No.94709
Monitoring Year 2 - 2017

Moores Reach 1, Reach 2, & Reach 3; Silage Trib 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 Trib Reach 1**		**Silage Trib Reach 2**		**Mill Branch**		**Moores Fork Reaches 1/2**		**Moores Fork Reach 3**		**Silage Trib Reach 1**		**Silage Trib Reach 2**		**Moores Fork Reaches 1/2**		**Moores Fork Reach 3**		**Silage Trib Reach 1**		**Silage Trib 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 2 - 2017

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 2 - 2017

Moores Fork

	Cross-Section M1 (Riffle)								Cross-Section M2 (Riffle)								Cross-Section M3 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	1150.4	1150.4	1150.4						1148.7	1148.7	1148.7						1148.4	1148.4	1148.4					
Bankfull Width (ft)	33.2	34.2	34.1						31.8	32.5	32.5						39.1	39.3	38.9					
Floodprone Width (ft)	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	1.9						2.3	2.3	2.3					
Bankfull Max Depth (ft)	3.3	3.2	3.4						3.5	3.4	3.4						5.2	5.1	5.2					
Bankfull Cross-Sectional Area (ft^2)	74.1	74.3	71.9						67.2	65.6	62.0						91.8	90.1	87.8					
Bankfull Width/Depth Ratio	14.9	15.7	16.1						15.0	16.1	17.0						16.6	17.2	17.2					
Bankfull Entrenchment Ratio	4.4	4.2	4.3						4.6	4.5	4.5						---	---	---					
Bankfull Bank Height Ratio	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**	**MY4**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	1142.3	1142.3	1142.3						1139.5	1139.5	1139.5						1138.6	1138.6	1138.6					
Bankfull Width (ft)	52.2	51.6	52.3						32.0	31.6	32.6						39.3	39.1	39.3					
Floodprone Width (ft)	124.0	124.0	124.0						124.0	124.0	124.0						---	---	---					
Bankfull Mean Depth (ft)	1.9	1.9	1.8						2.3	2.3	2.2						2.7	2.7	2.9					
Bankfull Max Depth (ft)	3.3	3.2	3.7						3.5	3.6	3.6						5.1	5.5	5.2					
Bankfull Cross-Sectional Area (ft^2)	101.1	97.4	95.8						73.0	72.4	72.8						106.1	106.2	115.6					
Bankfull Width/Depth Ratio	26.9	27.3	28.6						14.0	13.8	14.6						14.5	14.4	13.3					
Bankfull Entrenchment Ratio	2.4	2.4	2.4						3.9	3.9	4.1						---	---	---					
Bankfull Bank Height Ratio	0.8	0.8	0.8						1.0	1.0	1.1						---	---	---					
	Cross-Section M7 (Run)								**Cross-Section M8 (Riffle)**								**Cross-Section M9 (Pool)**							
Dimension and Substrate	**Base[1]**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	1134.9	1134.9	1134.9						1132.4	1132.4	1132.4						1132.1	1132.1	1132.1					
Bankfull Width (ft)	49.5	49.2	49.6						34.6	34.0	33.5						30.6	33.1	32.9					
Floodprone Width (ft)	124.0	124.0	124.0						124.0	124.0	124.0						---	---	---					
Bankfull Mean Depth (ft)	2.4	2.4	2.4						2.6	2.7	2.7						4.0	3.8	3.7					
Bankfull Max Depth (ft)	3.5	3.5	3.8						4.1	4.3	4.2						6.3	6.3	6.5					
Bankfull Cross-Sectional Area (ft^2)	118.1	117.0	117.7						91.5	91.5	89.2						122.0	125.9	122.3					
Bankfull Width/Depth Ratio	20.7	20.7	20.9						13.1	12.6	12.6						7.7	8.7	8.8					
Bankfull Entrenchment Ratio	2.5	2.5	2.5						3.6	3.6	3.7						---	---	---					
Bankfull Bank Height Ratio	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.

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

Moores Fork Stream Mitigation Project

DMS Project No.94709

Monitoring Year 2 - 2017

Silage Tributary

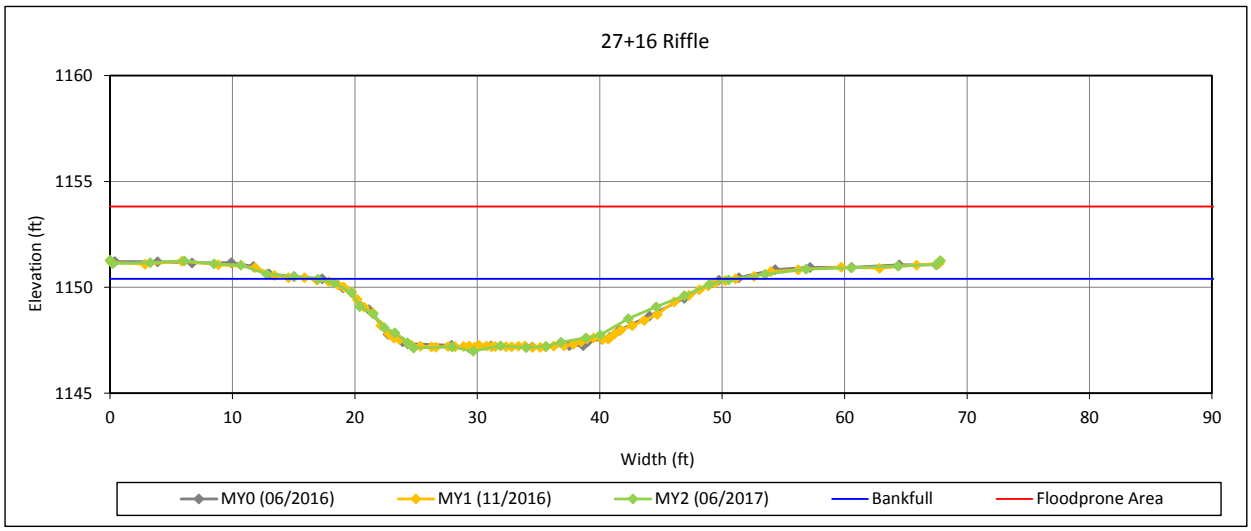
	Cross-Section ST1 (Riffle)								Cross-Section ST2 (Pool)								Cross-Section ST3 (Riffle)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	1234.6	1234.6	1234.6						1233.4	1233.4	1233.4						1193.4	1193.4	1193.4					
Bankfull Width (ft)	4.2	4.0	4.5						5.1	4.5	5.3						14.6	14.7	14.6					
Floodprone Width (ft)	9.4	9.2	9.6						---	---	---						22.5	22.8	24.6					
Bankfull Mean Depth (ft)	0.7	0.6	0.9						0.6	0.6	0.6						0.6	0.6	0.8					
Bankfull Max Depth (ft)	1.2	1.1	1.5						1.2	1.2	1.1						1.3	1.3	1.9					
Bankfull Cross-Sectional Area (ft^2)	2.8	2.3	4.1						3.2	2.8	3.0						9.3	8.8	11.0					
Bankfull Width/Depth Ratio	6.4	6.7	4.8						8.0	7.2	9.2						22.7	22.8	19.4					
Bankfull Entrenchment Ratio	2.2	2.3	2.2						---	---	---						1.5	1.5	1.7					
Bankfull Bank Height Ratio	1.0	1.0	1.0						---	---	---						1.0	1.0	1.0					
	Cross-Section ST4 (Pool)								**Cross-Section ST5 (Pool)**								**Cross-Section ST6 (Riffle)**							
Dimension and Substrate	**Base[1]**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base[1]**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	1193.1	1193.1	1193.1						1185.1	1185.1	1185.1						1175.4	1175.4	1175.4					
Bankfull Width (ft)	13.9	14.9	14.7						7.8	8.7	8.4						9.6	8.4	8.7					
Floodprone Width (ft)	---	---	---						---	---	---						28.0	28.0	28.0					
Bankfull Mean Depth (ft)	1.1	1.3	1.1						1.0	0.9	1.0						0.7	0.7	0.8					
Bankfull Max Depth (ft)	2.4	2.7	2.3						1.4	1.5	1.6						1.3	1.5	1.5					
Bankfull Cross-Sectional Area (ft^2)	15.5	19.4	16.0						7.9	8.1	8.7						6.8	6.1	7.3					
Bankfull Width/Depth Ratio	12.5	11.4	13.4						7.7	9.4	8.1						13.5	11.6	10.4					
Bankfull Entrenchment Ratio	---	---	---						---	---	---						2.9	3.3	3.2					
Bankfull Bank Height Ratio	---	---	---						---	---	---						1.0	0.9	0.9					
	Cross-Section ST7 (Riffle)																							
Dimension and Substrate	**Base[1]**	**MY1[1]**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**																
based on fixed bankfull elevation	1164.7	1164.7	1164.7																					
Bankfull Width (ft)	10.3	10.5	10.8																					
Floodprone Width (ft)	29.6	31.8	33.6																					
Bankfull Mean Depth (ft)	0.9	0.9	0.9																					
Bankfull Max Depth (ft)	1.5	1.6	1.8																					
Bankfull Cross-Sectional Area (ft^2)	8.8	9.3	9.6																					
Bankfull Width/Depth Ratio	12.0	12.0	12.1																					
Bankfull Entrenchment Ratio	2.9	3.0	3.1																					
Bankfull Bank Height Ratio	1.0	0.9	1.0																					

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

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section M1- Moores Fork



Bankfull Dimensions	
71.9	x-section area (ft.sq.)
34.1	width (ft)
2.1	mean depth (ft)
3.4	max depth (ft)
35.3	wetted perimeter (ft)
2.0	hydraulic radius (ft)
16.1	width-depth ratio
145.0	W flood prone area (ft)
4.3	entrenchment ratio
1.0	low bank height ratio

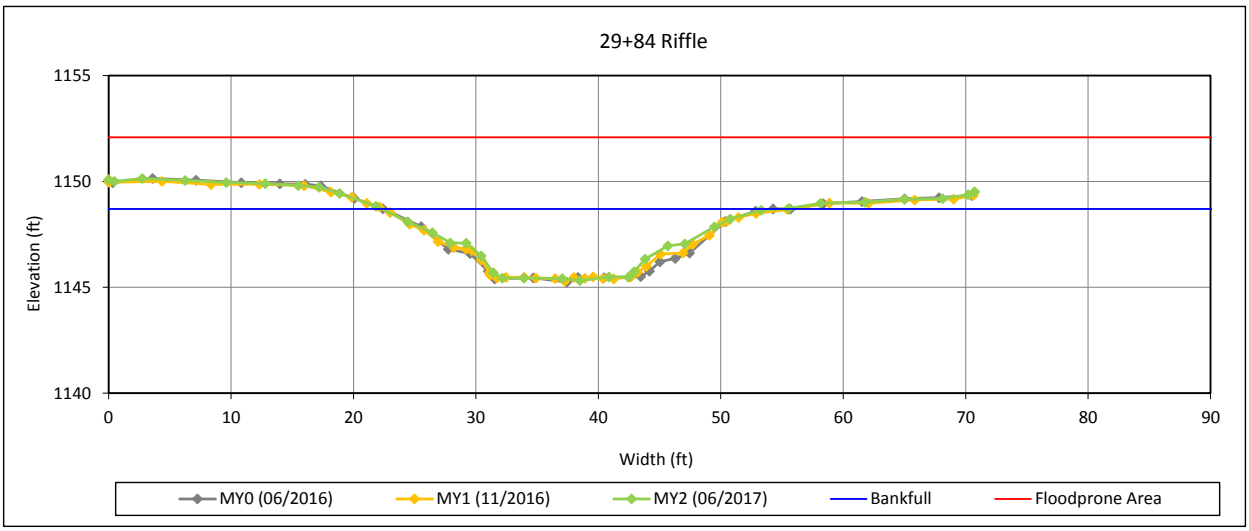
Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section M2- Moores Fork



Bankfull Dimensions	
62.0	x-section area (ft.sq.)
32.5	width (ft)
1.9	mean depth (ft)
3.4	max depth (ft)
33.8	wetted perimeter (ft)
1.8	hydraulic radius (ft)
17.0	width-depth ratio
145.0	W flood prone area (ft)
4.5	entrenchment ratio
1.0	low bank height ratio

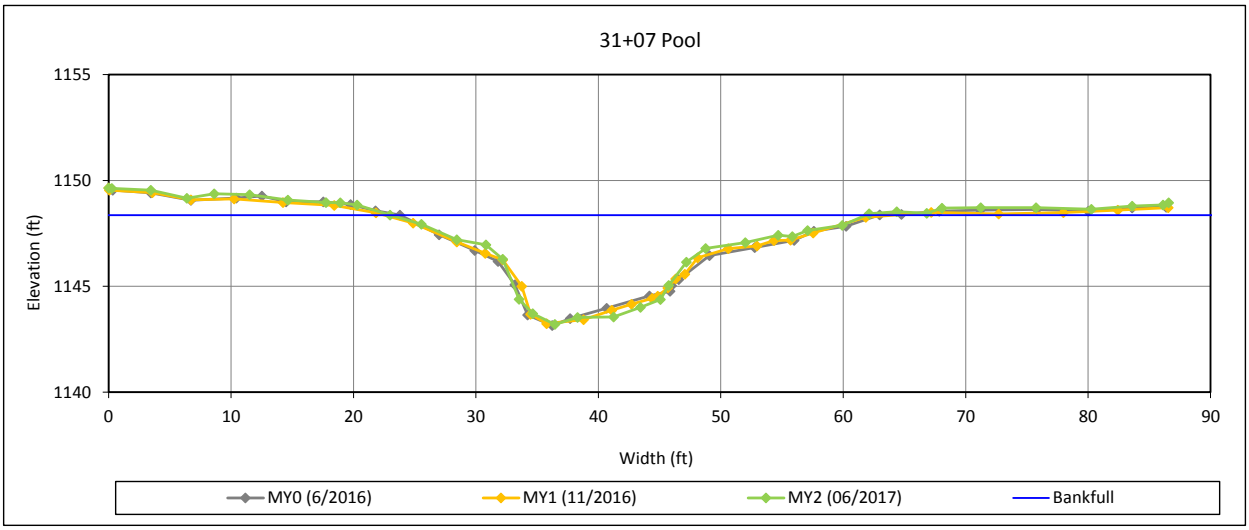
Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 -2017

Cross-Section M3- Moores Fork



Bankfull Dimensions	
87.8	x-section area (ft.sq.)
38.9	width (ft)
2.3	mean depth (ft)
5.2	max depth (ft)
41.4	wetted perimeter (ft)
2.1	hydraulic radius (ft)
17.2	width-depth ratio

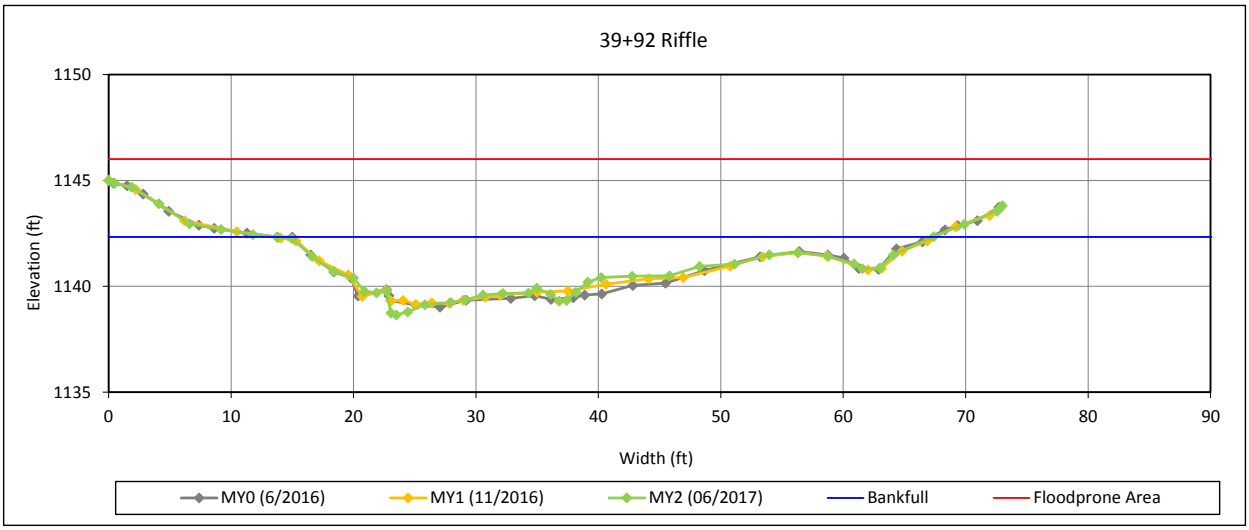
Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section M4- Moores Fork



Bankfull Dimensions	
95.8	x-section area (ft.sq.)
52.3	width (ft)
1.8	mean depth (ft)
3.7	max depth (ft)
54.5	wetted perimeter (ft)
1.8	hydraulic radius (ft)
28.6	width-depth ratio
124.0	W flood prone area (ft)
2.4	entrenchment ratio
0.8	low bank height ratio

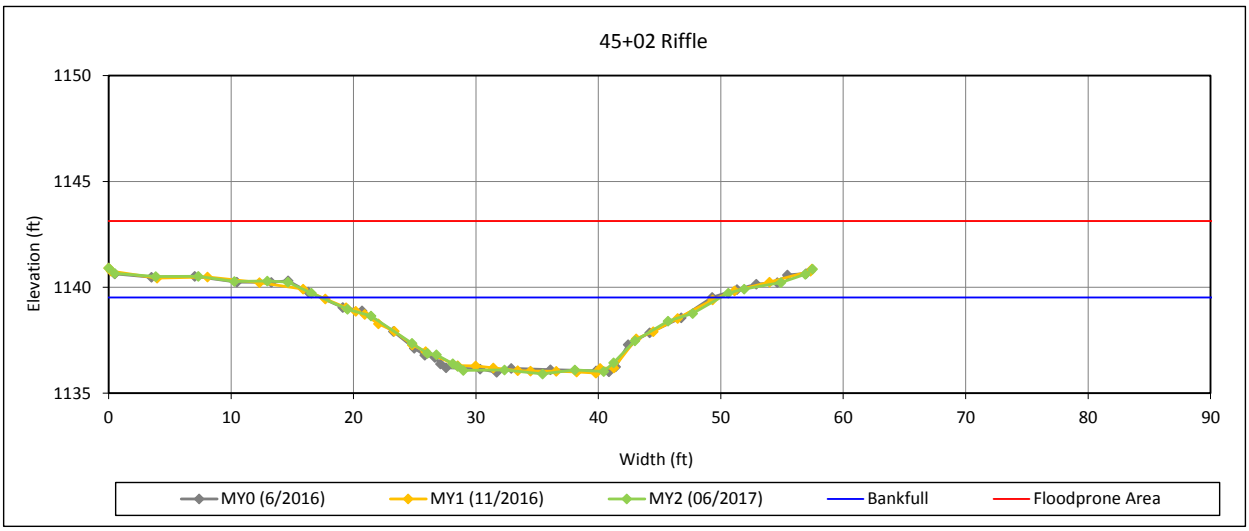
Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section M5- Moores Fork



Bankfull Dimensions	
72.8	x-section area (ft.sq.)
32.6	width (ft)
2.2	mean depth (ft)
3.6	max depth (ft)
33.9	wetted perimeter (ft)
2.1	hydraulic radius (ft)
14.6	width-depth ratio
124.0	W flood prone area (ft)
3.8	entrenchment ratio
1.1	low bank height ratio

Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

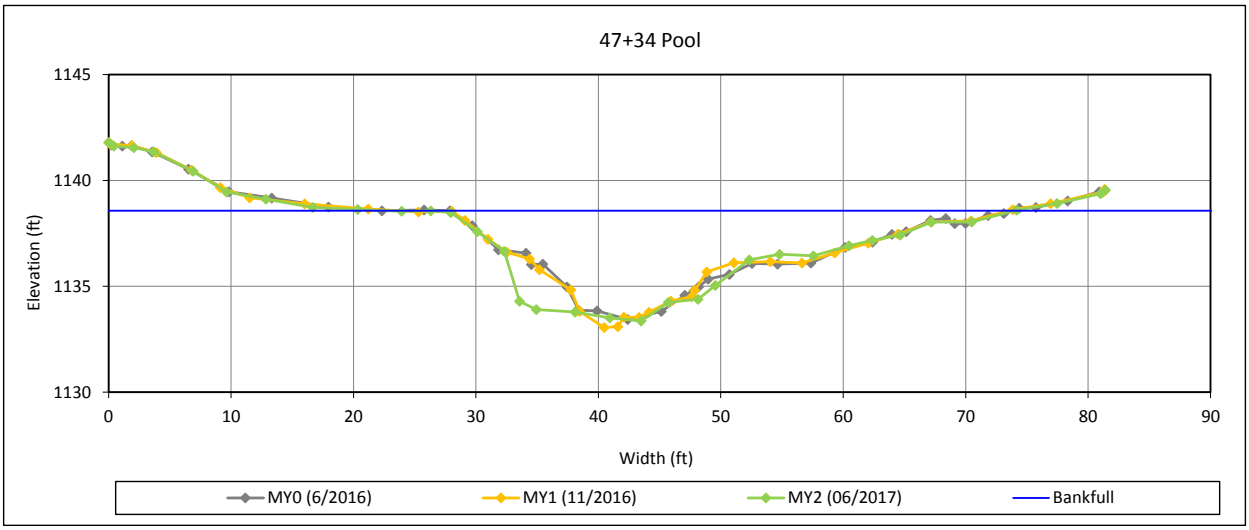
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

Cross-Section M6- Moores Fork



Bankfull Dimensions	
115.6	x-section area (ft.sq.)
39.3	width (ft)
2.9	mean depth (ft)
5.2	max depth (ft)
41.8	wetted perimeter (ft)
2.8	hydraulic radius (ft)
13.3	width-depth ratio

Survey Date: 06/2017

Field Crew: Kee Mapping & Surveying

View Downstream

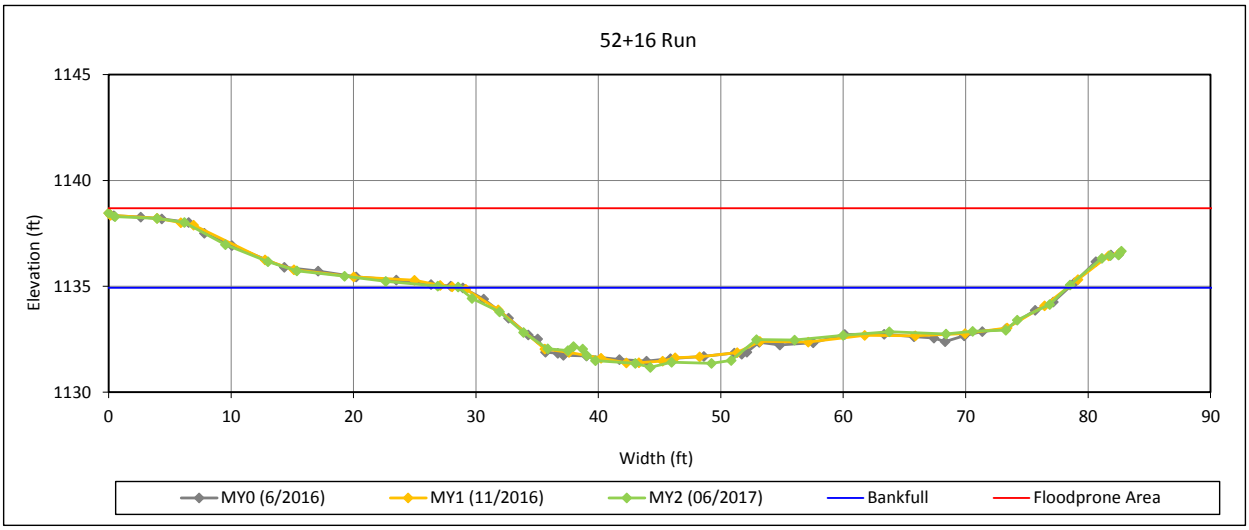
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

Cross-Section M7- Moores Fork



Bankfull Dimensions	
117.7	x-section area (ft.sq.)
49.6	width (ft)
2.4	mean depth (ft)
3.8	max depth (ft)
51.1	wetted perimeter (ft)
2.3	hydraulic radius (ft)
20.9	width-depth ratio
124.0	W flood prone area (ft)
2.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 06/2017

Field Crew: Kee Mapping & Surveying

View Downstream

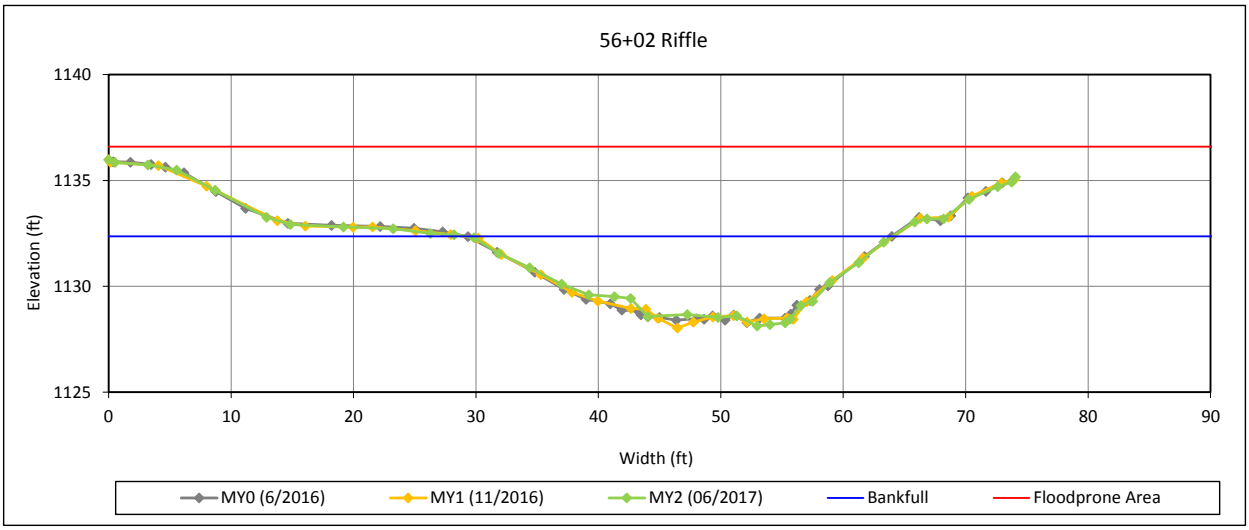
Cross Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

Cross-Section M8- Moores Fork



Bankfull Dimensions	
89.2	x-section area (ft.sq.)
33.5	width (ft)
2.7	mean depth (ft)
4.2	max depth (ft)
35.1	wetted perimeter (ft)
2.5	hydraulic radius (ft)
12.6	width-depth ratio
124.0	W flood prone area (ft)
3.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 06/2017

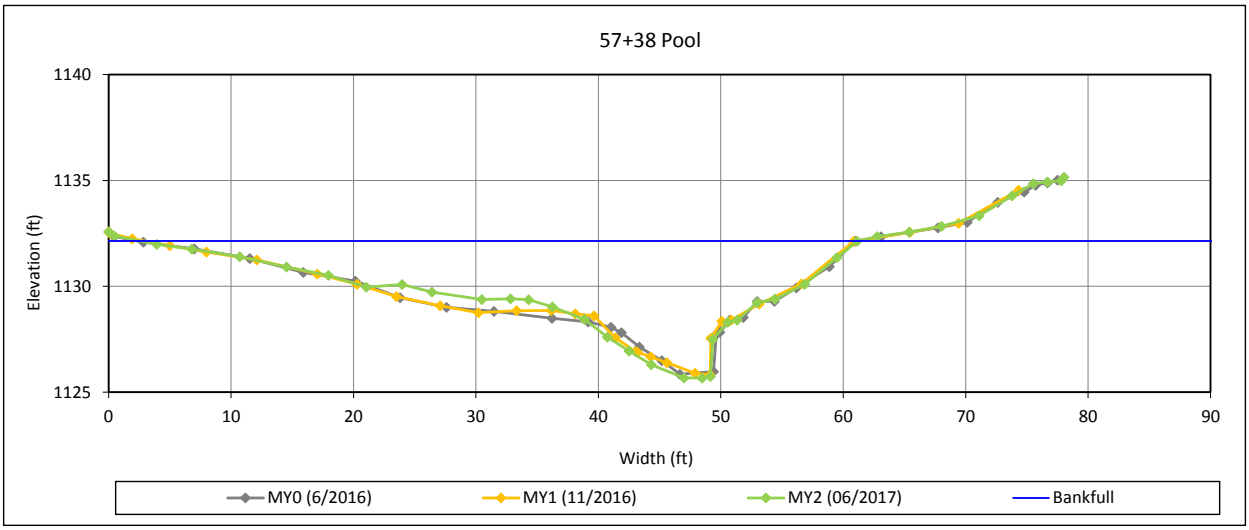
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section M9- Moores Fork



Bankfull Dimensions	
122.3	x-section area (ft.sq.)
32.9	width (ft)
3.7	mean depth (ft)
6.5	max depth (ft)
35.6	wetted perimeter (ft)
3.4	hydraulic radius (ft)
8.8	width-depth ratio

Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

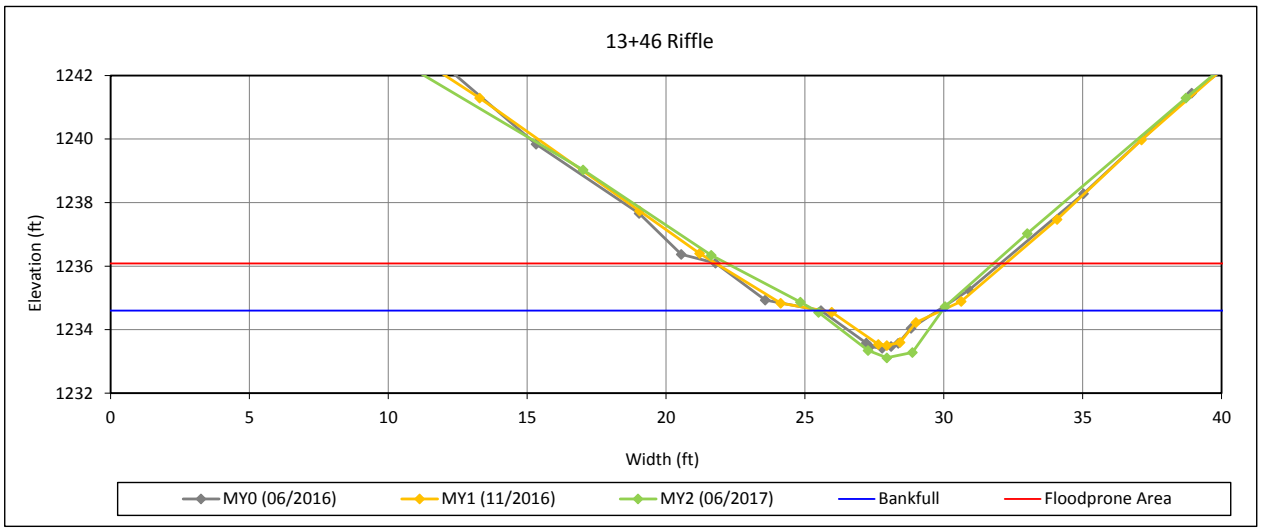
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

Cross-Section ST1- Silage Trib



Bankfull Dimensions	
4.1	x-section area (ft.sq.)
4.5	width (ft)
0.9	mean depth (ft)
1.5	max depth (ft)
5.5	wetted perimeter (ft)
0.7	hydraulic radius (ft)
4.8	width-depth ratio
9.6	W flood prone area (ft)
2.2	entrenchment ratio
1.0	low bank height ratio

Survey Date: 06/2017

Field Crew: Kee Mapping & Surveying

View Downstream

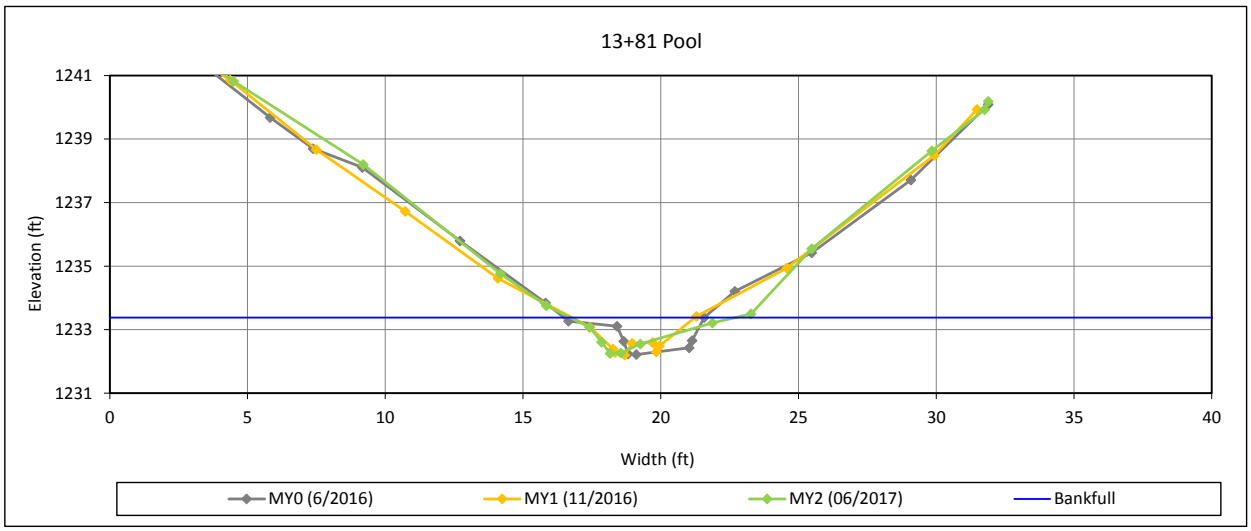
Cross-Section Plots

Moores Fork Stream Mitigation Project

DMS Project No. 94709

Monitoring Year 2 - 2017

Cross Section ST2- Silage Trib



Bankfull Dimensions	
3.0	x-section area (ft.sq.)
5.3	width (ft)
0.6	mean depth (ft)
1.1	max depth (ft)
5.8	wetted perimeter (ft)
0.5	hydraulic radius (ft)
9.2	width-depth ratio

View Downstream

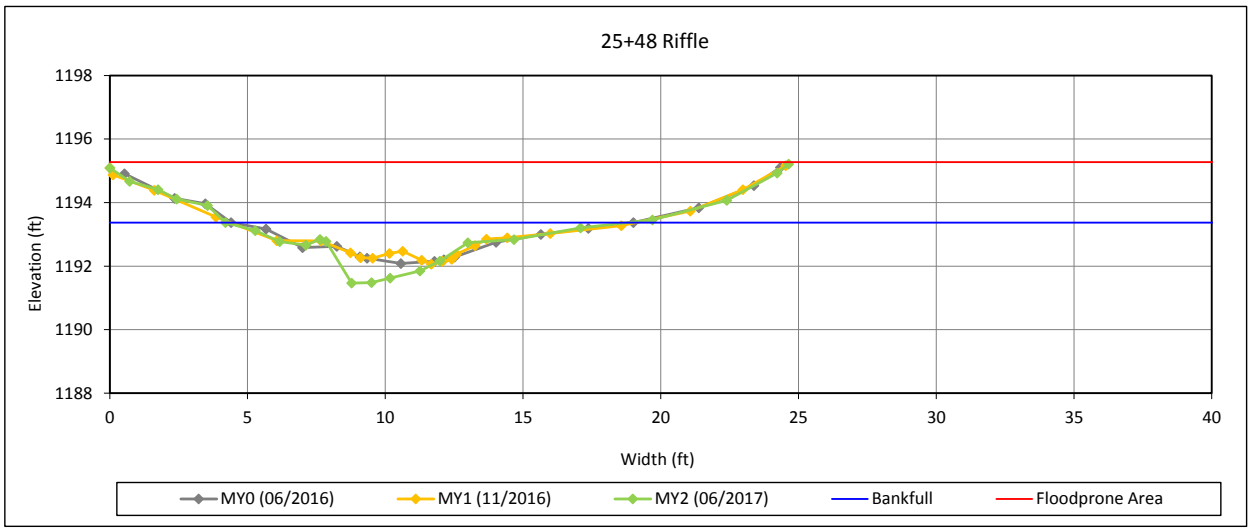
Survey Date: 06/2017

Field Crew: Kee Mapping & Surveying

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section ST3 - Silage Trib



Bankfull Dimensions	
11.0	x-section area (ft.sq.)
14.6	width (ft)
0.8	mean depth (ft)
1.9	max depth (ft)
15.7	wetted perimeter (ft)
0.7	hydraulic radius (ft)
19.4	width-depth ratio
24.6	W flood prone area (ft)
1.7	entrenchment ratio
1.0	low bank height ratio

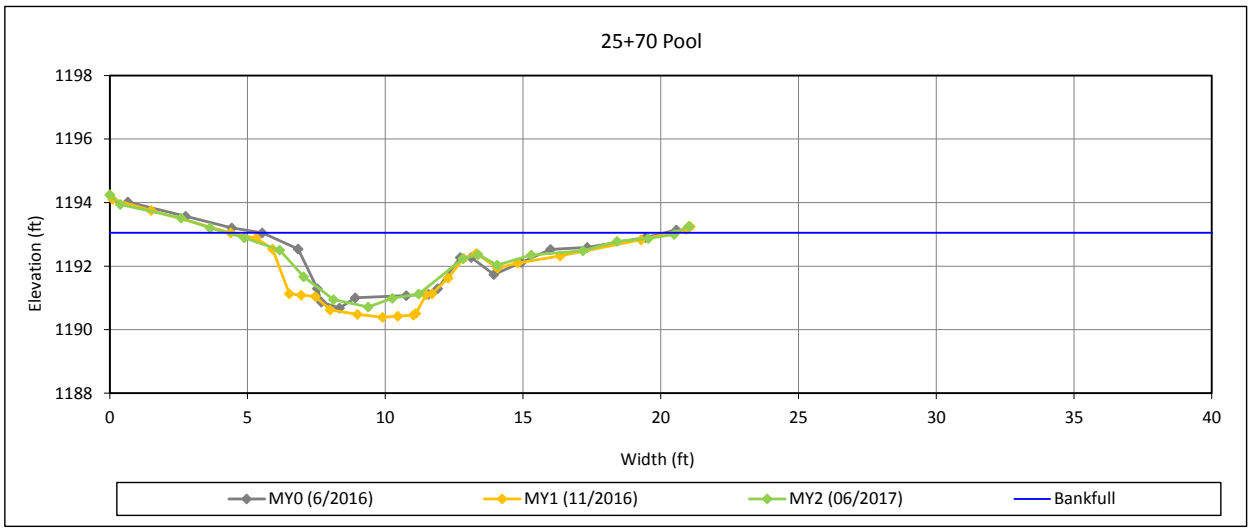
Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section ST4 - Silage Trib



Bankfull Dimensions	
16.0	x-section area (ft.sq.)
14.7	width (ft)
1.1	mean depth (ft)
2.3	max depth (ft)
15.9	wetted perimeter (ft)
1.0	hydraulic radius (ft)
13.4	width-depth ratio

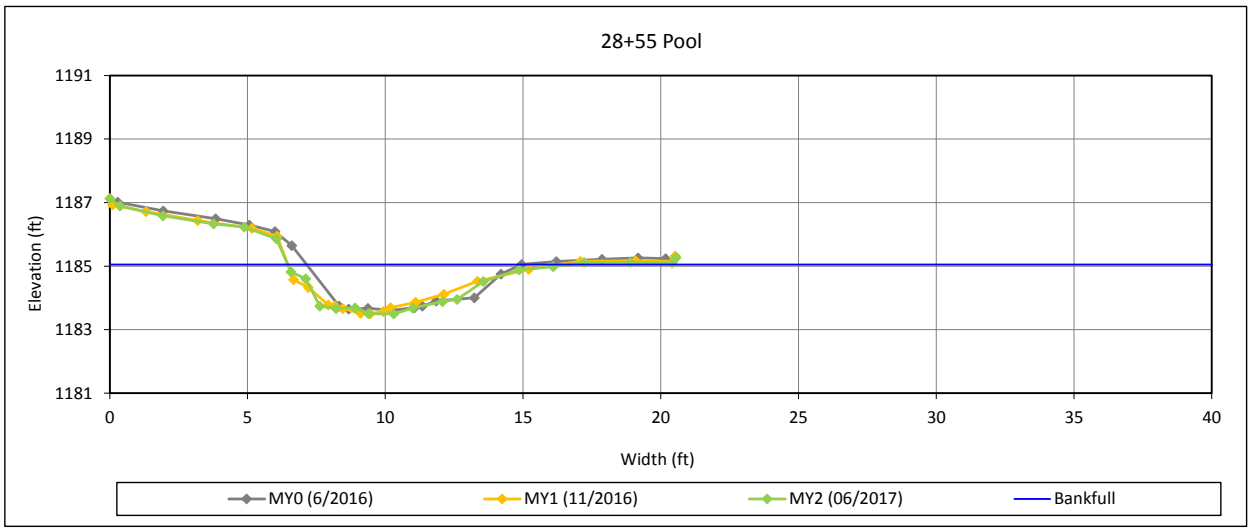
Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section ST5 - Silage Trib



Bankfull Dimensions	
8.7	x-section area (ft.sq.)
8.4	width (ft)
1.0	mean depth (ft)
1.6	max depth (ft)
9.4	wetted perimeter (ft)
0.9	hydraulic radius (ft)
8.1	width-depth ratio

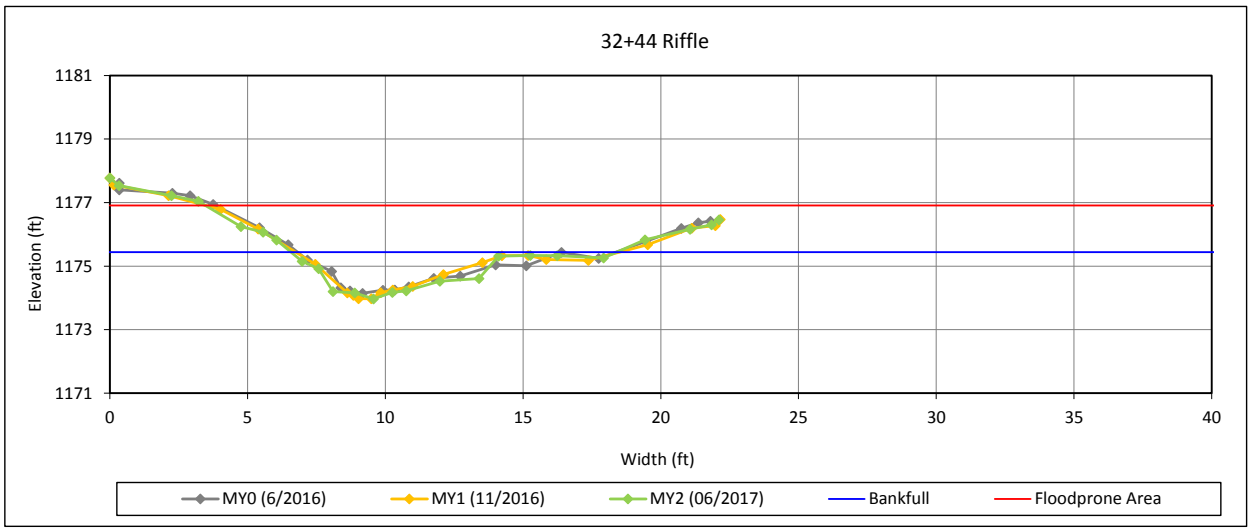
View Downstream

Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section ST6 - Silage Trib



Bankfull Dimensions	
7.3	x-section area (ft.sq.)
8.7	width (ft)
0.8	mean depth (ft)
1.5	max depth (ft)
9.6	wetted perimeter (ft)
0.8	hydraulic radius (ft)
10.4	width-depth ratio
28.0	W flood prone area (ft)
3.2	entrenchment ratio
0.9	low bank height ratio

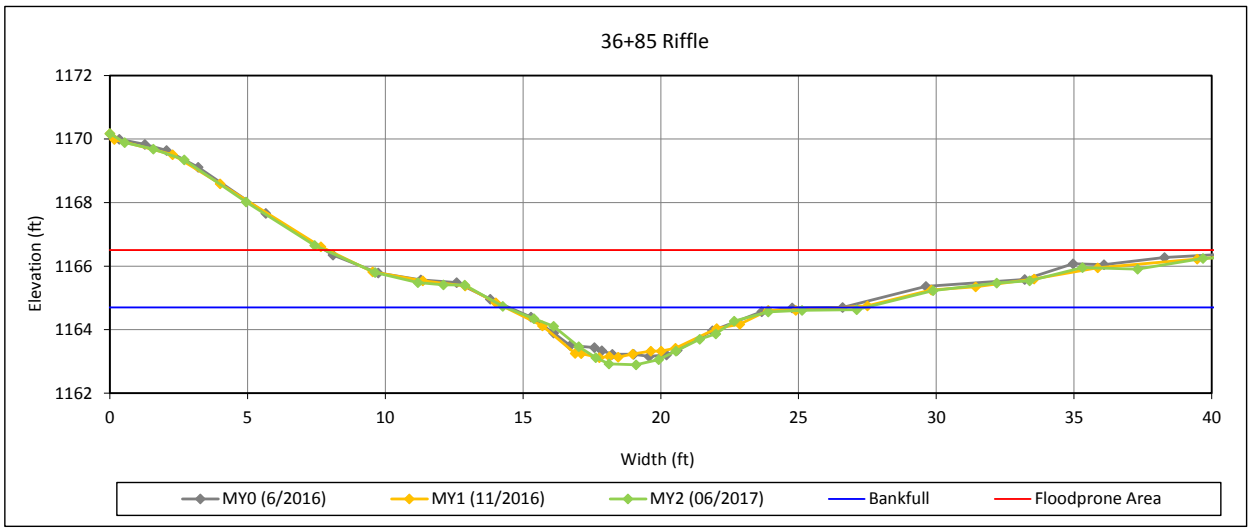
Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

Cross-Section Plots

Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Cross-Section ST7- Silage Trib



Bankfull Dimensions	
9.6	x-section area (ft.sq.)
10.8	width (ft)
0.9	mean depth (ft)
1.8	max depth (ft)
11.5	wetted perimeter (ft)
0.8	hydraulic radius (ft)
12.1	width-depth ratio
33.6	W flood prone area (ft)
3.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 06/2017
Field Crew: Kee Mapping & Surveying

View Downstream

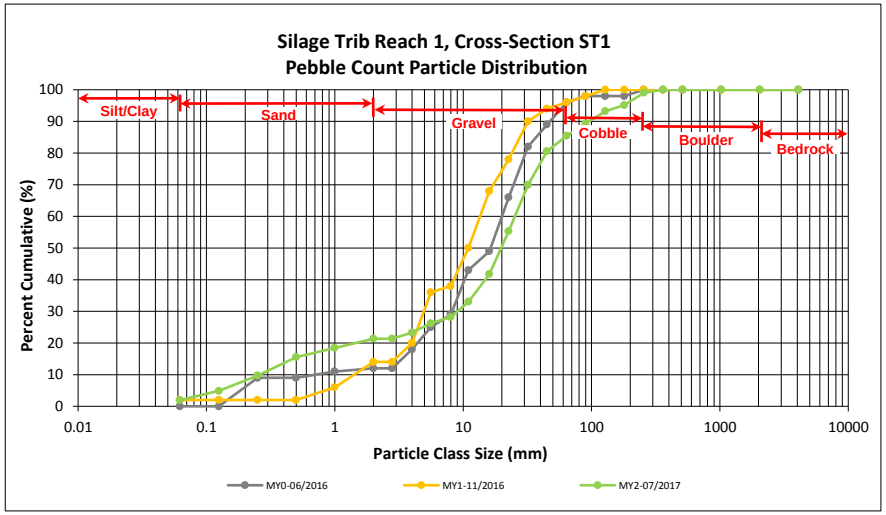
Cross-Section Pebble Count Plots

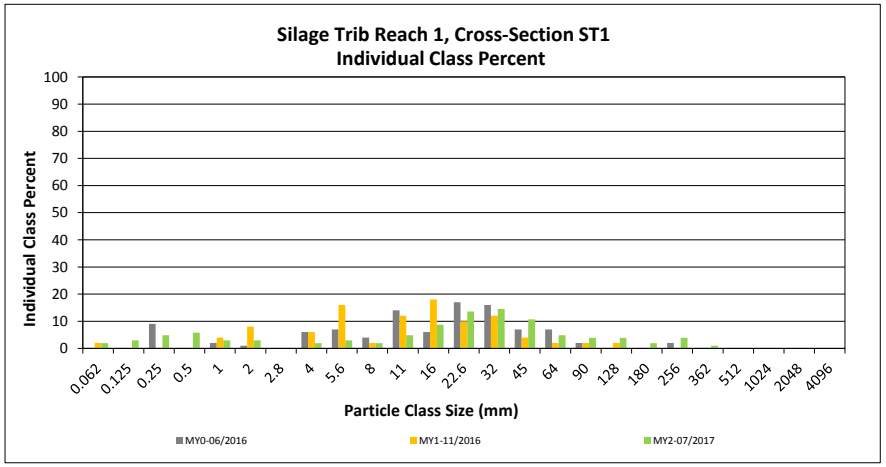
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Silage Trib Reach 1, Cross-Section ST1

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125	3	3	5
	Fine	0.125	0.250	5	5	10
	Medium	0.25	0.50	6	6	16
	Coarse	0.5	1.0	3	3	18
	Very Coarse	1.0	2.0	3	3	21
GRAVEL	Very Fine	2.0	2.8			21
	Very Fine	2.8	4.0	2	2	23
	Fine	4.0	5.6	3	3	26
	Fine	5.6	8.0	2	2	28
	Medium	8.0	11.0	5	5	33
	Medium	11.0	16.0	9	9	42
	Coarse	16.0	22.6	14	14	55
	Coarse	22.6	32	15	15	70
	Very Coarse	32	45	11	11	81
	Very Coarse	45	64	5	5	85
COBBLE	Small	64	90	4	4	89
	Small	90	128	4	4	93
	Large	128	180	2	2	95
	Large	180	256	4	4	99
BOULDER	Small	256	362	1	1	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**103**	**100**	**100**

Cross Section ST1	
Channel materials (mm)	
D_{16} =	0.56
D_{35} =	11.98
D_{50} =	19.7
D_{84} =	57.7
D_{95} =	175.5
D_{100} =	362.0





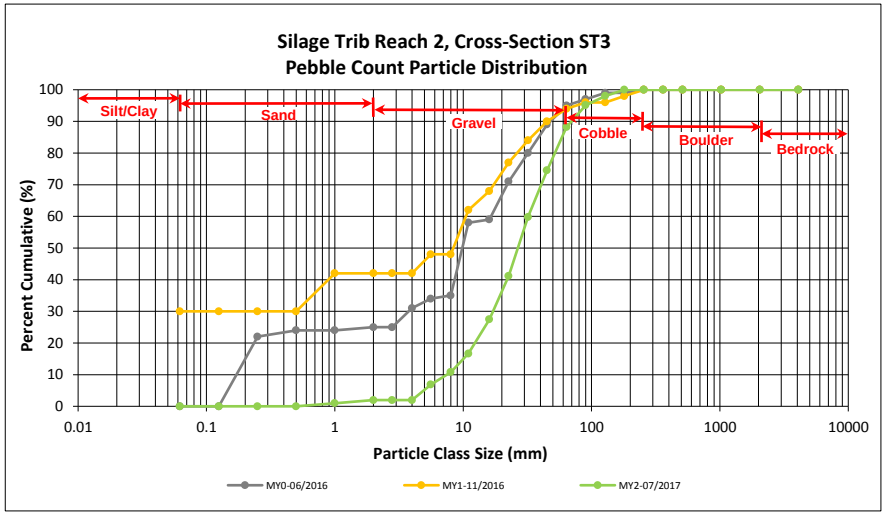
Cross-Section Pebble Count Plots

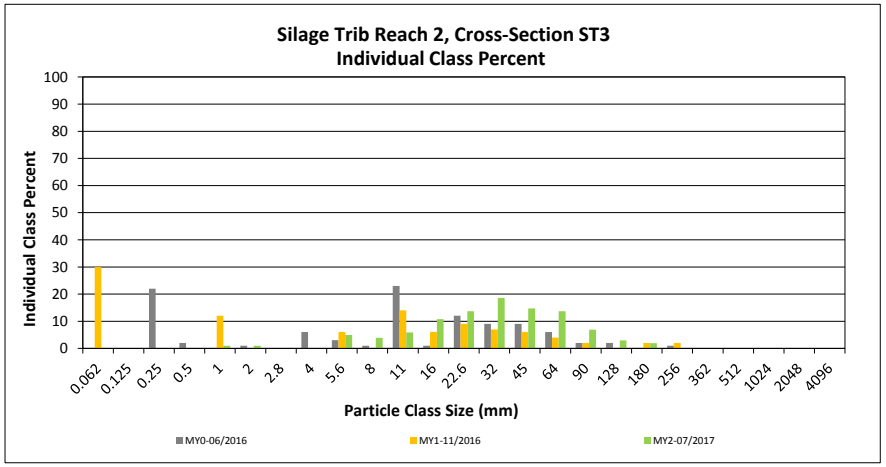
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Silage Trib Reach 2, Cross-Section ST3

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	1	1	1
	Very Coarse	1.0	2.0	1	1	2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.6	5	5	7
	Fine	5.6	8.0	4	4	11
	Medium	8.0	11.0	6	6	17
	Medium	11.0	16.0	11	11	27
	Coarse	16.0	22.6	14	14	41
	Coarse	22.6	32	19	19	60
	Very Coarse	32	45	15	15	75
	Very Coarse	45	64	14	14	88
COBBLE	Small	64	90	7	7	95
	Small	90	128	3	3	98
	Large	128	180	2	2	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**102**	**100**	**100**

Cross Section ST3	
Channel materials (mm)	
D_{16} =	10.61
D_{35} =	19.35
D_{50} =	26.6
D_{84} =	57.4
D_{95} =	89.6
D_{100} =	180.0





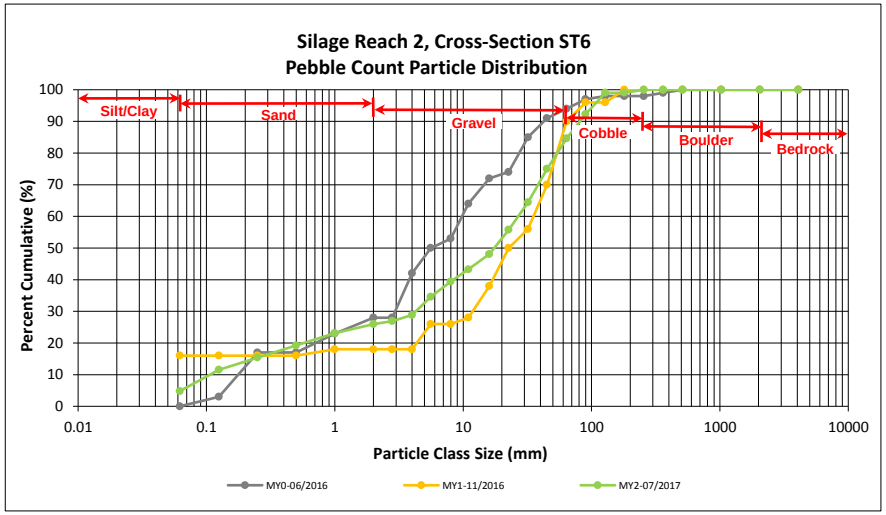
Cross-Section Pebble Count Plots

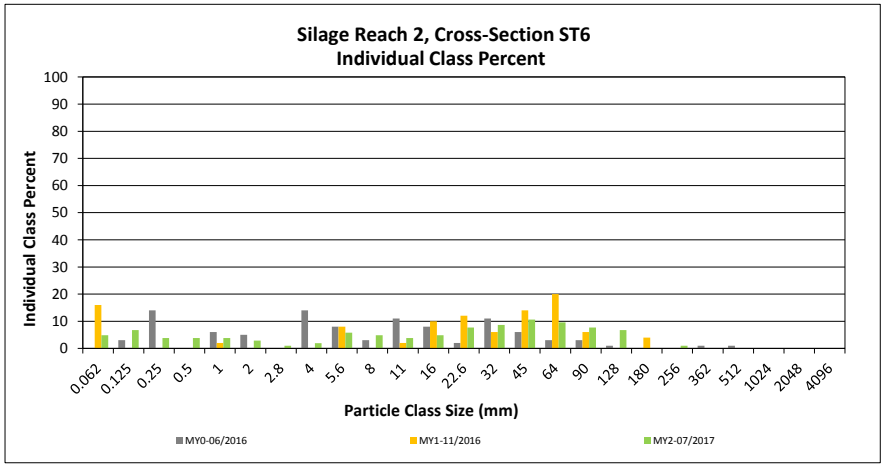
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Silage Reach 2, Cross-Section ST6

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	5	5	5
SAND	Very fine	0.062	0.125	7	7	12
	Fine	0.125	0.250	4	4	15
	Medium	0.25	0.50	4	4	19
	Coarse	0.5	1.0	4	4	23
	Very Coarse	1.0	2.0	3	3	26
GRAVEL	Very Fine	2.0	2.8	1	1	27
	Very Fine	2.8	4.0	2	2	29
	Fine	4.0	5.6	6	6	35
	Fine	5.6	8.0	5	5	39
	Medium	8.0	11.0	4	4	43
	Medium	11.0	16.0	5	5	48
	Coarse	16.0	22.6	8	8	56
	Coarse	22.6	32	9	9	64
	Very Coarse	32	45	11	11	75
	Very Coarse	45	64	10	10	85
COBBLE	Small	64	90	8	8	92
	Small	90	128	7	7	99
	Large	128	180			99
	Large	180	256	1	1	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**104**	**100**	**100**

Cross Section ST6	
Channel materials (mm)	
D_{16} =	0.28
D_{35} =	5.76
D_{50} =	17.4
D_{84} =	62.6
D_{95} =	103.6
D_{100} =	256.0





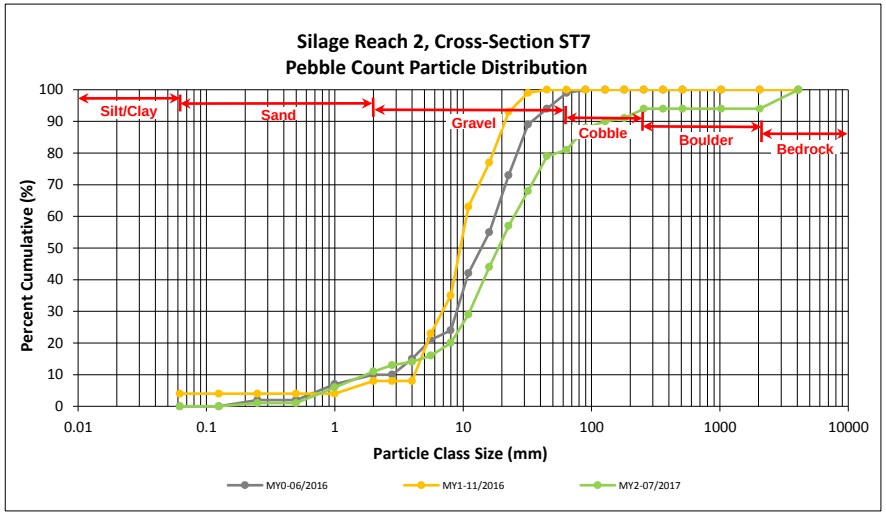
Cross-Section Pebble Count Plots

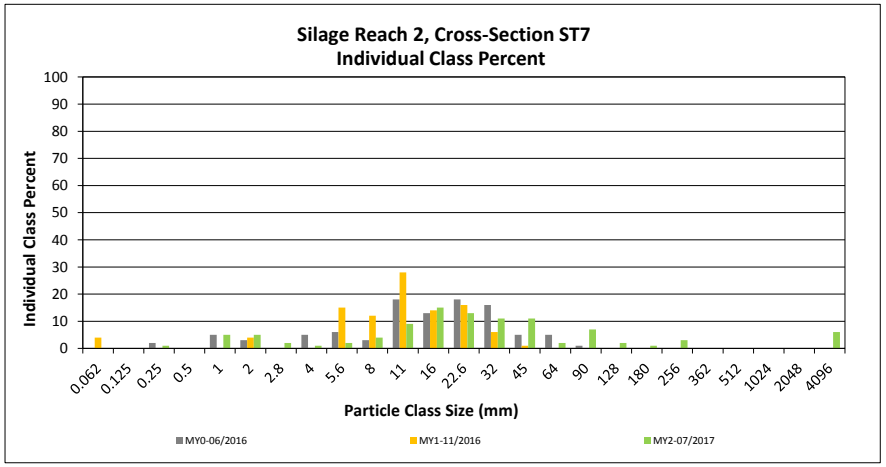
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Silage Reach 2, Cross-Section ST7

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	1	1	1
	Medium	0.25	0.50			1
	Coarse	0.5	1.0	5	5	6
	Very Coarse	1.0	2.0	5	5	11
GRAVEL	Very Fine	2.0	2.8	2	2	13
	Very Fine	2.8	4.0	1	1	14
	Fine	4.0	5.6	2	2	16
	Fine	5.6	8.0	4	4	20
	Medium	8.0	11.0	9	9	29
	Medium	11.0	16.0	15	15	44
	Coarse	16.0	22.6	13	13	57
	Coarse	22.6	32	11	11	68
	Very Coarse	32	45	11	11	79
	Very Coarse	45	64	2	2	81
COBBLE	Small	64	90	7	7	88
	Small	90	128	2	2	90
	Large	128	180	1	1	91
	Large	180	256	3	3	94
BOULDER	Small	256	362			94
	Small	362	512			94
	Medium	512	1024			94
	Large/Very Large	1024	2048			94
BEDROCK	Bedrock	2048	>2048	6	6	100
			Total	**100**	**100**	**100**

Cross Section ST7	
Channel materials (mm)	
D_{16} =	5.60
D_{35} =	12.78
D_{50} =	18.8
D_{84} =	74.1
D_{95} =	2298.8
D_{100} =	>2048





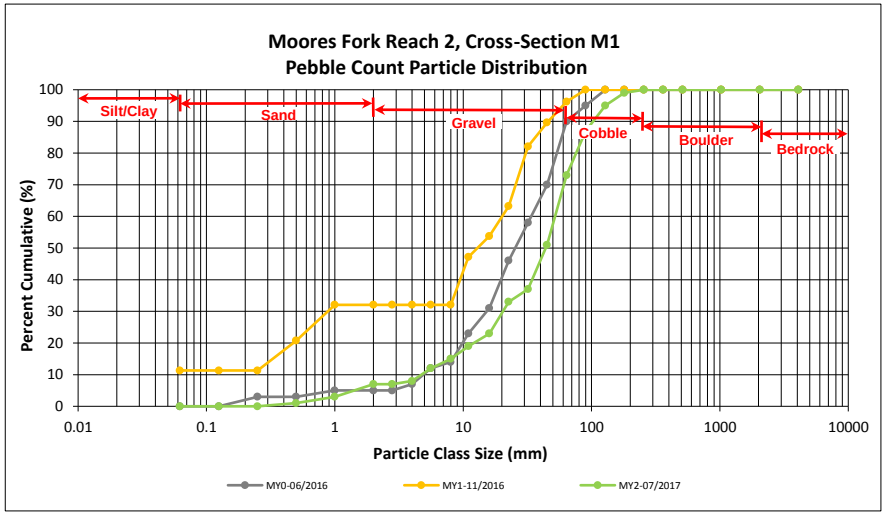
Cross-Section Pebble Count Plots

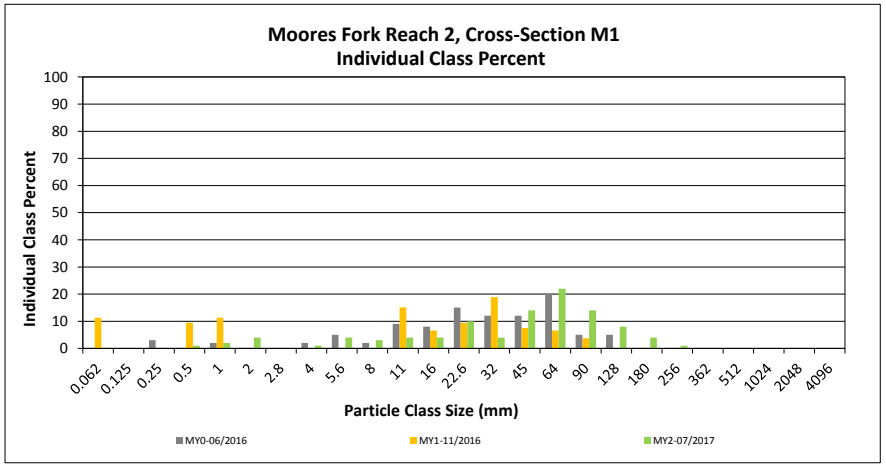
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Moores Fork Reach 2, Cross-Section M1

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	1	1	1
	Coarse	0.5	1.0	2	2	3
	Very Coarse	1.0	2.0	4	4	7
GRAVEL	Very Fine	2.0	2.8			7
	Very Fine	2.8	4.0	1	1	8
	Fine	4.0	5.6	4	4	12
	Fine	5.6	8.0	3	3	15
	Medium	8.0	11.0	4	4	19
	Medium	11.0	16.0	4	4	23
	Coarse	16.0	22.6	10	10	33
	Coarse	22.6	32	4	4	37
	Very Coarse	32	45	14	14	51
	Very Coarse	45	64	22	22	73
COBBLE	Small	64	90	14	14	87
	Small	90	128	8	8	95
	Large	128	180	4	4	99
	Large	180	256	1	1	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section M1	
Channel materials (mm)	
D_{16} =	8.66
D_{35} =	26.89
D_{50} =	43.9
D_{84} =	83.7
D_{95} =	128.0
D_{100} =	256.0





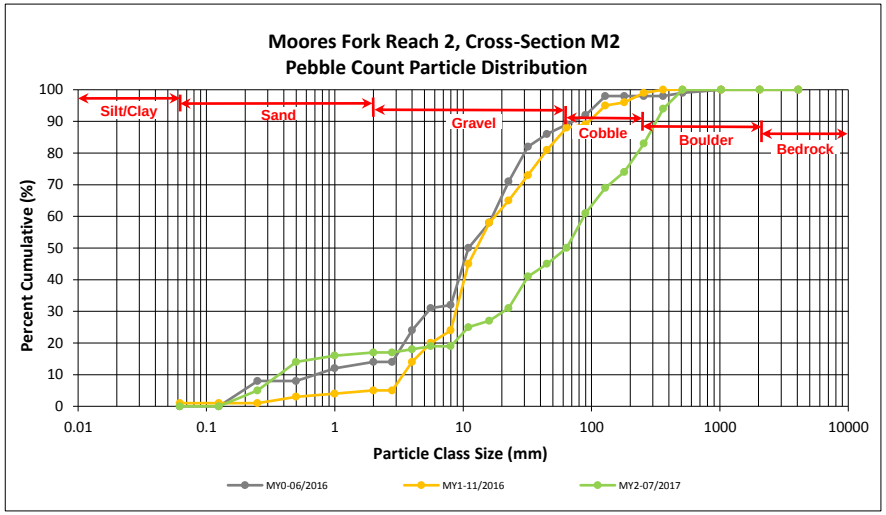
Cross-Section Pebble Count Plots

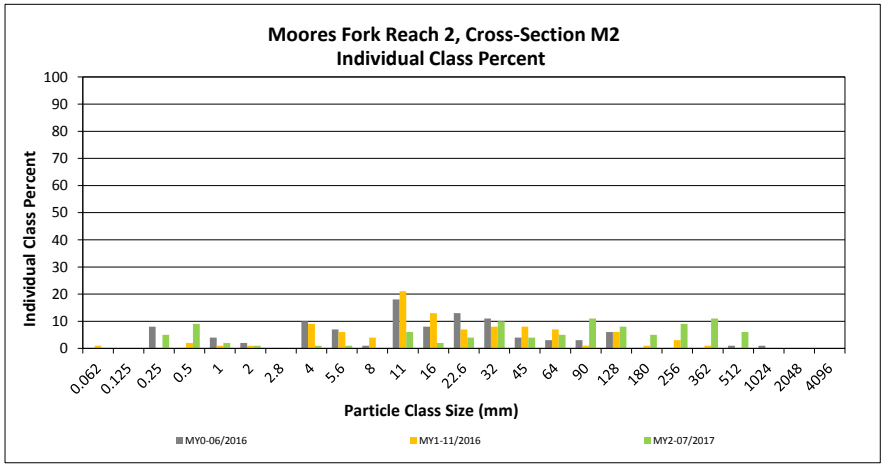
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Moores Fork Reach 2, Cross-Section M2

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	5	5	5
	Medium	0.25	0.50	9	9	14
	Coarse	0.5	1.0	2	2	16
	Very Coarse	1.0	2.0	1	1	17
GRAVEL	Very Fine	2.0	2.8			17
	Very Fine	2.8	4.0	1	1	18
	Fine	4.0	5.6	1	1	19
	Fine	5.6	8.0			19
	Medium	8.0	11.0	6	6	25
	Medium	11.0	16.0	2	2	27
	Coarse	16.0	22.6	4	4	31
	Coarse	22.6	32	10	10	41
	Very Coarse	32	45	4	4	45
	Very Coarse	45	64	5	5	50
COBBLE	Small	64	90	11	11	61
	Small	90	128	8	8	69
	Large	128	180	5	5	74
	Large	180	256	9	9	83
BOULDER	Small	256	362	11	11	94
	Small	362	512	6	6	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section M2	
Channel materials (mm)	
D_{16} =	1.00
D_{35} =	25.97
D_{50} =	64.0
D_{84} =	264.2
D_{95} =	383.5
D_{100} =	512.0





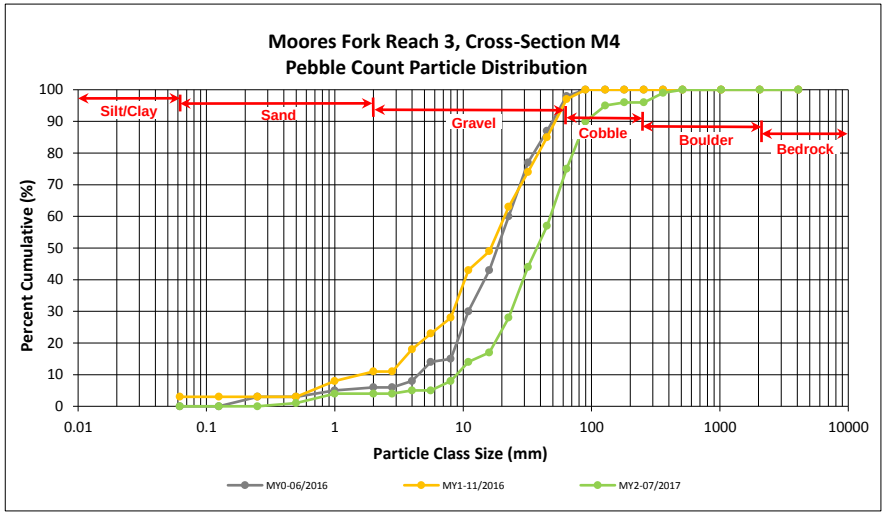
Cross-Section Pebble Count Plots

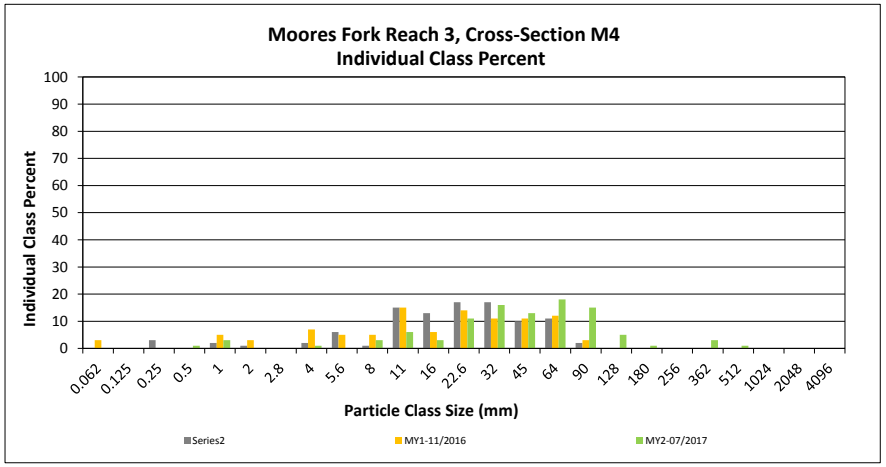
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Moores Fork Reach 3, Cross-Section M4

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	1	1	1
	Coarse	0.5	1.0	3	3	4
	Very Coarse	1.0	2.0			4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0	1	1	5
	Fine	4.0	5.6			5
	Fine	5.6	8.0	3	3	8
	Medium	8.0	11.0	6	6	14
	Medium	11.0	16.0	3	3	17
	Coarse	16.0	22.6	11	11	28
	Coarse	22.6	32	16	16	44
	Very Coarse	32	45	13	13	57
	Very Coarse	45	64	18	18	75
COBBLE	Small	64	90	15	15	90
	Small	90	128	5	5	95
	Large	128	180	1	1	96
	Large	180	256			96
BOULDER	Small	256	362	3	3	99
	Small	362	512	1	1	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section M4	
Channel materials (mm)	
D_{16} =	14.12
D_{35} =	26.31
D_{50} =	37.5
D_{84} =	78.5
D_{95} =	128.0
D_{100} =	512.0





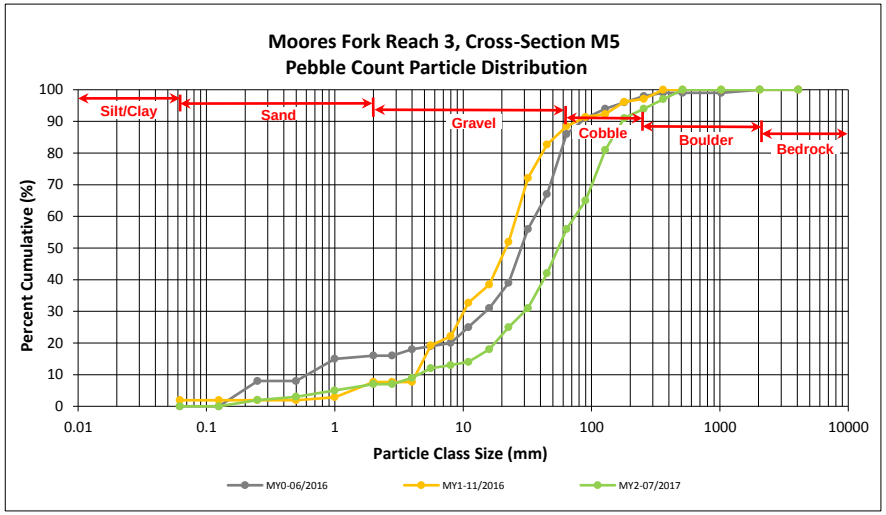
Cross-Section Pebble Count Plots

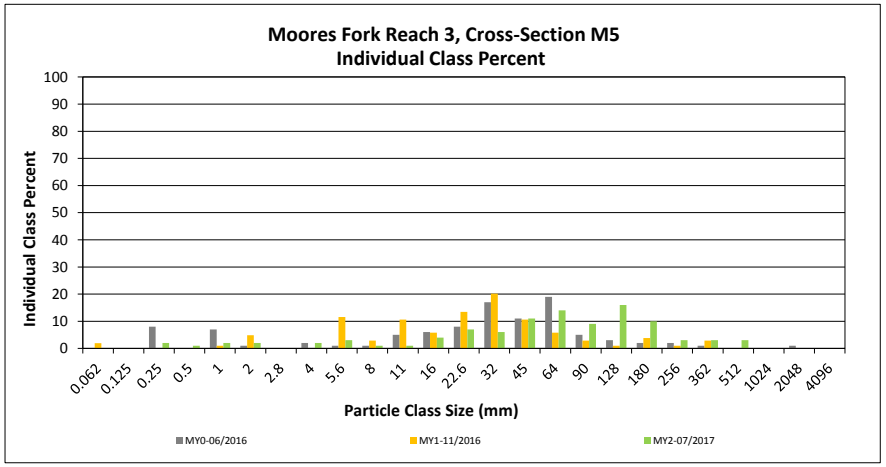
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Moores Fork Reach 3, Cross-Section M5

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary Class Percentage	Summary Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	2	2	2
	Medium	0.25	0.50	1	1	3
	Coarse	0.5	1.0	2	2	5
	Very Coarse	1.0	2.0	2	2	7
GRAVEL	Very Fine	2.0	2.8			7
	Very Fine	2.8	4.0	2	2	9
	Fine	4.0	5.6	3	3	12
	Fine	5.6	8.0	1	1	13
	Medium	8.0	11.0	1	1	14
	Medium	11.0	16.0	4	4	18
	Coarse	16.0	22.6	7	7	25
	Coarse	22.6	32	6	6	31
	Very Coarse	32	45	11	11	42
	Very Coarse	45	64	14	14	56
COBBLE	Small	64	90	9	9	65
	Small	90	128	16	16	81
	Large	128	180	10	10	91
	Large	180	256	3	3	94
BOULDER	Small	256	362	3	3	97
	Small	362	512	3	3	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section M5	
Channel materials (mm)	
D_{16} =	13.27
D_{35} =	36.22
D_{50} =	55.0
D_{84} =	141.8
D_{95} =	287.3
D_{100} =	512.0





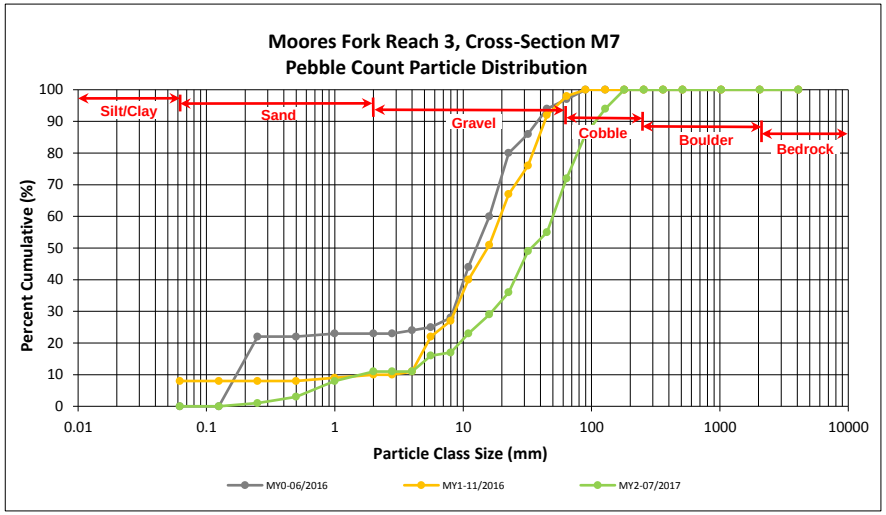
Cross-Section Pebble Count Plots

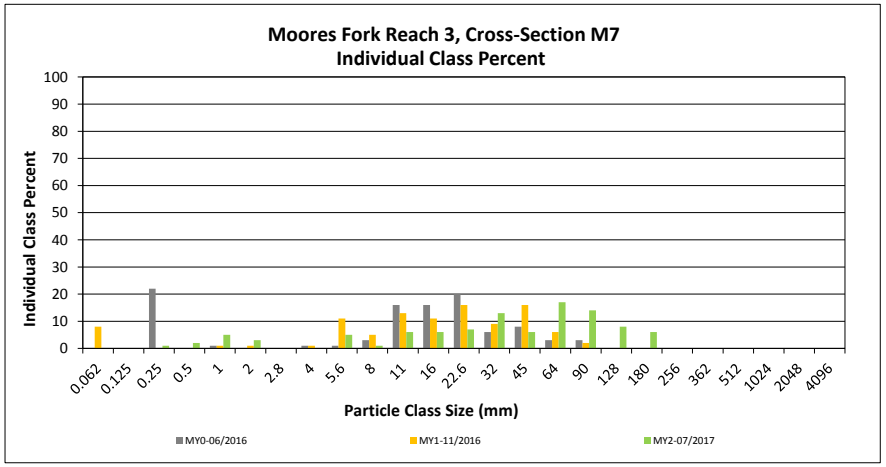
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Moores Fork Reach 3, Cross-Section M7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	1	1	1
	Medium	0.25	0.50	2	2	3
	Coarse	0.5	1.0	5	5	8
	Very Coarse	1.0	2.0	3	3	11
GRAVEL	Very Fine	2.0	2.8			11
	Very Fine	2.8	4.0			11
	Fine	4.0	5.6	5	5	16
	Fine	5.6	8.0	1	1	17
	Medium	8.0	11.0	6	6	23
	Medium	11.0	16.0	6	6	29
	Coarse	16.0	22.6	7	7	36
	Coarse	22.6	32	13	13	49
	Very Coarse	32	45	6	6	55
	Very Coarse	45	64	17	17	72
COBBLE	Small	64	90	14	14	86
	Small	90	128	8	8	94
	Large	128	180	6	6	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section M7	
Channel materials (mm)	
D_{16} =	5.60
D_{35} =	21.51
D_{50} =	33.9
D_{84} =	85.7
D_{95} =	135.5
D_{100} =	180.0





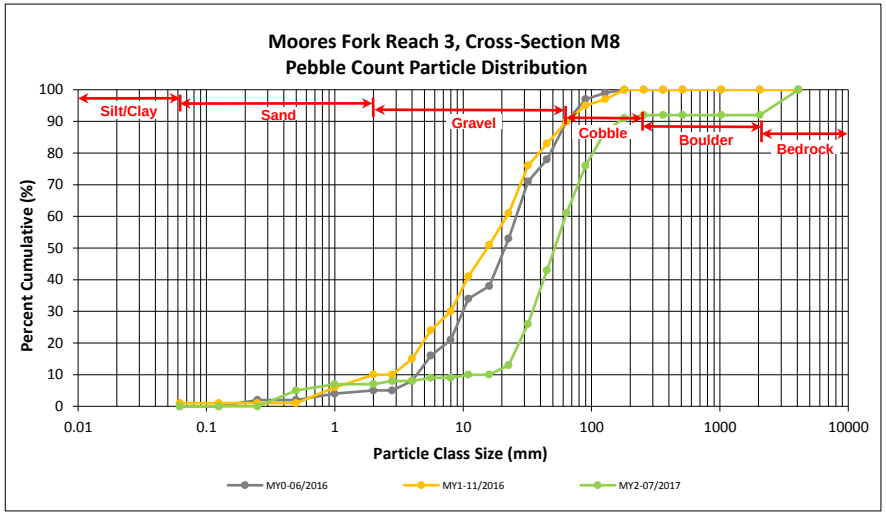
Cross-Section Pebble Count Plots

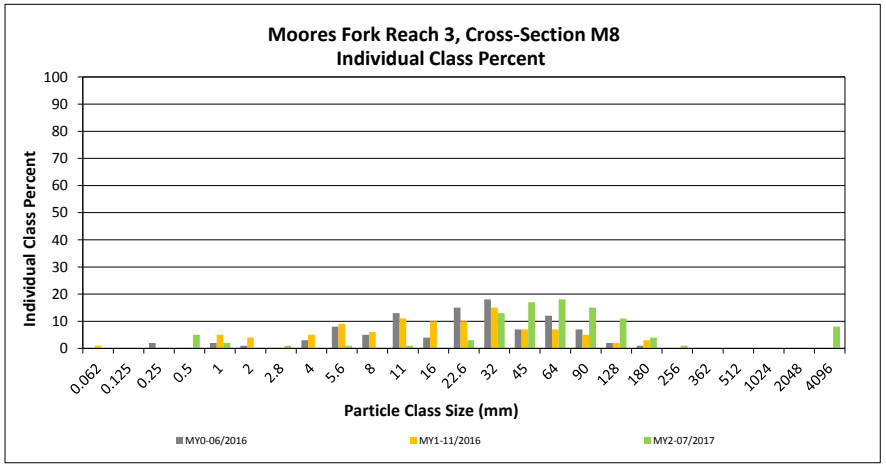
Moores Fork Stream Mitigation Project
DMS Project No. 94709
Monitoring Year 2 - 2017

Moores Fork Reach 3, Cross-Section M8

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50	5	5	5
	Coarse	0.5	1.0	2	2	7
	Very Coarse	1.0	2.0			7
GRAVEL	Very Fine	2.0	2.8	1	1	8
	Very Fine	2.8	4.0			8
	Fine	4.0	5.6	1	1	9
	Fine	5.6	8.0			9
	Medium	8.0	11.0	1	1	10
	Medium	11.0	16.0			10
	Coarse	16.0	22.6	3	3	13
	Coarse	22.6	32	13	13	26
	Very Coarse	32	45	17	17	43
	Very Coarse	45	64	18	18	61
COBBLE	Small	64	90	15	15	76
	Small	90	128	11	11	87
	Large	128	180	4	4	91
	Large	180	256	1	1	92
BOULDER	Small	256	362			92
	Small	362	512			92
	Medium	512	1024			92
	Large/Very Large	1024	2048			92
BEDROCK	Bedrock	2048	>2048	8	8	100
			Total	**100**	**100**	**100**

Cross Section M8	
Channel materials (mm)	
D_{16} =	24.49
D_{35} =	38.33
D_{50} =	51.6
D_{84} =	116.3
D_{95} =	2655.9
D_{100} =	>2048





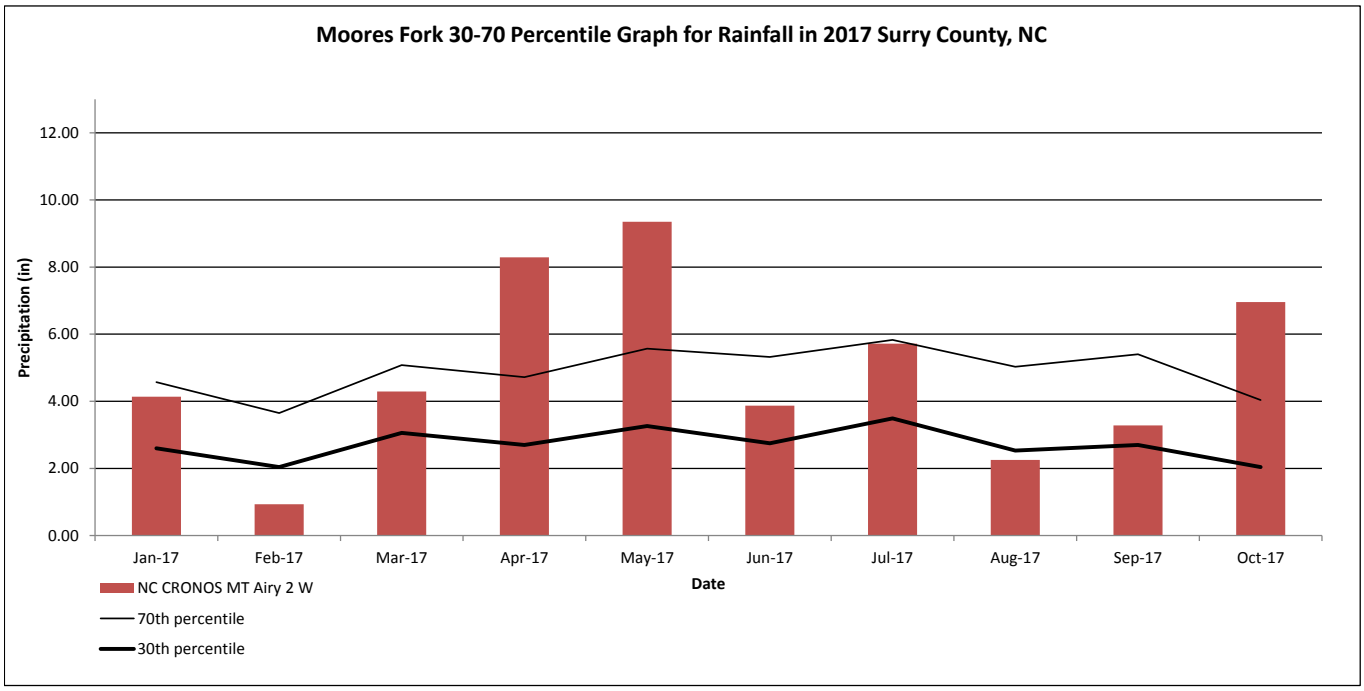
APPENDIX E. Hydrology Summary Data and Plots

Table 13. Verification of Bankfull Events
Moores Fork Stream Mitigation Project
DMS Project No.94709
Monitoring Year 2 - 2017

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
Silage Trib Reach 2	MY1	10/25/2016	~8/4/2016	Crest Gage	0.75

Monthly Rainfall Data

Moores Fork Stream Mitigation Project
DMS Project No.94709
Monitoring Year 2 - 2017



[1] 2017 rainfall collected from NC CRONOS Station Name: MT AIRY 2 W (NCSU, 2017)

[2] 30th and 70th percentile rainfall data collected from weather station MT AIRY 2 W, NC (USDA, 2017)